

### Environmental Management Plan (EMP) for:

The continuous brownfield prospecting and full-scale quarrying of white marble for dimension stone production on private farm Okatjimukuju No. 55 within Mining Licence (ML) 211 in the Karibib Area, Erongo Region - Namibia

<b>MEFT APPLICATION NO.:</b>	<b>APP-001154</b>
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# 1 INTRODUCTION

## 1.1 General

UMA-Pedra Investment cc (hereinafter referred to as the Proponent), the sole holder of Mining Licence (ML) 211 intends to develop and operate a medium-scale quarry for dimension stones as well as the construction and erection of the associated supporting infrastructure. The proponent will work directly with its sister company, Dreamland Investment cc a well-established local dimension stone mining entity with a local footprint in this industry. The ML211 is located within the Karibib constituency approximately 19km south-east of Karibib town and to the immediate south of the existing Okatji Marble mine. The license area covers an area of 17Ha and is situated between the operational Okatji Marble cc mining claims to the north and Dreamland's mining license, ML 178, to the south. The license area can be accessed via the B2 highway between Karibib and Wilhelmstal, and thereafter, through several existing small farm tracks.

This report provides details on the following aspects:

- A brief description of the proposed project activities;
- A recap of the significant potential impacts identified from the scoping assessment
- Summary of the relevant regulatory framework in which the Environmental Management Plan (EMP) shall be implemented;
- The environmental impact management and monitoring actions to be implemented to either mitigate or enhance potential impacts; and
- Lastly, an independent judgement of the Environmental Assessment Practitioner (EAP) on how the proposed project activities should be executed to ensure safe and sustainable utilization of o resources in the framework of best practice

## 1.2 About the Project Proponent

UMA-Pedra Investment cc is the sole holder of ML 211 and will work directly with its sister company, Dreamland Investment cc, to jointly develop and operate the proposed quarry and associated support infrastructure. Dreamland Investment is a well-established local dimension stone mining entity with a local footprint in this industry, and therefore, it will provide the proponent with the necessary technical and administrative support to effectively implement this project. The concerned ML was initially granted to Dreamland Investment cc on 09 February 2021 for a period of 10-years but was later transferred to UMA-Pedra Investment cc (a sister entity to Dreamland Investment) on 29 March 202.

### **1.3 About the Environmental Consultant**

OMAVI Geotechnical & Environmental Services was appointed by the license holder to undertake an Environmental Impact Assessment (EIA) and prepare the project-specific Environmental Management and Rehabilitation Plan (EMRP) for the proposed quarrying and block extraction activities. The EIA is to be undertaken in accordance with the Environmental Management Act of 2007 and its 2012 EIA regulations. OMAVI is a specialist environmental management consulting entity, with considerable industry experience in environmental compliance and environmental management of exploration and mining projects. Our team of scientists possesses the right set of interpersonal, technical and analytical skills which holistically ensure that we understand, in an integrated manner, how a set of planned activities would interact with the biophysical, socio-economic and political landscape within which such activities are envisioned to take place.

OMAVI has sound and robust experience and understanding of the local dimension stone sector from a compliance and operational point of view, and therefore, it understands the dynamic interactions of such operations with the bio-physical and socio-economic environment. At OMAVI we are grounded in the idea that a balance between socio-economic development and environmental protection is vital and can be achieved through proactive and integrated planning whereby project activities are designed, planned and implemented with due consideration to minimize adverse environmental and socio-economic impacts, as well as with closure and rehabilitation requirements in mind.

### **1.4 Aim of the Environmental Management Plan (EMP)**

OMAVI prepared this document as part of the Environmental Scoping and Impact Assessment for proposed prospecting and quarrying within ML211 which was conducted in terms of the Environmental Management Act, 2007 (Act No 7 of 2007). This Environmental Management Plan is a live document that has been prepared based on the environmental effects identified in Environmental Scoping and Impact Assessment and should be read in conjunction with the Environmental Scoping and Impact Assessment Report.

The aim of this document is to provide management measures to address the environmental effects that have been identified in the Environmental Scoping and Impact Assessment report and to give possible mitigation measures/recommendations to address these effects. It is essential for personnel involved to fully be aware of the possible environmental issues and the means to avoid or minimize the potential impacts of activities on site. Furthermore, the proponent fully understands the legal and policy requirements as a holder of the Mining Licence. Impacts identified in the EIA form the basis of a set of environmental specifications that will be implemented on-site. These environmental specifications act as an agreement between the proponent and the Ministry of Environment, Forestry, and Tourism (MEFT).

## 1.5 Project Background

### 1.5.1 Project location

ML 211 is located on private farm Okatjimukoju no. 55, (the Farm hereafter), approximately 19km south-east of Karibib town and to the immediate south of the existing Okatji Marble mine. The license area covers an area of 17Ha and is situated between the operational Okatji Marble cc mining claims to the north and Dreamland's mining license, ML 178, to the south. The license area can be accessed via the B2 highway between Karibib and Wilhelmstal, and thereafter, through several farm tracks as shown in **Figure 1** below. Table 1 summarizes the approximate corner coordinates of ML 211.

Table 1 - Approximate corner coordinates of the project site

LATITUDE	LONGITUDE
-21° 59' 20.48"S	15° 57' 27.22"E
-21° 59' 52.81"S	15° 57' 25.94"E
-22° 00' 3.25"S	15° 58' 21.64"E



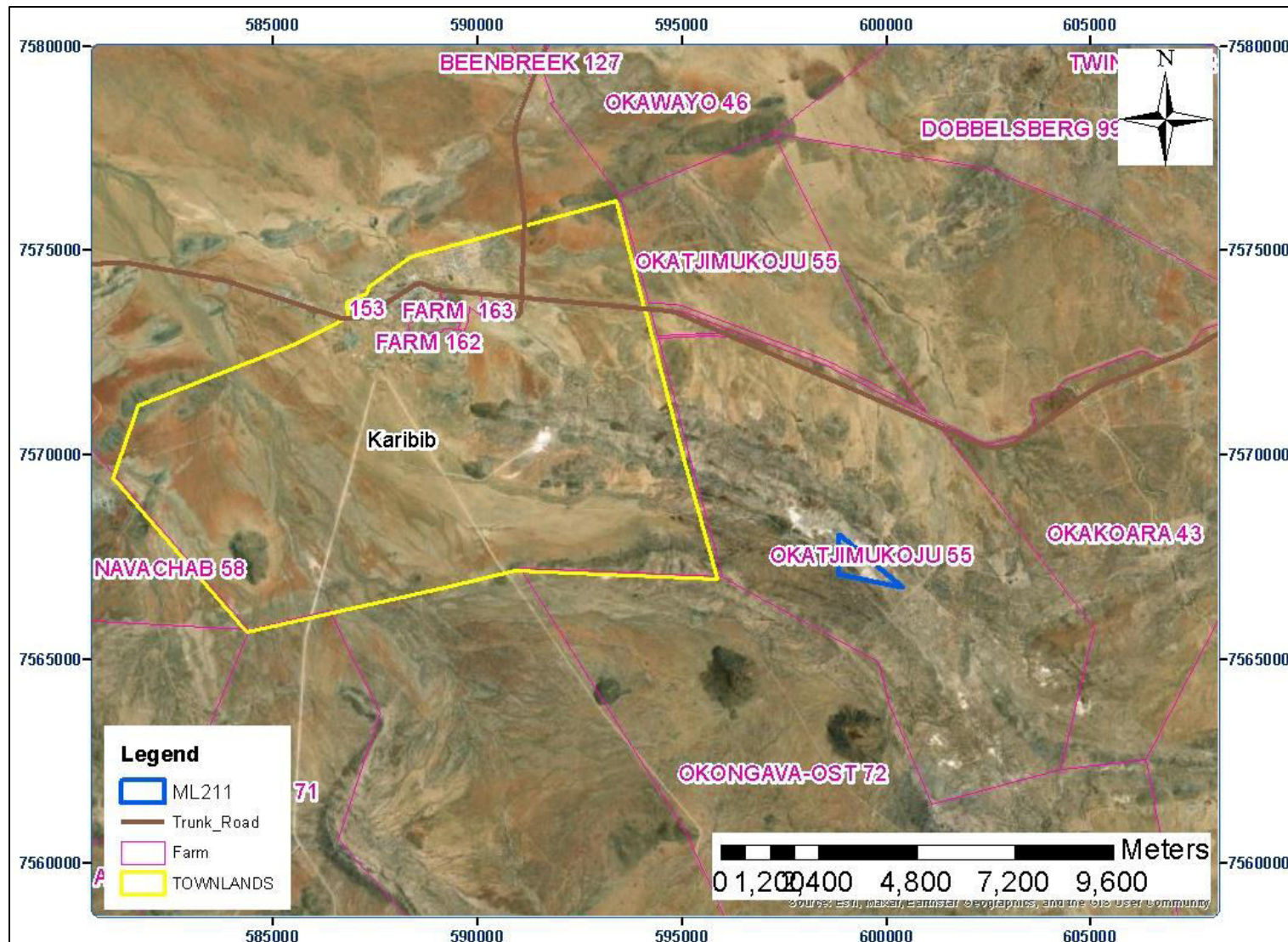


Figure 1 - ML 211 Locality Map

## 1.5.2 Recap of planned activities and processes

### CONSTRUCTION/PRE-OPERATION PHASE

The activities to be undertaken during the construction phase are summarised below:

- General site clearing of the proposed quarry areas, and erection/ installation of the camp site; waste rock area; access roads; stockpile bays for topsoil storage; temporary block sorting, storage and loading bays for blocks; and general operational support infrastructure areas (e.g., onsite office, maintenance workshop area, power supply genset pads, diesel and water tanks pads, temporary fenced off yard for solid and liquid waste);
- If needed, widening and upgrading of existing access tracks and creation of new access routes to quarries at the marble ridge;
- Geotechnical core drilling to inform the quarry(s) layout and designs;
- Erection of 700 – 1000m<sup>2</sup> corrugated sheet and concrete floor lined structure to be used as a maintenance workshop and storage space for spares and supplies. The concrete floors of such structure shall extend at least 1.5m beyond the boundary of the corrugated sheets to ensure ease of and effectiveness of containing any oil and lubricant spillages;
- Erection of three (2) 12 m long containers, with 2 stacked on top of each other, for workers accommodation at the proposed camp site;
- Erection of one (1) 6 m long office container;
- Erection of one (1) 6 m long container, partitioned for ablution facilities (toilets and shower);
- Clearing of parking bays near the Mining Licence for tipper trucks, excavators, front end loaders, 4x4 bakkies and excavation of a 2 m deep hole about 20 m from each ablution facility container where a sewage septic tank would be installed for temporary sewage collection. Such hole shall be lined with a HDPE liner which would be anchored on the surface in a 1 m deep trench. The septic tanks shall be pump emptied as and when the need arises.
- Erection of at least one above-ground 10 000L diesel tank for onsite diesel storage near each quarry. Such tanks shall be placed on a concrete bund for spillage control.
- Installation of a heavy-duty diesel engine powered generator near each quarry. Each of these generated shall be placed on a concrete bund and have an associated shade structure for heat control;
- Placement of solar panels on the roofs of accommodation containers alternatively for domestic power supply such as lighting and cooking;
- Ongoing engagement with the local community for human resource planning and development.



- Generation of waste would be inevitable during construction and operations, a fenced off yard for temporary waste storage will be created close to the accommodation and office areas. The solid waste will be stored in sealed containers and thereafter disposed of occasionally at an acceptable waste disposal site elsewhere (e.g., Karibib waste site).

#### **BLOCK EXTRACTION TECHNOLOGY AND OTHER PROCESSES**

##### **a. Overburden material removal**

Heavy earth-moving equipment is typically used for the removal of overburden. In certain instances, the weathered area is removed by drilling holes using jackhammers and thin drill machines. Light explosives are used to charge these holes, and then under carefully monitored blasting techniques, the excess material is released.

##### **b. Rock cutting and blocks extraction**

Diamond wire is then passed through the two holes that were previously drilled to intersect each other in order to cut with a diamond wire saw. Cutting big blocks of stone from the natural rock mass, or separating them in some other way, is how dimension stone is quarried. For this project the actual quarrying of good quality marbles will be carried out by using diamond wire saw cutting technique until the quarry has advanced to a depth of at least 5 to 7m from surface, after which a combination of diamond wire saw cutting and blade cutting techniques will be adopted to release substantial amounts of rock (typically in the 1000s of m3 range).

A vertical cut of 4 to 6 meters per year will be made through the rock mass at the quarry as quarrying for block extraction begins at the summit of the ridge. If the rock mass quality is poor or does not fulfil market demands at the time, some areas of the ridge may be left undeveloped. However, this won't be visible until the test quarrying program is over.

The homogeneity of the rock itself, the quarry owner's capacity to handle the raw stone, and the desired end use for the stone once it has been molded are some of the elements that affect the size of each individual block that is produced. The way a particular quarry is run can vary greatly. Likewise, the geology of the rock mass has a significant influence on the mining process in a dimension stone quarry.

##### **c. Removal of blocks from the quarry and storage**

Depending on the final geometry of the quarry, handling of blocks from the quarry will most likely be by means of front-end loaders fitted with fork attachments. The dimension stone (DS) blocks extracted through diamond wire saw cutting and blade cutting will be removed from

the quarry by front-end loaders fitted with forks and moved to a designated stockpile area for further sorting and storage as shown in **Error! Reference source not found..**

d. Quarrying output

The output of the mining process or from cutting and splitting are commercial 5 to 7 m<sup>3</sup> rectangular blocks. The annual production of the dimension stones from the planned quarries is not known at this stage, but the thickness of the deposits the quarries are expected to have a Life of Mine more than 15 - 25 years. After extraction from the ground, the blocks are transported to a designated sorting and stockpile bay where they are sorted and stacked according to size and quality (colour, patterns, fracture frequency, staining, etc.). The blocks will subsequently be transported from site by means of flat deck trucks to the Dreamland factory in Karibib for further beneficiation, or directly to the port of Walvis Bay for shipping to overseas markets. This implies that no processing of dimension stone blocks will take place onsite, which has the upside that the amount of solid waste generated at the side is greatly reduced.

#### **QUARRY CLOSURE AND REHABILITATION**

During the operational phase of a quarry's life, the impact on the environment can be lessened by planning with future closure in mind. It is also good practice to plan mining where possible in such a way as to be able to utilise waste from operational quarries to fill the voids of worked out quarries. By planning properly, many voids from quarries and borrow areas can be filled up during the operational phase of a quarry at little extra cost (Ashmole and Motloug, 2008).

Therefore, towards the end of mining activities on active sites on the mining licence, progressive/ongoing rehabilitation will be carried by the Proponent. This will be done through rock shading, and partial backfilling with both waste rock and topsoil. Once quarrying is completed, following the depletion of the dimension stone quality deposit, the activities will be decommissioned, and the sites will be rehabilitated as much as possible. In summary, the quarry closure and decommissioning phase will entail the following:

- Dismantling of all infrastructures i.e., all support infrastructure, access roads;
- Stoppage of all quarrying activities;
- Landscaping of all disturbed areas (grubbing and levelling of access roads, stockpile bays, etc);
- Subsequent disbursement of weathered rock and the potentially seed rich topsoil over reclaimed areas;
- Workforce retrenchment, possible relocation and funding for alternative economic activities;

- Social exit from communities, which is the process whereby support for community initiatives cease.

Part of rehabilitation should also entail the following crucial measures:

- Re-vegetation of the disturbed sites using the plant species like those in the surrounds.

The rehabilitation program will be done in phases so that it can be implemented around the quarry and advanced as quarrying around that particular site develops due to the targeted and selected quarrying technique that would be used.

### **1.5.3 Recap of planned infrastructures and developments**

#### **PROJECT INPUT: INFRASTRUCTURE & PERSONNEL**

The inputs required during the operational phase of the quarry(s) in terms of capital equipment include the following:

- 4x4 mining support vehicles X3;
- Excavators / front-end loaders for overburden stripping, removal and initial splitting of blocks, and for block handling;
- Water tanker to cart water to the quarry sites (from nearby new or existing water supply boreholes);
- Portable down-the-hole drill rig for block splitting;
- Tipper trucks for waste rock haulage to designated stockpiling bays;
- Diesel truck (bowser) for transporting diesel to site.
- Diesel storage tanks and power generators (same as in construction phase);
- Diamond wire saw cutters for block extraction;
- Submersible pumps to dewater quarries where necessary.

During peak production, it is anticipated that 15 to 20 people—both skilled, semi-skilled, and unskilled - will be employed, depending on how the market performs. All the workers will be lodged onsite at the accommodation camp. Quarry operations will be carried out daytime only. The camp's kitchen, restrooms, and sleeping quarters will all be powered by a diesel-powered generator or solar system made up of solar panels mounted on the rooftops of prefabricated and containerized buildings.

All equipment and vehicles will be stored at designated storage or parking areas near the working sites.

## 1.6 Structure of the EMP report

The structure of this EMP is outlined in Table 2 below.

**Table 2 - Summary of EMP report structure**

CHAPTER	BRIEF CONTENT
1	<b>Introduction</b> – provides brief project background; outlines the purpose of the report, details of the project proponent and the EAP, the scope of activities planned, and lastly, the overall structure of this report
2	<b>Project Legal Framework</b> – provides a brief review of regulatory framework within which the EMP needs to be implemented.
3	<b>EMP implementation roles and responsibilities</b> – outlines the responsible parties involved in the project, that ensures aspects of the emp are implimented
4	<b>Environment Management and Monitoring</b> – provides a summary of the key potential impacts identified as part of the impact assessment process; a list of the key role players who would be responsible for the effective implementation of the EMP; recommended environmental management actions for managing the various potential impact identified; and the recommended adaptive environmental monitoring program
5	<b>Rehabilitation Measures for Post-Quarrying Activities</b> - The rehabilitation and closure measures to be implemented at closure of the quarry to meet the requirements of the Environmental Management Act 07 of 2007
6	<b>Monitoring of the emp/EMP implementation: a guide</b> – provide measures that should be put in place in order to ensure compliance to the recommended mitigation measures and best practice environmental standards. provides a summary of the main issues and factors that require close monitoring, as well as key practical recommendations that help ensure the effective implementation of the EMP to the extend practical.

## 2 RELEVANT LEGAL FRAMEWORK

### 2.1 Legislation and Permitting (Licenses)

This section covers information on the legal obligations (legislations, policies, and guidelines) that governs certain project activities, where permitting and/or licensing may be required from different applicable regulatory authorities - refer to **Table 3** below. For a detailed description and presentation of the applicable legal requirements to the project activities, it is advised that this section is read and implemented alongside / consultation of **Chapter 4** Table 3 of the Environmental Scoping Report.

**Table 3 - Applicable regulatory authorities for permitting and/or licensing**

LEGISLATION	PROVISIONS	CONTACT DETAILS
Environmental Management Act No. 7 of 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 Regs 19 & 20).  In the event of amendments to this EMP, an amendment to the ECC will need to be applied through the office of Environmental Commissioner.  <u><b>The ECC needs to be renewed every 3 years. Bi-annual environmental monitoring reports will have to be submitted to the Ministry of Environment, Forestry and Tourism either by the Proponent or an Environmental Consultant every 6 months from date of issuing of the ECC</b></u>	<b>The Environmental Commissioner: (Department of Environmental Affairs and Forestry (DEAF)) Ministry of Environment, Forestry and Tourism Tel: (061) 284 2701</b>

<p>The Water Act 54 of 1956</p> <p>The Water Resources Management Act No. 11 of 2013 (unpromulgated)</p>	<p>Since, there will be no Groundwater abstraction and Use, the permit for commercial use is therefore not applicable. However, the Proponent is still required by law to protect water resources from pollution emanating from their project activities. Water resources shall be used in a sustainable way.</p> <p>In case of Groundwater abstraction and use, the permit for industrial and commercial should be applied for.</p> <p>Should there be a need to dispose of wastewater into the environment, the Proponent <b>would be required to apply for Treated Wastewater Discharge Permit</b> from the Department of Water Affairs (DWA): Directorate of Water Resources Management (Water Environment Division). This application can be launched while the EIA and EMP reports are being evaluated by MEFT.</p>	<p><b>Mr Franciskus Witbooi (Deputy Director: Water Policy and Water Law Administration.</b> <b>Tel: (061) 208 7158 OR</b></p> <p><b>Ms. Elise Mbandeka (Chief Hydrologist): Water Environment</b> <b>Tel: (061) 208 7167</b></p>
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<p>Mineral Prospecting &amp; Mining Act (Act No. 33 of 1992)</p>	<p>Section 38 (1): Applications for renewal of registration of mining Licence</p> <p>The Proponent should ensure that all the necessary permits/authorization for small/ medium-scale mining such as mining licence renewals are obtained from the Ministry of Mines &amp; Energy (MME)'s Mine Directorate.</p> <p>Section 54(2): details provisions pertaining to the decommissioning or abandonment of a mine</p>	<p><b>Mr Isabela Chirchir (Mining Commissioner) Tel: 061 284 8167</b></p>
<p>Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)</p>	<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><b>A fuel storage Permit should be applied for and obtained from the Ministry of Mines and Energy (MME)</b> prior to the construction stage if oils, diesel or lubricants in excess of the 600L/1000L will be stored on site</p>	<p><b>Carlo Mcleod (Ministry of Mines and Energy: Acting Director – Petroleum Affairs</b> <b>Tel.: (061) 284 8291</b></p>
<p>Forestry Act (No. 12 of 2001)</p> <p>Nature Conservation Ordinance No. 4 of 1975 (as amended)</p>	<p>Permits are required for the removal of protected plants species (trees) such as the Mopane Tree (<i>Colophospermum mopane</i>).</p>	<p><b>The nearest Forestry Division Office (Ministry of Environment, Forestry and Tourism)</b></p>

<p>National Heritage Act (Act No. 27 of 2004)</p>	<p>Should any objects of heritage significance be identified during the exploration, quarry development and subsequent quarrying (mining) the work must cease immediately in the affected sites and <b>the necessary steps taken to seek authorization from the Council.</b></p>	<p><b>Ms. Erica Ndalikokule (Head: Heritage Management) – National Heritage Council of Namibia</b> <b>Tel: (061) 301 903</b></p>
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### 3 EMP IMPLEMENTATION ROLES AND RESPONSIBILITIES

For the effective implementation of this EMP, the following person(s) in **Table 4** have been identified. However, it is important to note that UMA-Pedra Investment cc is ultimately responsible for the overall implementation of the EMP/EMRP.

**Table 4 - EMP Implementation Responsibility**

RESPONSIBLE PERSON(S)	EMP/EMRP RESPONSIBILITIES
<p><b>UMA-Pedra Investment (The Proponent) or Exploration / Mining Manager, who may also be the Proponent</b></p>	<ul style="list-style-type: none"> <li>- Managing/overseeing the implementation of this EMP and updating and maintaining it when necessary.</li> <li>- Issuing fines to individuals who contravene EMP provisions and if necessary, removing such individuals from site.</li> <li>- Setting up and managing the schedule for the day-to-day activities.</li> <li>- Liaison with all relevant interested and affected parties/stakeholders.</li> <li>- Ensuring all incidents are recorded and documented.</li> <li>- Undertaking an annual review of the EMP/EMRP and amending the document when necessary.</li> <li>- Responsible to enforce EMP implementation by contractors and site employees.</li> <li>- Sole implementation of the Closure and Rehabilitation Plan for the Quarry.</li> </ul>
<p><b>Environmental Control Officer (ECO) / Safety, Health &amp; Environment (SHE) Officer</b></p>	<ul style="list-style-type: none"> <li>- Implement, review and update the EMP.</li> <li>- Ensure all reporting and monitoring required under EMP is undertaken, documented and distributed as needed</li> <li>- Conduct environmental site training (toolbox talks) and inductions with the support of an environmental consultant.</li> <li>- Conducts environmental audit at work site with the support of environmental consultant.</li> <li>- Close out all non-conformances.</li> </ul>

	<ul style="list-style-type: none"> <li>- Ensure materials being used on site are environmentally friendly and safe.</li> </ul>
<b>Public Relations Officer (PRO)</b>	<ul style="list-style-type: none"> <li>- Liaising between the affected landowners/community members and the Proponent.</li> <li>- Ensure effective communication with stakeholders, media (if necessary) and the public.</li> <li>- Organising and overseeing public relations activities and managing public relations issues.</li> <li>- Collaborating with personnel and maintaining project-related open communication among project personnel, Proponent, and communities.</li> </ul>
<b>Affected community members</b>	<p>Monitor implementation of the EMP and notify the project Proponent or ECO</p> <ul style="list-style-type: none"> <li>- Actively participate in stakeholder forums</li> <li>- Make use of the grievances mechanisms to communicate issues to the Proponent (through the PRO) and/ or to relevant authorities. If not attended to, the community should provide photo proof and record of raised and unaddressed issues to the DEAF for further actions.</li> <li>- Monitor legal compliance</li> <li>- Review performance reports</li> <li>- Sanction poor performance and non-compliance where appropriate through directives, penalties, and fines.</li> </ul>
<b>The Department of Environmental Affairs and Forestry (DEAF)</b>	<ul style="list-style-type: none"> <li>- Approve the EMP and any amendments to the EMP, if any.</li> <li>- Approve reports of environmental issues and non-conformances as issued.</li> <li>- Review and approve environmental reports submitted as part of EMP implementation</li> </ul>

<p><b>Technical Staff and Consultants</b></p>	<p>Safely and effectively monitor various technical parameters related to:</p> <ul style="list-style-type: none"> <li>- Soil preservation/ protection</li> <li>- Ground stability</li> <li>- employee/ contractor health</li> <li>- water resources management</li> <li>- waste management, and</li> <li>- mechanical designs of various equipment on site</li> </ul>
<p><b>Project Workers/Employees and Visitors</b></p>	<ul style="list-style-type: none"> <li>- Follow requirements of the EMP relevant to them as directed by Proponent and ECO.</li> <li>- Report any potential environmental issues to the Proponent / site Manager and other possible non-conformances.</li> </ul>
<p><b>Others - Archaeology &amp; Heritage: Chance Finds Procedure (CFP)</b></p>	<ul style="list-style-type: none"> <li>- <b>Operator:</b> exercise due caution if archaeological remains are found</li> <li>- <b>Foreman:</b> secure site and advise management timeously</li> <li>- <b>Superintendent:</b> determine safe working boundary and request inspection</li> <li>- <b>Archaeologist:</b> inspect, identify, advise management, and recover remains.</li> </ul>

## 4 ENVIRONMENTAL MANAGEMENT AND MONITORING

### 4.1 Summary of triggering activities of key potential impacts

The key potential impacts identified and to be managed for the proposed project activities are as follows:

#### Positive impacts:

- Knowledge transfer
- Employment and Procurement opportunities,
- Socio-economic development (local and national),
- Technical skills development and transfer, and
- Corporate Social Responsibility (CSR) and infrastructure development and improvement

#### Negative (Adverse) impacts:

- Soils (physical disturbance and contamination)
- Air quality, Noise,
- Occupational and Community Health & Safety,
- Visual, and Land Use,
- Waste,
- Ecological & Biodiversity,
- Water Resources (Over-abstraction and pollution),
- Socio-economic (conflict over land use, poor and non-transparent communication),
- Vehicle Traffic, and
- Archaeological & Heritage Resources.

### 4.2 Environmental Management and Mitigation Measures

The potential adverse (negative) impacts stemming from the proposed project activities will be managed and mitigated by implementing the measures provided in **Table 6**. The aim will be to avoid the impacts and where avoidance is impossible, the significance of the impacts rating at high and medium level will then be reduced (high to medium and eventually low and for medium to low).



Environmental Management Plan Report: Quarrying activities on Mining Licence (ML) 211

The management plan actions for the enhancement of potential benefits and mitigation of potential adverse impacts are presented in **Table 5 and Table 6** below. The management plan actions presented in the above listed tables are for the planning, exploration, quarry development, & quarrying, as well as decommissioning (closure and rehabilitation). The required management plan actions have been presented together with key performance indicators, responsible person(s), resources or proof and the timeline of such management actions. The five forms the headings on the Tables are presented below:

- Environmental aspect and issues for which management actions are required.
- Proposed impact enhancement/ mitigation measures.
- Key performance indicator (KPI) 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 5** below summarises the various triggering activities for the key impacts identified. An understanding of each key project activity and the potential impacts it can trigger has significant bearing on deducing appropriate impact mitigation and/ or enhancing measures and strategies.

**Table 5 - Summary the various triggering activities for the key impacts identified.**

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
<b>PLANNING PHASE</b>						
EMP implementation and training	Lack of EMP awareness and implications thereof	<ul style="list-style-type: none"> <li>- An EMP non-compliance penalty system should be implemented on site.</li> <li>- The Proponent should appoint a Safety, Health &amp; Environment (SHE) Officer or an Environmental Control Officer (ECO) to be responsible for managing the EMP implementation and monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>- All required Plans and systems are compiled and in place</li> <li>- SHE Officer or ECO is appointed</li> <li>- Records of EMP implementation Plans and Systems.</li> <li>- Identification of all EMP implementation persons.</li> </ul>	Proponent	Independent Environmental Consultant: EMP compliance and auditing DEAF: site Inspections for compliance	Pre-exploration and subsequent phases
Authorizations	Lack of Agreements, Permits/ Licenses	All the required agreements and licenses or permits should be applied for and signed, respectively before commencement of work on the mining claims, or as required	- Applicable permits and licenses obtained from relevant authorities and kept on site for records keeping	Proponent and or Exploration/Minin Manager	Department of Water Affairs (for wastewater discharge)	Prior to exploration, quarry development and mining

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		<p>The permits, agreements referred to herein include:</p> <ul style="list-style-type: none"> <li>• land use agreements the land custodian</li> <li>• Road access</li> <li>• Petroleum storage permits</li> <li>• Water supply agreements &amp; Wastewater (Effluent) Discharge Permit</li> <li>• Waste disposal authorisations- permits from relevant authorities</li> <li>• Environmental Clearance</li> </ul>	<p>and future inspections</p> <ul style="list-style-type: none"> <li>- Agreements signed and obtained from land custodians or occupiers of land</li> </ul>		<p>Applicable local authority(ies) for water supply and waste disposal</p> <p>Permits and License such as road access permit</p> <p>Landowners and or occupiers of land</p>	
Communication Between the Proponent and affected communities	Lack of Communicating (proper liaison) between affected communities and Proponent with regards to land use	<p>The Proponent should appoint a Public Relation Officer (PRO) to liaise with the communities and other stakeholders</p> <p>A clear communication procedure / plan which should include a grievance mechanism should be compiled</p>	<p>A PRO is appointed</p> <p>A Complaint registry is compiled</p> <p>PRO contact details to be provided affected community leaders</p>	PRO	Grievance logbook	Prior to project activities) and their responsibilities throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
Employment opportunities	Unfairness and discrimination in employment opportunities during project phases	<ul style="list-style-type: none"> <li>- It should be mandatory to contractors to give all unskilled and semi-skilled work to be given to the locals before considering outsiders (anyone from outside Karibib and immediate surrounding villages).</li> <li>- The anticipated work opportunities and number of positions should be announced through the local leadership Authority.</li> </ul>	<p>The hired labourers are from the local communities</p> <p>No records of Complaints from communities regarding unfair labour practices.</p>	<p>Proponent</p> <p>Contractor</p>	Records of employment contracts	Pre-exploration and quarrying or as deemed necessary

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		<ul style="list-style-type: none"> <li>- The name of the prospective workers should be screened by the local leaders to verify their place of origin to ensure that the opportunities reserved for the locals are not given to outsiders.</li> <li>- Equal opportunities should be given to both men and women, where possible.</li> </ul>				
Services and Goods Supply to the project (Procurement opportunities)	Lack of local empowerment through procured goods and services supply	<ul style="list-style-type: none"> <li>- The procurement stage for the exploration and quarrying should follow a fair and transparent process.</li> <li>- Procurements for services and goods that are locally and nationally available should be open only to Namibian companies with strong local participation. A percentage of the scope should be reserved for Small- Medium Enterprise (SME) contractors who may be recruited on a sub- contract basis to build local capacity.</li> </ul>	The hired contractors and suppliers are from the affected communities and surrounding areas.	Proponent	Records of procurement contracts	Pre-exploration and quarrying, as well as when necessary throughout the project phases

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		<ul style="list-style-type: none"><li>- The business opportunities such as site clearing, cleaning services and maintenance should be given to local companies. Where necessary, joint ventures should be formed with other companies from other immediate areas to build capacity for the local company(ies).</li></ul>				
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**Table 6 - Management and Mitigation Measures for the Exploration, Quarry Development (Construction Phase) and Quarrying**

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
<b>EXPLORATION, CONSTRUCTION (QUARRY DEVELOPMENT) AND QUARRYING</b>						
EMP implementation and training	Lack of EMP awareness and implications thereof	<ul style="list-style-type: none"> <li>- EMP trainings should be provided to all new workers on site and to old workers (as a refresher) every 6 months.</li> <li>- All site personnel should be aware of necessary health, safety, and environmental considerations applicable to their respective work</li> <li>- The implementation of this EMP should be monitored.</li> <li>- The site should be inspected, and a compliance audit done throughout the project activities, monthly during the exploration phase and annually for the quarrying phase.</li> <li>- An EMP non-compliance penalty system should be implemented on site.</li> <li>- The ECC should be renewed on time</li> </ul>	<ul style="list-style-type: none"> <li>- Compliance monitoring conducted monthly for the exploration phase and annually for the mining phase and recorded</li> <li>- EMP Refresher training for employees/workers every 6 months in both phases</li> <li>- Timely renewal of the Environmental Clearance Certificate (ECC) every 3 years</li> </ul>	<ul style="list-style-type: none"> <li>- ECO / SHE Officer</li> <li>- Technical Staff (Independent Environmental Consultant): EMP Compliance and auditing</li> <li>- DEAF: site inspections for compliance</li> </ul>	<ul style="list-style-type: none"> <li>- Monitoring reports ECC renewed on time</li> <li>- Records of EMP training conducted</li> <li>- Funds (N\$300 for ECC Renewal every 3 years)</li> </ul>	Throughout the Exploration and quarrying phases

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Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
Slope stability	Slope instability in the quarry after heavy rains	<ul style="list-style-type: none"> <li>- Monthly site inspections should be conducted by a geotechnical engineer to assess stability of quarry slopes or walls, and recommend stabilization measures where necessary</li> </ul>	<ul style="list-style-type: none"> <li>- Presence, frequency and extent of ground cracks</li> <li>- General condition of quarry walls (is there evidence of slumping, loose rocks at the base of slope, over-hanging rocks)</li> </ul>	<ul style="list-style-type: none"> <li>-Site Exploration / Manager (holds overall responsibility)</li> <li>-Geotechnical Engineer/Geotechnical Consultant</li> </ul>	<ul style="list-style-type: none"> <li>-Technical Staff (Geotechnical Engineer)</li> <li>-Stability Reports</li> </ul>	Once every month and as and when signs of ground instability is detected/observed
Physical Land (soils)	Soil disturbance Soil erosion	<ul style="list-style-type: none"> <li>- Overburden should be handled more efficiently during both exploration and mining operations to avoid erosion when subjected erosional processes</li> <li>- Prevent creation of huge piles of waste rocks by performing sequential backfilling.</li> <li>- Stockpiled topsoil and overburden waste rocks should be used to backfill the explored</li> </ul>	<ul style="list-style-type: none"> <li>- Record any evidence of new traffic tracks outside of designated access and haul roads by means of photograph.</li> <li>- Record evidence of new erosion</li> </ul>	<ul style="list-style-type: none"> <li>SHE Officer</li> <li>Hired soil scientist</li> </ul>	<ul style="list-style-type: none"> <li>Technical Staff (Soil observation Scientist to offer training and monitor depth profiles as well as contamination levels</li> </ul>	<ul style="list-style-type: none"> <li>Throughout the Exploration and quarrying phases</li> <li>Once every 6 months for monitoring depth of soil profile</li> </ul>

		<p>and quarried and disturbed site areas/spots during site rehabilitation.</p> <ul style="list-style-type: none"> <li>- Soils that are not within the intended and targeted footprints of the site should be left undisturbed and soil conservation implemented as far as possible.</li> <li>- Project vehicles and machinery should stick to access roads provide and or meant for the project operations but not to unnecessarily create further tracks on site by driving everywhere resulting in soil compaction.</li> <li>- Haul roads must have compacted drainage channels along shoulders covered with riprap (or possibly concrete lined) to minimize erosion</li> <li>- Access roads should be designed appropriately in a manner that disturbs minimal land areas as possible.</li> <li>- Make use of the existing road network as much as possible and avoid off-road driving.</li> <li>- All traffic should stick to access roads provided and or meant for the project operations.</li> </ul>	<p>gullies (photographs)</p> <ul style="list-style-type: none"> <li>- Annual site wide evaluation on the effectiveness of erosion control efforts including erosion control structures</li> </ul>			
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Water Resources	Water use (quantity)	<ul style="list-style-type: none"> <li>- Water should be efficiently used by implementing water saving measures such as recycle and re-use where necessary and possible.</li> <li>- Water conservation awareness and saving measures should be made to all employees and become accountable.</li> </ul>	<ul style="list-style-type: none"> <li>- Proof or recording/ quantification of water saving efforts.</li> </ul>	<ul style="list-style-type: none"> <li>- Exploration / Mining Manager</li> <li>- ECO</li> </ul>	Monthly records of water used	Throughout the project phases
Physical land / soil disturbance	Susceptibility to erosion and compaction	<ul style="list-style-type: none"> <li>- Minimize footprint area of drilling and test quarrying operations, and therefore limiting the disturbance footprint to a minimal area as much as possible</li> <li>- Minimize soil contamination through containment and handling of potential pollutants (e.g., oils, drilling fluids)</li> <li>- Implement soil conservation measures (e.g., proper placement and stockpiling of clean soils and overburden material, maintaining soil fertility of topsoil stored for future reclamation and rehabilitation works)</li> </ul>	<ul style="list-style-type: none"> <li>- Soil erosion prevention measures are visibly in place.</li> <li>- No soil erosion linked to project activities.</li> <li>- No stockpiled topsoil left after exploration and quarrying</li> </ul>	-ECO	<p>TLB / Front-end loader</p> <p>Excavator for backfilling</p>	Throughout the project phases

		<ul style="list-style-type: none"> <li>- Ensure that the overall thickness of soils placed during reclamation and rehabilitation is consistent with surrounding undisturbed areas and future land use</li> <li>- Design test quarries and access track roads such that their slopes are battered to an appropriate gradient for rehabilitation</li> <li>- Schedule quarrying works in such a manner that it does not coincide with periods of heavy rainfall to the extent practical</li> <li>- Avoid creation of new access roads to the extent practical</li> <li>- Always make use of emergency spill trays underneath all machinery</li> <li>- Avoid mixing of topsoil (which is typically rich in seeds) and sub-surface soils during stripping and stockpiling. Topsoil will have to be removed cautiously and safely stockpiled in a designated area for later use in rehabilitation work.</li> </ul>				
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Water resources	Over-abstraction of water resources	<ul style="list-style-type: none"> <li>- Water should be efficiently used by implementing water saving measures such as recycle and re-use where necessary and possible. This includes using water for cooling exploration and mining/quarrying equipment for the cleaning of project equipment.</li> <li>- Water conservation awareness and saving measures training should be provided to all the project workers in both phases so that they understand the importance of conserving water and become accountable.</li> </ul>	<ul style="list-style-type: none"> <li>- Proof or recording/ quantification of water saving efforts.</li> <li>- Recycling and re-use of water onsite</li> <li>- Monthly and annual records of water used</li> </ul>	<ul style="list-style-type: none"> <li>- Exploration / Mining Manager</li> <li>- ECO</li> </ul>	None	Throughout the project phases
Land Use	Changes in land use due to creation of quarry and erection of site infrastructure	<ul style="list-style-type: none"> <li>- Complete prevention of this impact will not be possible; however, the extent of the impact can be minimized by:</li> <li>- ensuring that changes in land use are confined to the footprints of the access track roads, the exploration camp, and targeted test quarrying sites.</li> <li>- Further control measures to reduce the risk of this impact include the following:</li> <li>- The project activities should</li> </ul>	Visible efforts onsite	<ul style="list-style-type: none"> <li>Proponent</li> <li>Exploration / Mining Manager</li> </ul>	None	Throughout the project phases

		<p>target areas that are at least 400 m from existing homesteads and boreholes to minimize land use change close to sites of human settlement</p> <ul style="list-style-type: none"> <li>- Use existing access roads and avoid creation of new access roads to the extent practical. This will minimize the footprint of areas to be disturbed</li> <li>- Place/ position the exploration camp(s) closer to target sites for drilling and test quarrying</li> <li>- The Proponent must promptly communicate any foreseeable conflicts with farming or human settlement activities to avoid conflicts</li> </ul>				
Topography and Landscape	Change on the landscape and topography	<ul style="list-style-type: none"> <li>- Implement ongoing rehabilitation practices, e.g., by reclaiming and rehabilitating unsuccessful test quarries immediately and associated access roads</li> <li>- Minimize safety risks to workers, the public and animals, as well as conflicting relationships with communities by fencing off active</li> </ul>				

		<p>and preserved test quarry sites, and putting danger tapes around such sites</p> <ul style="list-style-type: none"> <li>- Target sites with exposed bedrock to the extent practical to avoid creation of overburden dumps</li> <li>- Where practical excavate test quarries adjacent to abandoned trenches created by small scale miners to minimize the extent of landscape and topography disturbance</li> <li>- Where deeper test quarries are created to extract sample blocks practice rockface blinding by placing natural waste rock material against exposed test quarry faces</li> <li>- Communicate to affected communities which specific sites will be left open for continuous quarrying so that they are aware to avoid walking/ driving to such sites or herding their livestock near such sites</li> <li>- Post closure land-use measures</li> </ul>				
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		<p>and/or establishment of self-sustaining indigenous vegetation.</p> <ul style="list-style-type: none"> <li>- Erosion management measures</li> <li>- No muddy and dirty equipment should be brought onto site as this is likely to carry seed of alien species</li> <li>- The Colophospermum mopane tree which is a protected species in Namibia occurs on some of the white marble and black granitoid ridges targeted for prospecting and eventual quarrying (mining). During drilling and test quarrying the removal of this species should therefore be avoided. Alternatively, if removal is necessary, a Permit to remove such tree should be applied for and obtained from MEFT's Forestry Directorate.</li> </ul>				
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<p>Fauna (animals)</p>	<p>Disturbance and killing of indigenous fauna: local livestock and wildlife as well as reptiles</p>	<ul style="list-style-type: none"> <li>- Domestic animals found within or within proximity of the site should not be killed, snared, or captured.</li> <li>- The harming and killing of animals' species encountered onsite (small or big) is strictly prohibited.</li> <li>- Poaching (illegal hunting) of the wildlife on and around the site is strictly prohibited</li> <li>- Prevent animal access to exploration and mining camp or active sites through fencing</li> <li>- Enforce speed limits and traffic control measures to minimise the risk of road kills</li> <li>- Prevent illegal hunting and trapping by enforcing harsh non-compliance measures to workers</li> <li>- Prevent creation of hazards by means of good "housekeeping" and prevention of litter</li> <li>- Any animal fatalities should be recorded, and the causes established and remedied for monitoring purposes</li> </ul>	<ul style="list-style-type: none"> <li>- No complaints of site workers killing livestock</li> <li>- No incidents of poaching related to the project workers.</li> <li>- Workers are educated on the importance of respecting community properties (part of their induction and contracts)</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Exploration / Mining Manager</li> <li>- ECO</li> </ul>	<p>Grievance logbook</p> <p>Anti-poaching Unit of the Namibian Police</p> <p>MEFT: Parks</p>	<p>Throughout the project phases</p>
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		<ul style="list-style-type: none"> <li>- Avoid disturbance of vulture and other bird nests (if any) during the breeding season</li> <li>- Avoid activities close to large trees near the base of the mountains</li> <li>- Cap or seal off drill holes to prevent small mammals from getting trapped</li> <li>- Any incident of poaching related observed by the project personnel should be reported to the Police.</li> <li>- The Proponent should promote environmental education on the importance of faunal biodiversity preservation to all site workers.</li> </ul>				
Non-exploration / quarrying waste	Environmental pollution	<ul style="list-style-type: none"> <li>- General waste including used PPE will be stored on site in designated bins and regularly collected for transportation to waste facility in Karibib (upon prior agreement of waste disposal with the Town Council).</li> <li>- Recyclable waste will be stored on site in designated bins and regularly collected for transportation to designated</li> </ul>	<p>Waste are disposed in designated containers</p> <p>Waste is recycled and re-used</p> <p>A register of all non-exploration and quarrying</p>	<p>Exploration / Mining Manager</p> <p>ECO</p>	<p>Waste containers</p> <p>Waste recycling companies</p>	<p>Throughout the project phases</p>

		<p>waste facility in Karibib (upon prior waste disposal agreement with the Town Council))</p> <ul style="list-style-type: none"> <li>-Following clearing, vegetation removed shall be stockpiled and burnt on site. Due care shall be taken by the site supervisor ensure that such fires are well contained to avoid unwanted veld fires</li> <li>-Used wooden pallets will be collected and temporarily stored on site for possible reuse. Pallets that are not fit for reuse shall be transported to waste storage facility in Karibib or possibly used for firewood by the exploration and quarrying crew</li> <li>-Scarp metals will be temporarily stored at the project site, in a fenced off area, prior to removal by a licensed scrap metal recycling contractor on a regular basis</li> <li>-Waste liquids (oils, grease, sludge) will be collected and stored in designated tightly sealed containers on site and ultimately removed by a licensed recycling contractor on a regular basis</li> </ul>	<p>Waste generated and kept on site.</p>			
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		-Used tyres will be collected in designated waste bins and transported off site by a licensed contractor				
Solid waste, and wastewater (liquid waste)	Environmental pollution	<p>-Project workers should be sensitized to dispose of waste in a responsible manner and not to litter.</p> <p>-Ensure regular removal of general waste to an approved waste fill area in or close to Karibib</p> <p>-Promote the recycling or disposal to an approved hazardous or industrial waste site in or close to Karibib</p> <p>-The only wastewater will be domestic sewage and water used for washing industrial and domestic equipment, which should be treated and re-used as far as practical e.g., for dust suppression</p> <p>-Ensure provision of adequate waste skips at all working sites, exploration, and mining (quarrying) camp</p> <p>-Fence off areas where such waste is stored to eliminate possible</p>	<p>-Waste are disposed in designated containers</p> <p>-The site is equipped with sufficient toilets that are emptied accordingly.</p> <p>-Waste is recycled and re-used</p> <p>-A register of all waste generated and kept on site.</p>	Exploration / Mining Manager  -ECO	<p>-Waste containers</p> <p>-Wasterecycling companies</p>	Throughout the project phases

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		<p>contact with domestic and wild animals.</p> <p>-The site should be equipped with enough portable toilets that should be emptied in accordance with their manufacturers 'instruction.</p>				
	<p>Hydrocarbons release into the environment (grease, oils, fuel spills and leakages from machinery and fugitive wastes.)</p>	<p>-All hazardous materials shall be stored (on bunded area), handled and disposed of according to the applicable material safety data sheets (MSDS), as well as applicable regulations (e.g., the Health and Safety Regulations).</p> <p>-Vehicle maintenance should be conducted in designated areas only, preferably off-site. If maintenance is to be conducted on site, these areas should be designed to contain spillages i.e., maintenance site must be bunded and paved, and the use of chemicals must be controlled.</p> <p>-Waste oil, fuels and other chemicals from drip trays on stationery vehicles and machinery</p>	<p>-No spillages on the surface</p> <p>-There are sufficient containers for hazardous waste</p> <p>-There are warning signs for the hazardous waste and hydrocarbon containers presence onsite.</p> <p>-Register of Hydrocarbons containers onsite.</p>	<p>-ECO</p> <p>-Contractor</p>	<p>-Hazardous waste bins</p> <p>-Material log sheet</p>	<p>Throughout the project phases</p>

		<p>will be disposed of as hazardous waste at a licensed facility by a specialist hazardous waste handler.</p> <p>-Spill kits will be easily accessible, and workers will be trained in the use thereof.</p> <p>-Staff and contractors will be trained in the handling and storage of oils, fuels, chemicals and other hazardous substances</p> <p>-All areas for storage of fuels, oils, lubricants must be concrete lined with concrete pads extending at least 1.5m beyond the size of the storage tanks/ containers or drums.</p>				
Surface water resources	Contamination of surface water through runoff and infiltration	<p>-Ensure that all targeted drilling and test quarrying activities will not encroach any significant water sources traversing the project site. To ensure this during the exploration stage, buffers of 100m shall be maintained around main channels and tributaries, and if the project proceeds to mining phase such buffers must be delineated more accurately using the predicted extent of the 1% annual</p>	<p>-Stormwater is contained and diverted to the designated points.</p> <p>-No disposal of contaminant onsite or in water systems</p>	<p>-Exploration / Mining Manager</p> <p>-ECO</p>	<p>-Stormwater management systems</p> <p>-Waste containers for hazardous waste</p> <p>-Wastewater management systems</p>	Throughout the project phases

		<p>exceedance probability (i.e., the 1 in 100-year) flood event.</p> <ul style="list-style-type: none"> <li>-Maximise the recycling and reuse of external water during drilling and test quarrying operations. This will minimise water demand from the external sources</li> <li>-Establish water quality control procedure involving regular sampling and quality testing at sites downstream of active sites</li> <li>-Keep clean water away from test quarrying, drilling and exploration camp sites using simple diversion channels</li> <li>-Store effluent wastewater in designated septic tanks at the exploration site and regularly drain this by hiring a registered wastewater management entity</li> <li>-Apply erosion controls such avoiding leaving open excavations in streams and riverbeds to minimize sediment runoff</li> <li>-Make use of emergency spillage</li> </ul>				
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		trays at all active sites to minimize risk of surface water contamination from hydrocarbon spillages				
Groundwater resources	Contamination of groundwater	<p>-Due to the shallow nature (&lt;30 m) of the planned drilling and test quarrying activities, it is highly unlikely that any groundwater will be intercepted during. Hence why the impacts on groundwater resources are perceived to be low.</p> <p>-If any groundwater is intercepted in test quarries, pump, store and reuse such water</p> <p>-Maintain all vehicles to prevent spills of oils, hydraulic fluids, etc</p> <p>-No effluent water should be discharged into the environment.</p> <p>-Effluent and sewage water from the exploration camp should be collected in septic tanks and regularly collected by designated sewage management entity for safe discharge at a suitable location in Karibib</p> <p>-Bund all hazardous liquid storage installations such as the trailer</p>	<p>Measurement of baseline groundwater levels</p> <p>Monitoring of the groundwater table /depths during Quarrying and recorded</p>	<p>-ECO</p> <p>-Exploration / Mining Manager</p>	<p>-Water level dip meter and related in-situ water level and quality measurement equipment</p>	<p>Baseline Groundwater Levels to be measures prior to exploration (from boreholes within a 2km radius)</p>

		<p>mounted diesel tank</p> <p>-Baseline groundwater quality measurements should be established right before the commencement of the planned activities by sampling groundwater from existing domestic boreholes.</p> <p>During exploration, groundwater samples should be collected every 6 months from existing boreholes (within a 2km radius) for quality testing at one of the local laboratories and monitoring. Water quality tests to be performed shall include pH, electrical conductivity, total dissolved solids, turbidity, salinity, hardness, total hydrocarbons, alkalinity, major ions (such as Ca, Mg, Na, K, Nitrate, CO<sub>3</sub>, HCO<sub>3</sub>, Cl, SO<sub>4</sub>) and metals (such as Mn, Pb, Zn, Fe) as per Namibia's Department of Water Affairs' requirements for water supplies for drinking water and for wastewater treatment and discharge</p> <p>-Any wastewater (effluent) to be</p>				
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		discharged into the environment would require an Article 21 Permit from the Minister of Agriculture, Water and Land Reform, and such effluent shall comply with the following minimum standards before being released into the environment:				
Air Quality	Project dust & emissions from vehicles and unpaved access roads	<ul style="list-style-type: none"> <li>-Stockpile loose top and sub-surface soils in designated areas away from places of residence</li> <li>-Avoid clearing vegetation unnecessarily or too far in advance of test quarrying</li> <li>-Place crushed gravel with less fines on access roads close to homesteads to minimize dust levels</li> <li>-Drill machines must be fitted with dust filters</li> <li>-Ensure minimum travel distances between working areas and stockpiles</li> <li>-Consider the utilization of reasonable amount of water to suppress dust on problematic site areas.</li> </ul>	<ul style="list-style-type: none"> <li>-Dust suppression measures implemented</li> <li>-Visible efforts to curb dust.</li> </ul>	<ul style="list-style-type: none"> <li>-Proponent</li> <li>-ECO</li> </ul>	<ul style="list-style-type: none"> <li>- Grievance logbook</li> <li>-Dust suppression water tanks</li> <li>-Dust masks for workers</li> </ul>	Throughout the project phases

		<ul style="list-style-type: none"> <li>-Ensure that all vehicles and machinery are maintained in good working condition and that they are serviced on regular basis</li> <li>-Ensure that all vehicles are switched off when stationary – no vehicles should be idling for extended periods</li> <li>-Enforce speed limits of 50 km/ hour, and lower proximal to places of residence</li> <li>-Avoid stripping and bulk excavation activities on very windy days</li> <li>-Test personnel health at regular intervals and implement dust monitoring from the start of exploration by means of installing simple dust fallout buckets 500m, 1km and 2km down-wind of key exploration and quarrying target areas</li> <li>-Provide a complaint register on site where complaints can be made. This register should enable effective</li> </ul>				
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		<p>communication of complaints where these are reasonably addressed. All complaints regarding air quality should be adequately investigated and actions taken to reduce the impact in a timely manner should it be required</p> <ul style="list-style-type: none"> <li>-Implement and maintain a Dust and Emission Management Plan which provides clear details on preventing, maintaining and improving the air quality in terms of site-specific activities. This plan could possibly incorporate a dust fallout monitoring programme should it be evident that dust emissions is a problem</li> <li>-Avoid burning of waste material on site</li> <li>-Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable</li> <li>-All access roads leading to the site should have speed limits of no more than 40km/h to minimise the amount of dust generated by the vehicles, which will minimise air</li> </ul>				
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		<p>quality concerns.</p> <ul style="list-style-type: none"> <li>-Dust masks, eye protective glasses and other respiratory personal protective equipment (PPE) such as face masks should be provided to the workers.</li> <li>-The vehicles carrying dusty materials should be covered to prevent materials being blown from the vehicle.</li> </ul>				
Health and Safety	Occupational injuries from mishandling equipment,	<ul style="list-style-type: none"> <li>-The site workers and visitors should be equipped with appropriate and sufficient PPE (hand gloves, safety goggles, boots, earplugs, overalls, face masks, hard hats, etc).</li> <li>-Trainings and "know-how" to use PPE should be provided to all workers as part of their induction.</li> <li>-The site should be equipped with a minimum of two first aid kits. Two or three of the workers should be trained on how to administer first aid.</li> <li>-Procedures for dealing with injuries or accidents must be in place and all contact details for emergency</li> </ul>	<ul style="list-style-type: none"> <li>-Comprehensive Safety &amp; Health Systems</li> <li>-Adequate PPE for all workers and visitors</li> <li>-Regular health screening of workers</li> <li>-Annual health and safety audits done</li> <li>-Health &amp; Safety is part of the inductions</li> <li>-Health &amp; Safety</li> </ul>	<ul style="list-style-type: none"> <li>-Proponent</li> <li>-Exploration / Mining Manager</li> <li>-ECO</li> </ul>	<ul style="list-style-type: none"> <li>-Safety &amp; Health Awareness pamphlets and Trainings</li> <li>-First aid kits</li> <li>-PPE</li> <li>-Nearest Health facility (Centre)</li> <li>-Warning signs onsite in both English, Afrikaans, Otjiherero and Damara Nama languages</li> </ul>	Throughout the project phases

		<p>personnel available. Uma-Penra Investment safety and emergency response manual must be applied. Such manuals must be developed based on statutory requirements stipulated under the Labour Act.</p> <p>-As per the Labour Act (Act 6 of 1992) and SABS 10083 (2004) workers will need to be protected against dust and noise in the workplace. SABS 10083 (2004) requires that noise levels in the workplace (as defined and measured in accordance with that standard) should not exceed 70 to 85 dBA. If this limit is reached, then a noise zone must be declared. A noise zone has special requirements for protective equipment and for training of exposed personnel.</p> <p>-Dust will be released into the air at test quarrying, soil stockpile sites and access roads. SABS 1929 (2005) provides the following standards for PM10 particulate matter:</p> <p>-The daily limit for the protection of human health over a 24hour period is 75 µg/m<sup>3</sup></p>	Education			
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		<p>-The annual limit for a calendar year is 40 µg/m<sup>3</sup></p> <p>-Workers must go for regular (bi-annual) health check-ups to ensure that these targets are met. In addition, continuous dust monitoring must be implemented</p> <p>-Water brought to site for human consumption must comply with acceptable water quality specifications provided in Section 21 of the Water Act (Act 54 of 1956) of the Republic of Namibia</p> <p>-Record and report all health and safety incidences</p> <p>-The following features of the project's design and management will reduce risk of mosquitos breeding on the project site:</p> <p>-Used tyres that may be generated on site, that could contain pooled water and act as breeding ground for mosquitos, will be transported to designated waste disposal sites in Karibib regularly.</p>				
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Noise	Noise from project activities	<p>-All workers on site must be equipped with ear plugs to be used when exposed to excessive noise.</p> <p>-Switch off machines that are not used.</p> <p>-Regular maintenance of drilling / quarrying and earth moving machinery should maintain noise to acceptable levels for operators and the public.</p> <p>-Standardized noise measurements should be carried out on individual equipment at the delivery to site to construct a reference data-base, and regular checks carried out to ensure that equipment is not deteriorating and to detect increases which could lead to an increase in the noise impact over time and increased complaints.</p> <p>-The activities are to take place during daytime (07h00 to 17h00) only to minimise nuisance to residents. Periods of silence during</p>	<p>-Planning of weekdays activities</p> <p>-PPE provided to workers operating noisy equipment and in noisy site areas.</p> <p>-Complaints of excessive noise from residents</p>	<p>-Exploration / Mining Manager</p> <p>-ECO</p>	<p>-Clearly written placards with blasting hours in a day placed near the site</p>	<p>Throughout the project phases</p>

		<p>the day may be necessary.</p> <ul style="list-style-type: none"> <li>-When working in areas within 500m of homesteads silencers should be fitted and maintained on diesel powered equipment and vehicles</li> <li>-Train personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events</li> <li>-Leave as much vegetation in the surrounding as possible to act as noise buffers</li> <li>-Keep communities informed of planned drilling and blasting, earth moving and test quarrying schedules through fortnightly radio announcements through the traditional authorities.</li> <li>-Keep a logbook of noise complaints and implement remedial actions promptly as far as practical</li> <li>-Install portable noise monitoring devices at the crusher site as well as</li> </ul>				
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		<p>in all working areas (weigh bridge, stockpile bags, next to haul roads) and calibrate all equipment by fitting noise suppressors to ensure compliance to acceptable noise levels. The noise monitors should be installed at least 1.2m above ground and at least 4m away from any surface. In procuring the noise monitoring devices the proponent must ensure that their specifications comply with SANS 10103:2008, ISO 9613- 2:1996 (Acoustics – description, measurement, and assessment of environmental noise) and ISO 6395:2008</p> <p>(Earth Moving Machinery –Determination of sound power level – Dynamic test conditions). The acceptable noise levels according to SANS 10103:2008 are summarized below for guidance:</p> <p>-All project activities must not be carried out in the night, early morning (before 07h30) and evenings (after 17h00).</p>				
Vehicle traffic safety,	The increase in traffic flow	-The transportation of project materials, equipment and	-All drivers are appropriately	-Exploration / Mining Manager	-Road traffic signs	Throughout the project phases

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		<p>machinery should be limited to twice a week only.</p> <p>-Drivers of all project phases' vehicles should be in possession of valid and appropriate driving licenses and vehicles should be road worthy.</p> <p>-The vehicle drivers should comply with the access and load control at the site gate / entry.</p> <p>-The vehicles should be driven slowly (40km/hour or less), and on the lookout for livestock and people.</p> <p>-The site access roads should be well equipped with road signs condition to cater for vehicles travelling to and from site.</p> <p>-Vehicle drivers should only make use of designated site access roads and parking areas provided onsite.</p>	<p>licensed</p> <p>-Drivers are adhering to onsite rules and regulation.</p> <p>-All vehicles are roadworthy.</p> <p>Heavy trucks are limited day travelling only and twice a week.</p>	-ECO		
Fire Outbreaks	Accidental fire outbreak onsite	<p>-Portable fire extinguishers should be provided on site.</p> <p>-No open fires to be created by project personnel.</p> <p>-Potential flammable areas and</p>	<p>-No wildfires recorded (due to presence of workers)</p>	<p>-Exploration / Mining Manager</p> <p>-ECO</p>	<p>-Fire extinguishers (1 per vehicle) and 1 per working site</p>	Throughout the project phases

		<p>structures such as fuel storage tanks should be marked as such with clearly visible signage.</p> <p>- Do not leave fires unattended</p>				
Visual	Visual impact (aesthetics) and night lightings	<p>-Ensure that there are no elevated overburden dumps or final voids post- test quarrying and actual quarrying</p> <p>-Drilling sites will be progressively rehabilitated to create landscape like the surrounding undisturbed areas.</p> <p>-Unsuccessful test quarrying sites will equally be rehabilitated progressively</p> <p>-As far as is practical no vegetation will be removed unnecessarily. Where new access roads are to be constructed, the methods should be low intensive and possibly use manpower and not machines for clearing.</p> <p>-Test quarries where exploration results are positive shall be battered to safe angles or possibly turned into temporary earth dams with gently sloping sides in preparation</p>	<p>-No complaints of night bright lights from the site by the nearest local communities.</p> <p>-No visual nuisance from the contrasting view of the koppies facing the frequented local/main roads</p>	<p>-Proponent</p> <p>Exploration / Mining Manager</p> <p>-ECO</p>	None	Throughout the project phases

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		<p>for the development and subsequent quarrying.</p> <p>-Care shall be taken to ensure that all rehabilitated areas are like the immediate environment in terms of visual character, vegetation cover and topography and any negative visual impacts will be rectified to the satisfaction of the MEFT officials.</p> <p>-Exploration and actual mining should be limited to the sides of the koppies not overlooking the district roads. This is to prevent the visual impact on tourists and travellers alike on the D3704 and D3707 due the contrasting landscape from block removals.</p>				
Archaeology and heritage	Accidental disturbance and destruction of archaeological or heritage objects and sites	<p>- The Heritage Impact Assessment that was conducted revealed that there were no known archaeological features at the site, however should heritage material be discovered during the operational stages of the project</p> <p>- Identified of any archaeological significant objects on the site should</p>	<p>-Preservation of all artefacts that are discovered around project area</p> <p>-Cessation of work upon discovery/ unearthing of unknown objects</p>	<p>Exploration / Mining Manager</p> <p>-ECO</p> <p>-Archaeologist</p>	<p>- Salvage equipment</p> <p>-Flag tapes</p> <p>-GPS (site marking)</p> <p>-Technical Staff/Consultant (Archaeologist to help identify and advise on heritage object discovery)</p>	<p>As and when required, prior to site setup activities and upon encounter</p> <p>-Archaeologist to be present during the earth workings</p>

		<p>not be disturbed but are to be reported to the project ECO who informs the National Heritage Council offices for further instructions and actions.</p> <p>-Be familiar with the National Heritage Council's Chance Find Procedure (please refer to <b>Appendix A</b>) and if uncertain about the procedure should receive training by a suitably qualified archaeologist with respect to the identification of archaeological/heritage remains.</p> <p>-Use spotters during shallow excavation works</p> <p>-Survey the spatial extent and exact locations of know sites</p>				
Social conflicts	Land Use Conflict Issues	<p>-From the onset the project proponent must ensure that they maintain transparent and inclusive communication channels with the leadership representative of the local area and communities of Karibib.</p> <p>-The local government (e.g., the</p>	-Bi-Annual community update meetings (or when required) with community leaders	-Proponent  -PRO	- Grievance logbook  -Project Work schedules  -Open communica	Throughout the project phases

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		<p>traditional authorities, councilor, must assume a leadership role in coordinating and promptly attending to any conflicts that arise between the affected communities and the project Proponent</p> <p>-The management of the company must honour all promises made during to the affected communities during the public consultation meetings held in so far as creation of employment and procurement opportunities to locals, rehabilitation of community boreholes, and possible assistance or partnerships with small-scale miners are concerned</p>	<p>-No complaints of unaddressed raised issues</p>		<p>tion channels</p>	
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## 5 REHABILITATION MEASURES FOR POST-QUARRYING ACTIVITIES

The rehabilitation and closure measures to be implemented at closure of the quarry to meet the requirements of the Environmental Management Act are presented in **Table 7** . It is crucial for the Proponent to ensure that they make provision of both financial and technical resources for progressive rehabilitation (for post-exploration, where necessary) and post-exploration/quarrying activities.

**Table 7 - Rehabilitation and closure measures after site closure**

Aspect	Mitigation Measure(s)	Completion criteria
Stockpiled topsoil, disturbed and mined-out areas	<ul style="list-style-type: none"> <li>- All exploration boreholes excavated pits and test quarries that will no longer be required for mining purposes will be backfilled.</li> <li>-The stockpiled topsoil on explored site areas that no longer serve purpose for mining phase, should be levelled.</li> <li>-The once stockpiled topsoil during mining should be spread back on the quarry site, blocks of leftover stone can be used as barrier to prevent unauthorized access to the worked-out quarry and before complete rehabilitation is properly done. The natural development can be enhanced by reforestation (re-vegetation) and so further decrease the visual impact of the quarry.</li> <li>- Mined-out areas on worksites should be rehabilitated by stockpiling and backfilling.</li> <li>-Provision of both financial and technical resources for progressive rehabilitation and post- exploration/quarrying activities should be made.</li> </ul>	None

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<p>Re-vegetation</p>	<p>-All surface infrastructure areas affected by the project will be revegetated using local plant species. The following revegetation measures will be implemented over the disturbed site:</p> <ul style="list-style-type: none"> <li>• Prepare surface rehabilitation areas for the natural establishment of vegetation by undertaking the following:</li> <li>• Rip disturbed footprint to a depth of approximately 500 mm with suitable agricultural equipment to alleviate compaction.</li> <li>• For areas that are heavily compacted (hard stands, access roads, haul roads), rip with construction equipment to a depth of at least 1 m, and over-rip with agricultural equipment 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.</li> <li>• Undertake vegetation monitoring (including % recovery of un-revegetated sites) post closure to ensure rehabilitation success.</li> </ul>	<p>-Exotic weed species are not observed to be elevated in abundance when compared to the regional setting as reported by a trained independent botanist or Ecologist.</p> <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>
<p>Surface infrastructure</p>	<p><u>Infrastructure for Potential Beneficial re-use</u></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 Farm owners or occupiers of land for infrastructure to remain and be transferred; and</li> <li>• Finalise agreements with third parties, along with transfer schedule.</li> </ul> <p>Service infrastructure to be removed</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 infrastructures such as offices, tanks, camps, ablution container; water storage container/tank, and accommodation containers.</li> <li>• Decontaminate hazardous waste storage tanks and containers at a dedicated decontamination bay in Karibib or to the nearest town with capable facilities.</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>

	<ul style="list-style-type: none"> <li>• Demolish and excavate concrete foundations to 1 m below ground level. Alternatively, and in appropriate instances the concrete slabs of “clean” infrastructure (not processing infrastructure) can be covered with a 1 000 mm soil cover as part of site re-profiling and integrated into the surrounding topography.</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 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> <li>• Rip disturbed footprint to a depth of approximately 500 mm with suitable agricultural 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>Measures relating to support Infrastructure</p> <ul style="list-style-type: none"> <li>• In addition, Identify and donate equipment to affected communities that can be reused and/or recycled</li> <li>• Dismantle the remaining overland pipelines and salvage as possible.</li> <li>• Seal open ends of buried pipelines and fully cover with nothing exposed.</li> </ul> <p>Measures relating to transport Infrastructure</p> <ul style="list-style-type: none"> <li>• Agreements will be put in place between Uma-Penra Investment and local communities as well as the relevant authorities for roads to remain post closure for beneficial use by the communities.</li> </ul> <p>-Roads that will no longer be used by local community post closure will be rehabilitated as follows:</p> <ul style="list-style-type: none"> <li>• Access roads to completed/mined out ridges or ridges will be closed off to avoid re- creation of tracks over such areas.</li> <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 a depth of approximately 300 mm with suitable agricultural equipment to alleviate compaction; and</li> <li>• Establish vegetation species that mimic the surrounding shrub/bushland by</li> </ul>	
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	<p>collecting seeds from pristine surroundings and actively planting before the wet season.</p> <p>Measures relating to Electrical Infrastructure</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</li> </ul> <p>required Measures relating to crusher plant and Mobile Machinery/ Vehicles Conveyors</p> <ul style="list-style-type: none"> <li>• Dismantle steel structures and demolish concrete footings; and</li> </ul> <p>Dispose demolition waste at demolition</p> <ul style="list-style-type: none"> <li>• Obtain legal authorisations for infrastructure to remain and to be transferred.</li> <li>• waste site Crusher site</li> </ul> <p>Dismantle/demolish crushing site and related infrastructure.</p> <ul style="list-style-type: none"> <li>• Decontaminate crushing plant equipment at dedicated decontamination bay in Karibib or any nearest capable facility, upon agreements.</li> <li>• Demolish and excavate concrete foundations to 1 m below ground level. Alternatively, and in appropriate instances the concrete slabs of “clean” infrastructure can be covered with a 1 000 mm soil cover as part of site re-profiling and integrated into the surrounding topography.</li> <li>• Clean up contaminated soils; and</li> <li>• Undertake general surface</li> </ul> <p>rehabilitation Machinery and Vehicles</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> </ul> <p>Clean-up contaminated soils.</p>	
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<p>Above Ground Openings (quarry, diversion ditches)</p>	<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> </ul> <p>Establish vegetation.</p>	<p>None</p>
<p>Petroleum products</p>	<ul style="list-style-type: none"> <li>• Remove oil drums and petroleum products off site for resale/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 or any nearby capable waste facility.</li> <li>• Demolish and excavate concrete foundations to 1 m below ground level, and</li> <li>• Clean up contaminated waste.</li> </ul>	<p>None</p>
<p>Contaminated soils</p>	<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> <ul style="list-style-type: none"> <li>• Rehabilitate moderately contaminated (inorganically contaminated) soils as follows:</li> <li>• Excavate contaminated material to a depth of 300 mm and remove and dispose of at the Karibib landfill site or any nearest capable and approved waste management facility.</li> </ul> <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>	<p>-Inorganically contaminated soils are safely disposed of at the Karibib or any nearest capable and approved waste management site, 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>

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Solid waste	<ul style="list-style-type: none"> <li>• Sort and screen waste produced from the dismantling and demolition of infrastructure.</li> <li>• Crush decontaminated concrete, if required, to reduce uptake in waste cells.</li> <li>• Recycle waste that can be recycled/salvaged (e.g., steel) after decontamination; and</li> </ul> <p>Dispose of inert demolition waste at the Karibib landfill, upon agreement with the Town Council</p>	None
Quarry	<ul style="list-style-type: none"> <li>• Refer to <b>Table 8</b> for possible after-use options that could be considered for post-mining use of the quarry upon successful rehabilitation or at least until it is made safe for such use(s).</li> </ul>	Depending on the factors affecting the quarry for the intended uses. These factors include size of the area, topography of the area, water (quality, depth, and temperature), quarry faces (height, and fracturing/soundness), quarry benches (width and fracturing/soundness), piles of leftover stone (form and height), ownership, points of compass, scenery, flora and fauna, geological values, human settlement, and status of land use planning

Once the quarry is successfully rehabilitated, the Proponent in collaboration with the relevant authorities (national and regional) and local leadership can consider some of the post-quarrying uses provided in **Table 8**.

**Table 8 - After-use solutions with potential for natural (dimension) stone quarries (after Lintukangus et al., 2011)**

After-use solution	Suitability for natural (dimension) stone quarries
Aquaculture: crab farming and fish farming	Good suitability for recreational activity but challenging for profitable operations.
Research and education: geological (excursion or education) sites, nature preservation areas, training courses for rescue dogs and rescue personnel, xerothermic areas, and other science use (e.g., astronomy)	Good suitability
Culture: open-air theatres, museums, quarrying heritage, art (sculptures, lighting, painting, rock art, film sets)	Good suitability
Hobby activities: diving and climbing	Good suitability and affordable
Recreational activities: parks (recreational areas, build environments), places to swim (summer/winter), paddling, sailing, skating, fishing, leisure house area	Good suitability and local specific
Rock building: housing and storage	Good suitability, but expensive
Storage: water storage, cold storage of timber and landfills	Challenging, except for cold storage.
Forestry: natural and planted	Good suitability, but challenging for profitable forestry
Other solutions: harbours, cooling water for industry, energy production and industrial plants	Challenging, but very interesting, e.g., harbours

## 6 MONITORING OF THE EMP/EMRP IMPLEMENTATION: A GUIDE

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 of:

- Establishing a baseline, that is, gathering information on the basic site characteristics
- Establishing long term trends in disturbed systems
- Estimating inherent variation within the environment, which can be compared with the variation observed in another area where similar activities are practiced.
- Making comparisons against a standard or target level.

The following monitoring tools/ techniques 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, etc
  - 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 crusher plant, 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 dust encapsulation system.
  - provision of site signboards that are erected to indicate date and time of blasting operations.
  - 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.
  - proper transportation management including utilisation of approved routes, allowable vehicles load and other.
  - Evidence for creation of new tracks due to non-compliance.

Additionally, when photographs are submitted for compliance monitoring, they should be geo-referenced or their exact location should be clearly marked 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 stone quarry activities to ensure compliance with the following mitigation measures:
  - conditions of quarry slopes.
  - validity of all operating permits such as the ECC, water abstraction permit, blasting permits, 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, quarry, and crusher site.
  - 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 stone quarry activities to ensure compliance with the following mitigation measures:
  - record of all blasting notices to surrounding communities, and conservancies.
  - 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 site areas.
  - records of any Chance Find Procedure (Appendix 1) in so far as archaeological sites are concerned.
  - records of any complains launched to Eagle Focus Investments concerning the quarry activities.

- whether data records being collected for monitoring purposes are 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 exploration and quarrying phase. Such layout plans should encompass the following:
  - boundary fence (if any) of the quarry and crusher 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 crusher 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.

## **7 CONCLUSIONS**

This Environmental Management Plan highlights the management measures that will be implemented to mitigate the environmental impacts of the proposed activities. Additionally, it highlights the need / requirements for the Environmental Emergency Preparedness and Response procedure.

The EMP is a legal document, which commits the applicant to comply with all management measures, monitoring programmes and other plans as presented herein. As part of the EMP, monitoring programmes have been provided to manage and control critical components of the environment. This is a live document which may be amended if project activities alter.

## Appendix A – Chance Find procedure for offshore wrecks and other possible concealed objects of heritage significance.

Areas of proposed 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.

Manager/Supervisor must report the finding to the following competent authorities:

- National Heritage Council of Namibia (061 244 375)
- National Museum (061 276 800)
- National Forensic Laboratory (061 240 461)

Archaeological material (graves, artefacts, sites, etc) must NOT be touched. Tempering with the materials is an offence under the Heritage act and punishable upon conviction by the law.

### Responsibility:

<b>Proponent:</b>	To exercise due caution if archaeological remains are found
<b>Onboard Environmental or HS Officer:</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, recover remains and delineate clearance buffer

## **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 the Environmental Manager

### Action by site 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.

