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Environmental Management and Rehabilitation Plan (EMP / EMRP) for:

The Exploration and continuation of small-scale quarrying of white marbles and granitoids/ gneisses for dimension stone production and to support renewal of Mining Claims (MCs) No. 66714, 66731 and 66733 at Onjuva Village, Epupa Constituency, Kunene Region, Namibia

MEFT APPLICATION NO.:	**APP-003008**
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1 INTRODUCTION

1.1 Project Area Background

The Proponent of this project intends to re-commission operations of the existing marble and granitoid quarry at Onjuva village and to open new quarries on the 3 mining claims to produce 5 m^3 to 7 m^3 standard rectangular dimension stone blocks that would ultimately be sold locally and overseas to both consumers and stone processing factories. According to community members, the existing quarry ceased operations in 1997 and used to be operated by a different license holder. Ever since then no other form of industrial development with tangible benefits to the community has been realised in the area. A community rest camp was developed and established over the years through joint investment with a private developer and is currently the main source of income for the Orupembe conservancy and the concerned traditional authority.

The three mining claims concerned are situated along an elongated 350m – 400m wide white marble ridge which is flanked on either side by paragneisses/ granitoids. The marbles, paragneisses and granitoids are highly prospective for dimension stones due to their colour, patterns, durability, and low fracture frequency, especially with increasing depth from surface). The proposed quarrying, on site block cutting and downsizing, and ongoing prospecting activities will bring positive socio-economic upliftment to the drought-stricken and struggling economy of Onjuva village and the broader Orupembe communal conservancy. The projected benefits include value addition to the marble/ gneiss/ granitoid resources in the area which otherwise would have remained dormant and untapped.

1.2 Project Locality

Mining claims 66714, 66731 and are located approximately 200 km directly west and along a straight-line trajectory from the regional capital of the Kunene Region, Opuwo, and approximately 25 km north of Orupembe. Collectively, the claims cover an area of approximately 51 Hectares (Ha) in size.

The area can be accessed via existing district gravel roads such as the D3707 and D3704 from Purros and Opuwo which ultimately connect to several village access tracks. The license exclusively lies on communal land under the jurisdiction authority of the Otjikakurukouje Traditional Authority in the Epupa Constituency and overlies the Orupembe Communal Conservancy, which was officially registered in 2003 as part of the Ministry of Environment, Forestry and Tourism's efforts to increase community based conservation and management of wildlife and forests (refer to the regional map in **Figure 1-1.** below).

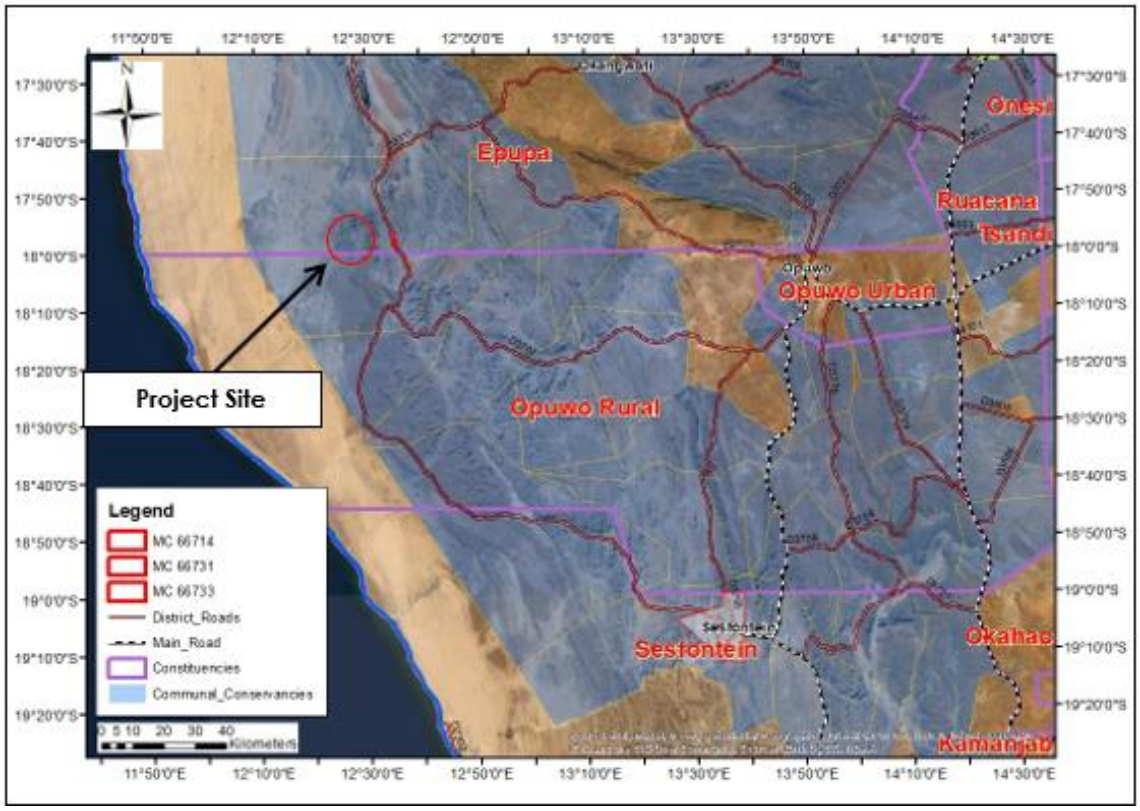

Figure 1-1. Regional locality map of Mining Claims 66714, 66731 and 66733

The three mining claims (project site locality) are shown on the map in **Figure 1-2**.

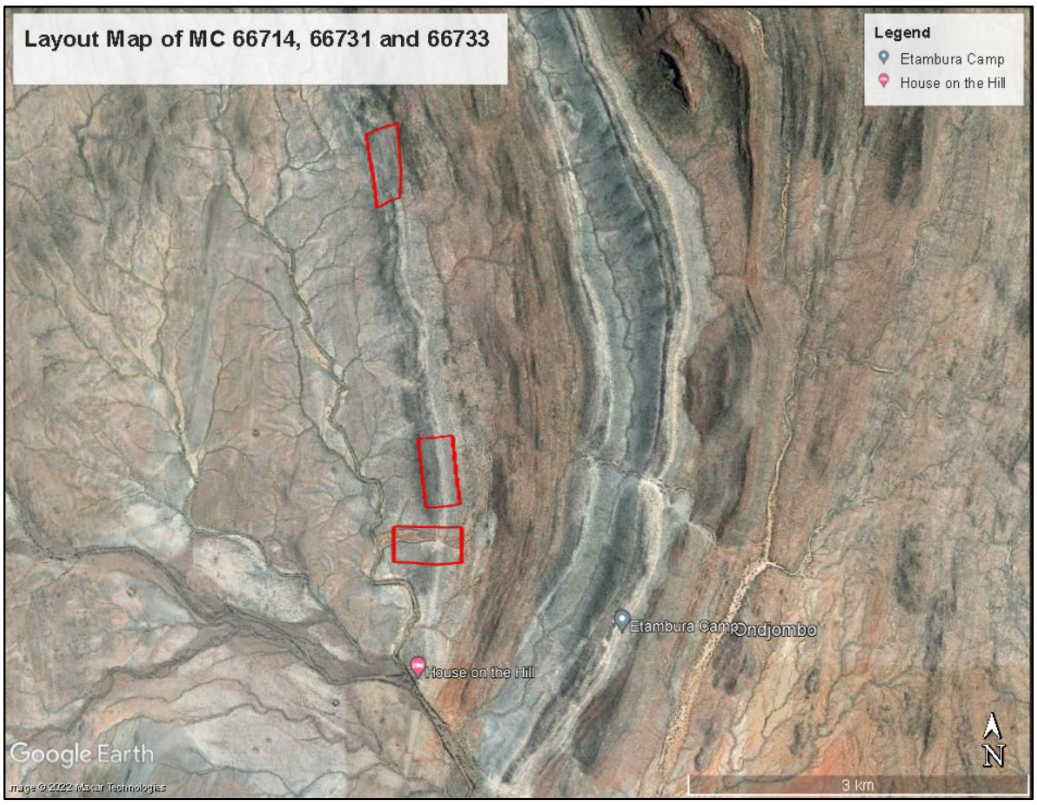

Figure 1-2. Local map of Mining Claims 66714, 66731 and 66733

The approximate corner coordinates of the claims are provided in Chyba! Nenalezen zdroj o dkazů. below.

Table 1-1. Approximate corner coordinates for mining claims 66714, 66731 and 66733

MC	Lat	Long
66714	-17.975278°	12.585278°
	-17.975278°	12.590833°
	-17.978056°	12.590833°
	-17.978056°	12.585278°
MC	**Lat**	**Long**
66731	-17.968333°	12.587500°
	-17.968056°	12.590278°
	-17.973333°	12.590833°
	-17.973611°	12.588056°
MC	**Lat**	**Long**
66733	-17.945000°	12.583333°
	-17.944722°	12.586111°
	-17.950000°	12.586111°
	-17.950556°	12.584167°

1.3 The Proponent

The three mining claims are registered and held by Zanite Investments cc, of which Mr. G. Zandberg is the sole member. The proposed prospecting activities shall be carried out by this entity, either wholly or in partnership with 3rd party partners who may be approached to provide various technical and financial inputs.

1.4 The Environmental Consultant

Omavi Geo-technical and Environmental Services (hereinafter referred to as Omavi) has been appointed by the proponent to carry out an Environmental Assessment (EA) and draft an environmental management and rehabilitation plan (EMRP) for the project, and ultimately, submit all necessary documentation to the Ministry of Environment, Forestry and Tourism (MEFT) in support of the application for an Environmental Clearance Certificate (ECC) to the Department of Environmental Affairs and Forestry (DEAF).

The drafting of the EMRP was done by a qualified and experienced environmental assessment practitioner, whose resume is attached to the Scoping Report. In addition, expert input was sought from experienced and qualified heritage and archaeological specialists to assess the risk of disturbing, destroying, or fragmenting possible aspects of archaeological or heritage importance in the project area.

2 BRIEF PROJECT DESCRIPTION

This section provides a brief presentation of the following:

- The general overview of the project activities (as presented under Chapter 2 of the Scoping Report) and Exploration works,
- The construction / development phase (establishment of the quarry), and
- Quarry operations and maintenance, and
- Quarry Closure and Rehabilitation.

2.1 Exploration Stage

A desktop study coupled with walkover field geological evaluation has already been conducted over the mining claims concerned, and for this the proponent already has an idea of where the good quality gneissic/ granitoidal and marble units occur within the license area, at least based on visual judgement and experience. Those know sites will be the primary target sites for further exploration drilling, test quarrying and if justified by economics continuous small-scale quarrying. A designated area, located to the west of the targeted linear marble/ gneissic ridge and approximately mid-way between the 3 concerned mining claims has preliminarily been earmarked for the placement of the various support structures.

In accordance with conventional practice, the proposed project will entail the following stages:

- Construction of onsite and offsite support infrastructure, clearing of the quarry sites and access roads, and general site establishment
- Active brownfields exploration drilling and quarrying, on site sizing of blocks, transporting of mined blocks, and ongoing rehabilitation of the quarries and support infrastructure area, and
- Quarry closure, decommissioning, and final rehabilitation

The activities involved at each of these stages are elaborated on below.

2.2 Construction 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)

- Widening and upgrading of existing access tracks and creation of new access routes to quarries, including the installation of culverts at river/ drainage channel crossings
- Topsoil removal and safe storage
- Overburden removal and usage of such overburden in cut and fill operations
- Geotechnical core drilling to inform the quarry(s) layout and designs
- Rehabilitation and possible deepening of existing water supply boreholes to support quarrying operations
- Erection of 700 – 1000m^2 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 (3) 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) - **Figure 2-1**.
- Clearing of parking bays near each mining claim 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 (**Figure 2-2**).
- 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 (**Figure 2-3)**.
- Placement of 19 – 37.5 mm crushed aggregates across the accommodation and designated parking bay areas for dust suppression purposes. The aggregates can be sieved borrow material from nearby sources or could be generated by crushing overburden waste rock from the historical quarrying operations near MC 66714.
- Placement of solar panels on the roofs of accommodation containers for domestic power supply such as lighting and cooking.
- The creation of a 12m wide access gravel road along the western toe of the targeted ridge connecting the three (3) license blocks.

- Diversion of small tributaries away from the maintenance workshop, accommodation, temporary waste storage and oil storage areas.
- Ongoing engagement with the Orupembe community for local human resource planning and development

Figure 2-1. Typical containerized ablution and sanitation facility to be erected on site

Figure 2-2. An example of a 10 000L diesel tank installed onsite for diesel storage

Figure 2-3. Typical overhead shaded structure installed over a diesel engine powered generator mounted to a concrete slab

The construction and operation of a solid waste disposal site for is not allowed within the license area as the area lies within a conservancy. However, because 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. Both liquid and solid waste will be stored in sealed containers and thereafter disposed of occasionally at an acceptable waste disposal site elsewhere. Ablution facilities shall be fitted with septic tanks in a lined pit and sewage shall be dis-infected periodically prior to pumping it out for subsequent disposal at one of the closest municipal sewage disposal sites as and when the need arises. Discharge of wastewater into the environment (e.g., into dry ephemeral rivers) without treatment is prohibited under the Water Act of 1906.

The proposed general site layout is shown in **Figure 2-4** below

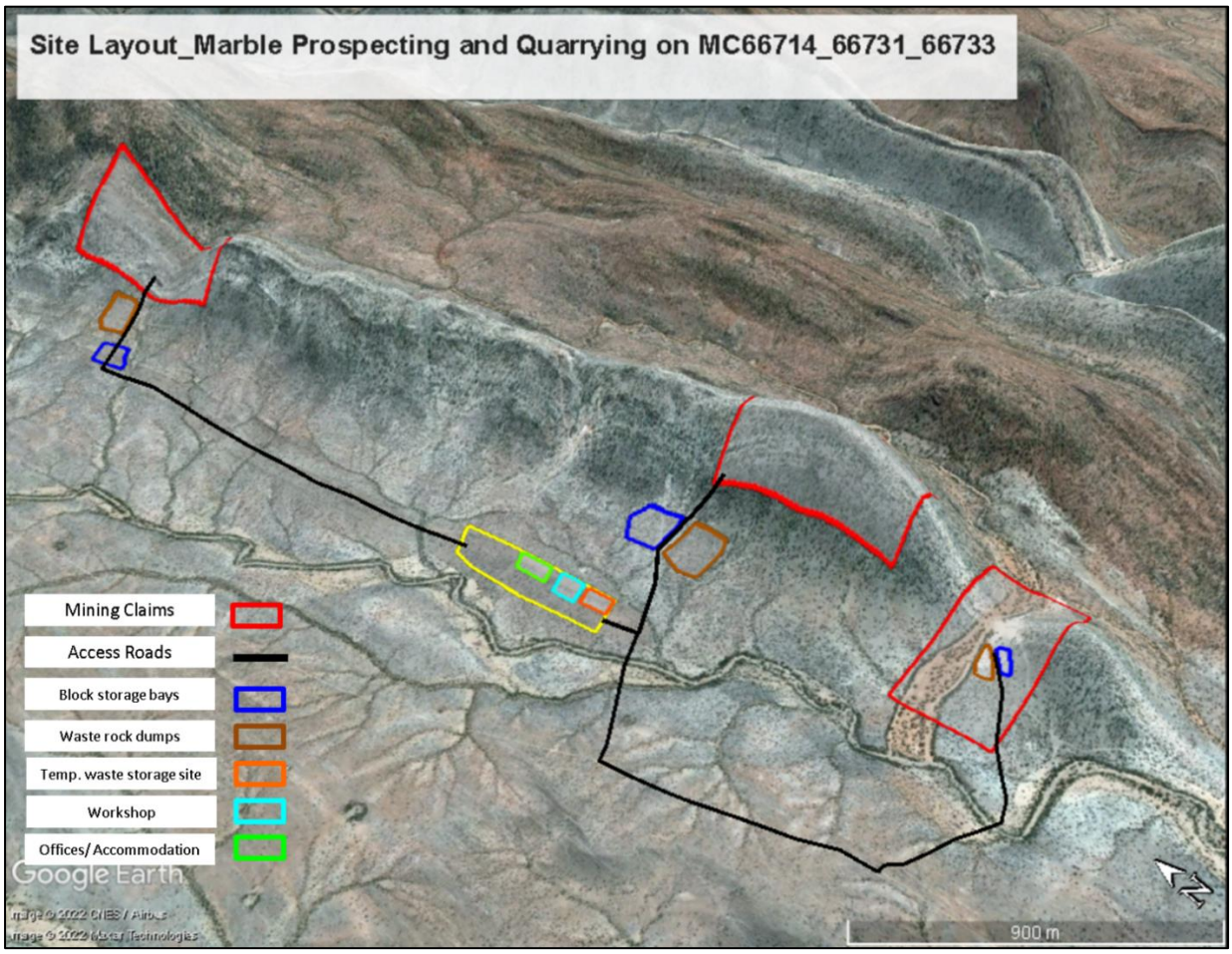

Figure 2-4. Proposed general site layout

2.3 Quarry Operation Phase: project inputs, processes & outputs

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

- 4x4 mining support vehicles.
- 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 rehabilitated water supply boreholes).
- Portable down-the-hole drill rig for block splitting,
- Tipper trucks for waste rock haulage to designated stockpiling bays
- Flat deck truck for long distance transportation of sized blocks to existing processing factories or to Walvis Bay direct shipment to overseas markets.
- Drilling fluids stored in manufacturers approved containers; and
- Water bowser for transporting water from water supply boreholes to the use areas
- 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

2.3.1 Staff accommodation and Equipment Storage

It is anticipated that during full production, and depending on the market's performance, approximately 20 to 30 people (both skilled, semi and unskilled) will be employed. All the workers will be accommodated onsite at the quarry camp. All quarries will only operate during day hours. The accommodation, ablutions and kitchen facilities at the camp will all be powered by a solar system comprising solar panels installed on the roofs of the containerize and prefabricated structures.

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

2.3.2 Block Extraction Technology and Other Processes

According to Ashmole and Motloung (2008), the mining method in a dimension stone quarry is largely influenced by the geology of the rock mass. Block extraction will generally start by loosening large volumes of rock (usually in the 1000s of m^3 range) by means of primary cuts (using a combination of diamond saws, wire saws and blade cutters as shown in **Figure 2-5**) and then dividing the loosened boulders stepwise into smaller pieces until commercial blocks are obtained, whilst simultaneously discarding waste material as the process progresses.

At each of the planned quarries, quarrying for block extraction will start at the top of the ridge and progress downwards through the rock mass in vertical cuts of 4 to 6m per annum.

Selective quarrying will be always practiced, whereby one quarry will be mined within each of the mining claim at a time. Certain ridges within the chain of mining claims may be left untouched if the rock mass quality is not good or the rock mass quality does not meet market demands at the time. This will however only become apparent upon completion of the test quarrying program. Due to the focused and selective quarrying approach which would be adopted, the rehabilitation program will also be phased such that rehabilitation will be implemented around each quarry and advanced as quarrying around that specific site progresses.

The actual quarrying of good quality gneiss/ granitoid and 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.

Figure 2-5. Typical quarrying and cutting operations in a dimension stone quarry

The dimension stone (DS) blocks extracted through the above two techniques 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 **Figure 2-6.**

Figure 2-6. Typical on-site block sorting and stockpiling prior to transportation for further beneficiation

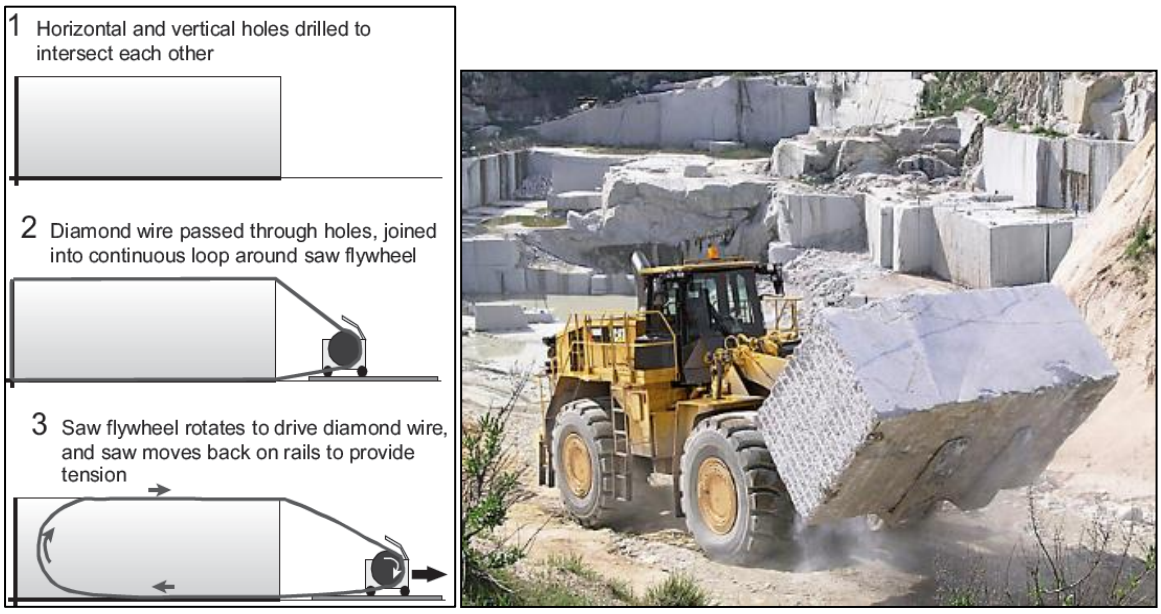

Figure 2-7. Illustration of quarrying by diamond wire technology and block handling from a quarry using a front-end loader

The removal of overburden is generally carried out with heavy earth-moving machinery. In some cases, the weathered zone is removed by drilling holes by jackhammers and slim drill machines for the drilling purpose. These holes are charged with light explosives and under controlled blasting methods the over burden material is loosened out. Subsequent diamond wire saw cutting involves drilling of two holes, which are drilled to intersect each other, and subsequently passing a diamond wire through these holes. The holes are typically created by applying 'Continuous Manual Hammering' or 'Slim Drill. The diamond wire is passed through the two holes and is then joined to form a continuous loop, which is placed over the flywheel of the saw. As the flywheel rotates, driving the diamond wire through the stone, the saw moves backwards along a track to maintain sufficient tension in the wire and in so doing the block is cut by continuous motion of the diamond wire saw (refer to **Figure 2-7**). The block freed from rock is toppled either pneumatically or by pulleys. The lifting and loading of blocks are done by 'Derrick cranes' and using various types of loaders. The diamond saw cutting technology has the advantage that it is associated with low noise and dust generation (Chatterjee *et al*. 2005).

Ashmole and Motloung, 2008 also stated that studies have shown that the use of diamond wire sawing has the added advantage of enhancing block recovery and reducing transportation costs by reducing the amount of waste generated and transported.

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 (as shown in **Figure 2-7 right photo**). The same front-end loaders will be fitted with a quick coupler which allows for fast interchanging of the bucket with fork or boom, thereby enabling the same machines to be utilized for removal of overburden, handling waste material and cleaning the quarry when fitted with the bucket and pulling blocks down from exposed faces when fitted with the boom. Collectively, this will reduce the number of machineries on site, thereby reducing the likelihood of hazards such as machine-machine collisions, machine-person/ fauna collisions, as well as noise, fume and dust pollution.

2.3.3 Quarrying Output

The output of the mining process or from cutting and splitting are commercial 5 to 7 m^3 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 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 either to factories in Karibib and/ or Walvis Bay 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.

2.4 Quarry closure and rehabilitation phase

During the operational phase of a quarry's life, the impact on the environmental 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 Motloung, 2008).

Therefore, towards the end of mining activities on active sites on the mining claims, 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.
- Donation of boreholes and associated infrastructures (e.g., borehole pumps) to the affected community
- 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 next chapter is the presentation of legal requirements in terms of project activities permitting and authorisations. The detailed presentation of the relevant legal framework can be found in the Scoping Report.

3 APPLICABLE LEGAL REQUIREMENTS

3.1 Authorizations 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 3-1** 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 of the Environmental Scoping Report.

Table 3-1. Applicable legislations in terms of permits or licenses for the planned activities on the Mining Claims

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 Regs19 & 20). In case of amendments to this EMP, an amendment to the ECC will need to be applied through the office of Environmental Commissioner. **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**	**The Environmental Commissioner: (Department of Environmental Affairs and Forestry (DEAF))** **Ministry of Environment, Forestry and Tourism** **Tel: (061) 284 2701**

Legislation	Provisions	Contact Details
The Water Act 54 of 1956 The Water Resources Management Act No. 11 of 2013 (unpromulgated)	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. In case of Groundwater abstraction and use, the permit for industrial and commercial should be applied for. Should there be a need to dispose of wastewater into the environment, the Proponent **would be required to apply for Treated Wastewater Discharge Permit** 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.	**Mr Franciskus Witbooi (Deputy Director: Water Policy and Water Law Administration.** **Tel: (061) 208 7158** **OR** **Ms. Elise Mbandeka (Chief Hydrologist): Water Environment** **Tel: (061) 208 7167**
Mineral Prospecting & Mining Act (Act No. 33 of 1992)	Section 38 (1): Applications for renewal of registration of mining claims The Proponent should ensure that all the necessary permits/authorisation for small/ medium-scale mining such as mining claim renewals are obtained from the Ministry of Mines & Energy (MME)'s Mine Directorate. Section 54(2): details provisions pertaining to the decommissioning or abandonment of a mine	**Mr Erasmus Shivolo (Mining Commissioner)** **Tel: 061 284 8167**
Road Traffic and Transport Act 52 of 1999 and its 2001 Regulations	Provides for the control of traffic on public roads and the regulations pertaining to road transport, including the licensing of vehicles and drivers. **The Proponent should consult with the nearest Roads Authority (RA) Offices to enquire on the need to apply for a formalized access road**	**Mr Eugene de Paauw (Roads Authority – Specialist Road Legislation)** **Tel.: (061) 284 7027**

Legislation	Provisions	Contact Details
	permit from the main road to site. If so, this should be applied for and obtained from the Roads Authority and conditions set therein should be compiled with	
Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)	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". **A fuel storage Permit should be applied for and obtained from the Ministry of Mines and Energy (MME**) prior to the construction stage if oils, diesel or lubricants in excess of the 600L will be stored on site	**Carlo Mcleod (Ministry of Mines and Energy: Acting Director – Petroleum Affairs** **Tel.: (061) 284 8291**
Forestry Act (No. 12 of 2001) Nature Conservation Ordinance No. 4 of 1975 (as amended)	Permits are required for the removal of protected plants species (trees) such as the Mopane Tree (*Colophospermum mopane*).	**The nearest Forestry Division Office (Ministry of Environment, Forestry and Tourism)**
National Heritage Act (Act No. 27 of 2004)	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 **the necessary steps taken to seek authorisation from the Council**.	**Ms. Erica Ndalikokule (Head: Heritage Management) – National Heritage Council of Namibia** **Tel: (061) 301 903**

4 EMP IMPLEMENTATION ROLES AND RESPONSIBILITIES

For the effective implementation of this EMP, the following person(s) in **Table 4-1** have been identified. However, it is important to note that Zanite Investment is ultimately responsible for the overall implementation of the EMP/EMRP.

Table 4-1. The responsible persons for EMP/EMRP Implementation and their role descriptions

Responsible Person(s)	EMP/EMRP Responsibilities
Zanite Investment (The Proponent) or Exploration / Mining Manager, who may also be the Proponent	-Managing/overseeing the implementation of this EMP and updating and maintaining it when necessary. -Issuing fines to individuals who contravene EMP provisions and if necessary, removing such individuals from site. -Setting up and managing the schedule for the day-to-day activities. -Liaison with all relevant interested and affected parties/stakeholders. -Ensuring all incidents are recorded and documented. -Undertaking an annual review of the EMP/EMRP and amending the document when necessary. -Responsible to enforce EMP implementation by contractors and site employees. - Sole implementation of the Closure and Rehabilitation Plan for the Quarry.
Environmental Control Officer (ECO) / Safety, Health & Environment (SHE) Officer	-Implement, review and update the EMP. -Ensure all reporting and monitoring required under EMP is undertaken, documented and distributed as needed -Conduct environmental site training (toolbox talks) and inductions with the support of an environmental consultant. -Conducts environmental audit at work site with the support of environmental consultant. -Close out all non-conformances. -Ensure materials being used on site are environmentally friendly and safe.

Responsible Person(s)	EMP/EMRP Responsibilities
Public Relations Officer (PRO)	-Liaising between the affected landowners/community members and the Proponent. -Ensure effective communication with stakeholders, media (if necessary) and the public. -Organising and overseeing public relations activities and managing public relations issues. -Collaborating with personnel and maintaining project-related open communication among project personnel, Proponent, and communities.
Affected community members	-Monitor implementation of the EMP and notify the project Proponent or ECO -Actively participate in stakeholder forums -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. -Monitor legal compliance -Review performance reports -Sanction poor performance and non-compliance where appropriate through directives, penalties, and fines.
The Department of Environmental Affairs and Forestry (DEAF)	-Approve the EMP and any amendments to the EMP, if any. -Approve reports of environmental issues and non-conformances as issued. -Review and approve environmental reports submitted as part of EMP implementation
Technical Staff and Consultants	Safely and effectively monitor various technical parameters related to: -Soil preservation/ protection -ground stability

Responsible Person(s)	EMP/EMRP Responsibilities
	-employee/ contractor health -water resources management -waste management, and -mechanical designs of various equipment on site
Project Workers/Employees and Visitors	-Follow requirements of the EMP relevant to them as directed by Proponent and ECO. -Report any potential environmental issues to the Proponent / site Manager and other possible non-conformances.
Others - Archaeology & Heritage: Chance Finds Procedure (CFP)	**Operator:** exercise due caution if archaeological remains are found **Foreman**: secure site and advise management timeously **Superintendent:** determine safe working boundary and request inspection **Archaeologist:** inspect, identify, advise management, and recover remains.

5 ENVIRONMENTAL MANAGEMENT AND QUARRY CLOSURE & REHABILITATION MEASURES

5.1 The Key Identified Potential Impacts Associated with the Project

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.

5.2 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 5 2 and Table 5 3. 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).

The management plan actions for the enhancement of potential benefits and mitigation of potential adverse impacts are presented in **Table 5-1, Table 5-2,** and **Table 5-3** 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 5-1. Management and Mitigation Measures for the Planning Phase

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
PLANNING PHASE						
EMP implementation and training	Lack of EMP awareness and implications thereof	-An EMP non-compliance penalty system should be implemented on site. -The Proponent should appoint a Safety, Health & Environment (SHE) Officer or an Environmental Control Officer (ECO) to be responsible for managing the EMP implementation and monitoring.	-All required Plans and systems are compiled and in place -SHE Officer or ECO is appointed -Records of EMP implementation Plans and Systems. -Identification of all EMP implementation persons.	-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 The permits, agreements referred to herein include: • land use agreements by traditional authority • Road access • Petroleum storage permits	-Applicable permits and licenses obtained from relevant authorities and kept on site for records keeping and future inspections -Agreements signed and obtained from land custodians or occupiers of land	-Proponent and or -Exploration/Mining Manager	-Department of Water Affairs (for wastewater discharge) -Applicable local authority(ies) for water supply and waste disposal -Permits and License such as road access permit	Prior to exploration, quarry development and mining

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		• Water supply agreements & Wastewater (Effluent) Discharge Permit • Waste disposal authorisations-permits from relevant authorities • Environmental Clearance			-Landowners and or occupiers of land	
Communication between the Proponent and affected communities	Lack of communication (proper liaison) between affected communities and Proponent with regards to land use	-The Proponent should appoint a Public Relation Officer (PRO) to liaise with the communities and other stakeholders -A clear communication procedure / plan which should include a grievance mechanism should be compiled	A PRO is appointed A Complaint registry is compiled PRO contact details to be provided affected community leaders	PRO	-Grievance logbook	Prior to project activities) and their responsibilities throughout the project phases
Employment opportunities	Unfairness and discrimination in employment opportunities during project phases	-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 Onjuva, Orupembe and immediate surrounding villages). -The anticipated work opportunities and number of positions should be announced through the local leadership at the Otjikakurukouje Traditional Authority.	-The hired labourers are from the local communities -No records of complaints from communities regarding unfair labour practices.	-Proponent -Contractor	-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
		-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. -Equal opportunities should be given to both men and women, where possible.				
Services and Goods Supply to the project (Procurement opportunities)	Lack of local empowerment through procured goods and services supply	-The procurement stage for the exploration and quarrying should follow a fair and transparent process. -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. -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	-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

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		to build capacity for the local company(ies).				

Table 5-2. 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
EXPLORATION, CONSTRUCTION (QUARYY DEVELOPMENT) AND QUARRYING						
EMP implementation and training	Lack of EMP awareness and implications thereof	-EMP trainings should be provided to all new workers on site and to old workers (as a refresher) every 6 months. -All site personnel should be aware of necessary health, safety, and environmental considerations applicable to their respective work -The implementation of this EMP should be monitored. -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**. -An EMP non-compliance penalty system should be implemented on site. -The ECC should be renews on time	-Compliance monitoring conducted monthly for the exploration phase and annually for the mining phase and recorded -EMP Refresher training for employees/workers every 6 months in both phases -Timely renewal of the Environmental Clearance Certificate (ECC) every 3 years	-ECO / SHE Officer -Technical Staff (Independent Environmental Consultant): EMP compliance and auditing -DEAF: site inspections for compliance	-Monitoring reports ECC renewed on time -Records of EMP training conducted -Funds (N$300 for ECC Renewal every 3 years)	-Throughout the exploration and quarrying phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
Slope stability	Sope instability in the quarry after heavy rains	-Monthly site inspections should be conducted by a geotechnical engineer to assess stability of quarry slopes or walls, and recommend stabilization measures where necessary	-Presence, frequency and extent of ground cracks -General condition of quarry walls (is there evidence of slumping, loose rocks at the base of slope, over-hanging rocks)	-Site Exploration / Manager (holds overall responsibility) -Geotechnical Engineer/Geotechnical Consultant	-Technical Staff (Geotechnical Engineer) -Stability Reports	Once every month and as and when signs of ground instability is detected/observed
Physical Land (soils)	Soil disturbance Soil erosion	-Overburden should be handled more efficiently during both exploration and mining operations to avoid erosion when subjected erosional processes -Prevent creation of huge piles of waste rocks by performing sequential backfilling. -Stockpiled topsoil and overburden waste rocks should be used to backfill the explored and quarried and disturbed site areas/spots during site rehabilitation. -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. -Project vehicles and machinery should stick to access roads provide and or	-Record any evidence of new traffic tracks outside of designated access and haul roads by means of photograph -Record evidence of new erosion gullies (photographs) -Annual site wide evaluation on the effectiveness of erosion control efforts including erosion control structures	-SHE Officer -Hired soil scientist	Technical Staff (Soil Conservation Scientist to offer training and monitor depth profiles as well as contamination levels	Throughout the Exploration and quarrying phases -Once every 6 months for monitoring depth of soil profile

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		meant for the project operations but not to unnecessarily create further tracks on site by driving everywhere resulting in soil compaction. -Haul roads must have compacted drainage channels along shoulders covered with riprap (or possibly concrete lined) to minimize erosion -Access roads should be designed appropriately in a manner that disturbs minimal land areas as possible. -Make use of the existing road network as much as possible and avoid off-road driving. -All traffic should stick to access roads provided and or meant for the project operations.				
Water Resources	Water use (quantity)	-Water should be efficiently used by implementing water saving measures such as recycle and re-use where necessary and possible. -Water conservation awareness and saving measures should be made to all employees and become accountable.	-Proof or recording/ quantification of water saving efforts.	-Exploration / Mining Manager -ECO	-Monthly records of water used	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
Physical land / soil disturbance	Susceptibility to erosion and compaction	-Minimize footprint area of drilling and test quarrying operations, and therefore limiting the disturbance footprint to a minimal area as much as possible -Minimize soil contamination through containment and handling of potential pollutants (e.g., oils, drilling fluids) -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) -Ensure that the overall thickness of soils placed during reclamation and rehabilitation is consistent with surrounding undisturbed areas and future land use -Design test quarries and access track roads such that their slopes are battered to an appropriate gradient for rehabilitation -Schedule quarrying works in such a manner that it does not coincide with	-Soil erosion prevention measures are visibly in place. -No soil erosion linked to project activities. -No stockpiled topsoil left after exploration and quarrying	-ECO	-TLB / Front-end loader -Excavator for backfilling	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		periods of heavy rainfall to the extent practical -Avoid creation of new access roads to the extent practical -Always make use of emergency spill trays underneath all machinery -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.				
Water resources	Over-abstraction of water resources	-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. -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.	-Proof or recording/ quantification of water saving efforts. -Recycling and re-use of water onsite -Monthly and annual records of water used	-Exploration / Mining Manager -ECO	None	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
Land Use	-Changes in land use due to creation of quarry and erection of site infrastructure	Complete prevention of this impact will not be possible; however, the extent of the impact can be minimized by: -ensuring that changes in land use are confined to the footprints of the access track roads, the exploration camp, and targeted test quarrying sites. Further control measures to reduce the risk of this impact include the following: -The project activities should target areas that are at least 400 m from existing homesteads and boreholes to minimize land use change close to sites of human settlement -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 -Place/ position the exploration camp(s) closer to target sites for drilling and test quarrying -The Proponent must promptly communicate any foreseeable conflicts with farming or human settlement activities to avoid	Visible efforts onsite	-Proponent -Exploration / Mining Manager	None	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		compromising relationship with the affected communities.				
Topography and Landscape	Change on the landscape and topography	-Implement ongoing rehabilitation practices, e.g., by reclaiming and rehabilitating unsuccessful test quarries immediately and associated access roads -Minimize safety risks to workers, the public and animals, as well as conflicting relationships with communities by fencing off active and preserved test quarry sites, and putting danger tapes around such sites -Target sites with exposed bedrock to the extent practical to avoid creation of overburden dumps -Where practical excavate test quarries adjacent to abandoned trenches created by small scale miners to minimize the extent of landscape and topography disturbance -Where deeper test quarries are created to extract sample blocks practice rockface blinding by placing				

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		natural waste rock material against exposed test quarry faces -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				
Flora (Vegetation)	Loss and disturbance of flora biodiversity	-Avoid illegal wood gathering by enforcing harsh measures to workers for non-compliance -Rescue any endemic species that may be destroyed by the proposed activities and donate them to registered nurseries -Make minor deviations to existing access roads to avoid areas of thick and/ or sensitive vegetation -Formulate and implement suitable and appropriate operational management guidelines for the cleared areas. Incorporated in the guidelines are the progressive rehabilitation measures. These should be considered:	The removal of vegetation is minimized The permit to remove mopane trees, where deemed necessary is obtained The creation of access is limited	-Exploration / Mining Manager -ECO	Forestry Directorate at MEFT (Permit to remove protected species)	Throughout the project phases, and when necessary (for permit application)

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		*Post closure land-use measures and/or establishment of self-sustaining indigenous vegetation. *Erosion management measures -No muddy and dirty equipment should be brought onto site as this is likely to carry seed of alien species -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.				

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
Fauna (animals)	Disturbance and killing of indigenous fauna: local livestock and wildlife as well as reptiles	-Domestic animals found within or within proximity of the site should not be killed, snared, or captured. -The harming and killing of animals' species encountered onsite (small or big) is strictly prohibited. Poaching (illegal hunting) of the wildlife on and around the site is strictly prohibited -Prevent animal access to exploration and mining camp or active sites through fencing -Enforce speed limits and traffic control measures to minimise the risk of road kills -Prevent illegal hunting and trapping by enforcing harsh non-compliance measures to workers -Prevent creation of hazards by means of good "housekeeping" and prevention of litter -Any animal fatalities should be recorded, and the causes established and remedied for monitoring purposes	-No complaints of site workers killing livestock -No incidents of poaching related to the project workers. -Workers are educated on the importance of respecting community properties (part of their induction and contracts)	-Proponent -Exploration / Mining Manager -ECO	-Grievance logbook -Anti-poaching Unit of the Namibian Police -MEFT: Parks	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Avoid disturbance of vulture and other bird nests (if any) during the breeding season -Avoid activities close to large trees near the base of the mountains -Cap or seal off drill holes to prevent small mammals from getting trapped -Any incident of poaching related observed by the project personnel should be reported to the Police. -The Proponent should promote environmental education on the importance of faunal biodiversity preservation to all site workers.				
Non-exploration / quarrying waste	Environmental pollution	-General waste including used PPE will be stored on site in designated bins and regularly collected for transportation to waste facility in Opuwo (upon prior agreement of waste disposal with the Town Council). -Recyclable waste will be stored on site in designated bins and regularly collected for transportation to	-Waste are disposed in designated containers -Waste is recycled and re-used	-Exploration / Mining Manager -ECO	-Waste containers -Waste recycling companies	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		designated waste facility in Opuwo (upon prior waste disposal agreement with the Town Council)) -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 -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 Opuwo or possibly used for firewood by the exploration and quarrying crew -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 -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	-A register of all non-exploration and quarrying waste generated and kept on site.			

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-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	-Project workers should be sensitized to dispose of waste in a responsible manner and not to litter. -Ensure regular removal of general waste to an approved waste fill area in or close to Opuwo -Promote the recycling or disposal to an approved hazardous or industrial waste site in or close to Opuwo -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 -Ensure provision of adequate waste skips at all working sites, exploration, and mining (quarrying) camp -Fence off areas where such waste is stored to eliminate possible contact with domestic and wild animals. -The site should be equipped with enough portable toilets that should be	-Waste are disposed in designated containers -The site is equipped with sufficient toilets that are emptied accordingly. -Waste is recycled and re-used -A register of all waste generated and kept on site.	Exploration / Mining Manager -ECO	-Waste containers -Waste recycling companies	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		emptied in accordance with their manufacturers' instruction.				
	Hydrocarbons release into the environment (grease, oils, fuel spills and leakages from machinery and fugitive wastes.)	-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). -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 bundled and paved, and the use of chemicals must be controlled. -Waste oil, fuels and other chemicals from drip trays on stationery vehicles and machinery will be disposed of as hazardous waste at a licensed facility by a specialist hazardous waste handler. -Spill kits will be easily accessible, and workers will be trained in the use thereof.	-No spillages on the surface -There are sufficient containers for hazardous waste -There are warning signs for the hazardous waste and hydrocarbon containers presence onsite. -Register of hydrocarbons containers onsite.	-ECO -Contractor	-Hazardous waste bins -Material log sheet	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Staff and contractors will be trained in the handling and storage of oils, fuels, chemicals and other hazardous substances -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.				
Surface water resources	Contamination of surface water through runoff and infiltration	-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 exceedance probability (i.e., the 1 in 100-year) flood event. -Maximise the recycling and reuse of external water during drilling and test quarrying operations. This will minimise water demand from the external sources	-Stormwater is contained and diverted to the designated points. -No disposal of contaminant onsite or in water systems	-Exploration / Mining Manager -ECO	-Stormwater management systems -Waste containers for hazardous waste -Wastewater management systems	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Establish water quality control procedure involving regular sampling and quality testing at sites downstream of active sites -Keep clean water away from test quarrying, drilling and exploration camp sites using simple diversion channels -Store effluent wastewater in designated septic tanks at the exploration site and regularly drain this by hiring a registered wastewater management entity -Apply erosion controls such avoiding leaving open excavations in streams and riverbeds to minimize sediment runoff -Make use of emergency spillage trays at all active sites to minimize risk of surface water contamination from hydrocarbon spillages				
Groundwater resources	Contamination of groundwater	-Due to the shallow nature (<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	Measurement of baseline groundwater levels	-ECO -Exploration / Mining Manager	-Water level dip meter and related in-situ water level and quality	Baseline groundwater levels to be measures prior to exploration

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		groundwater resources are perceived to be low. -If any groundwater is intercepted in test quarries, pump, store and reuse such water -Maintain all vehicles to prevent spills of oils, hydraulic fluids, etc -No effluent water should be discharged into the environment. -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 Opuwo -Bund all hazardous liquid storage installations such as the trailer mounted diesel tank -Baseline groundwater quality measurements should be established right before the commencement of the planned activities by sampling groundwater from existing domestic boreholes. During exploration, groundwater samples should be	Monitoring of the groundwater table /depths during quarrying and recorded		measurement equipment	(from boreholes within a 2km radius)

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		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, CO3, HCO3, Cl, SO4) 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 -Any wastewater (effluent) to be 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	-Stockpile loose top and sub-surface soils in designated areas away from places of residence	-Dust suppression measures implemented	-Proponent -ECO	-Grievance logbook	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
	unpaved access roads	-Avoid clearing vegetation unnecessarily or too far in advance of test quarrying -Place crushed gravel with less fines on access roads close to homesteads to minimize dust levels -Drill machines must be fitted with dust filters -Ensure minimum travel distances between working areas and stockpiles -Consider the utilization of reasonable amount of water to suppress dust on problematic site areas. -Ensure that all vehicles and machinery are maintained in good working condition and that they are serviced on regular basis -Ensure that all vehicles are switched off when stationary – no vehicles should be idling for extended periods -Enforce speed limits of 50 km/ hour, and lower proximal to places of residence	-Visible efforts to curb dust.		-Dust suppression water tanks -Dust masks for workers	

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Avoid stripping and bulk excavation activities on very windy days -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 -Provide a complaint register on site where complaints can be made. This register should enable effective 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 -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				

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Avoid burning of waste material on site -Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable -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 quality concerns. -Dust masks, eye protective glasses and other respiratory personal protective equipment (PPE) such as face masks should be provided to the workers. -The vehicles carrying dusty materials should be covered to prevent materials being blown from the vehicle.				
Health and Safety	Occupational injuries from mishandling equipment,	-The site workers and visitors should be equipped with appropriate and sufficient PPE (hand gloves, safety googles, boots, earplugs, overalls, face masks, hard hats, etc). -Trainings and ''know-how'' to use PPE should be provided to all workers as part of their induction.	-Comprehensive Safety & Health Systems -Adequate PPE for all workers and visitors -Regular health screening of workers -Annual health and	-Proponent -Exploration / Mining Manager -ECO	-Safety & Health Awareness pamphlets and Trainings -First aid kits -PPE -Nearest Health facility (Centre)	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-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. -Procedures for dealing with injuries or accidents must be in place and all contact details for emergency personnel available. Zanite Investment's safety and emergency response manual must be applied. Such manuals must be developed based on statutory requirements stipulated under the Labour Act. -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.	safety audits done -Health & Safety is part of the inductions -Health & Safety Education		-Warning signs onsite in both English and Otjiherero and Damara Nama languages	

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-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: -The daily limit for the protection of human health over a 24hour period is 75 µg/m^3 -The annual limit for a calendar year is 40 µg/m^3 -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 -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 -Record and report all health and safety incidences -The following features of the project's design and management will reduce				

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		risk of mosquitos breeding on the project site: -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 Opuwo regularly.				
Noise	Noise from project activities	-All workers on site must be equipped with ear plugs to be used when exposed to excessive noise. -Switch off machines that are not used. -Regular maintenance of drilling / quarrying and earth moving machinery should maintain noise to acceptable levels for operators and the public. -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.	-Planning of weekdays activities -PPE provided to workers operating noisy equipment and in noisy site areas. -Complaints of excessive noise from residents	-Exploration / Mining Manager -ECO	-Clearly written placards with blasting hours in a day placed near the site	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-The activities are to take place during daytime (07h00 to 17h00) only to minimise nuisance to residents. Periods of silence during the day may be necessary. -When working in areas within 500m of homesteads silencers should be fitted and maintained on diesel powered equipment and vehicles -Train personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events -Leave as much vegetation in the surrounding as possible to act as noise buffers -Keep communities informed of planned drilling and blasting, earth moving and test quarrying schedules through fortnightly radio announcements through the traditional authorities. -Keep a logbook of noise complaints and implement remedial actions promptly as far as practical				

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Install portable noise monitoring devices at the crusher site as well as 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 (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: -All project activities must not be carried out in the night, early morning (before 07h30) and evenings (after 17h00).				

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

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Potential flammable areas and structures such as fuel storage tanks should be marked as such with clearly visible signage.				
Visual	Visual impact (aesthetics) and night lightings	-Ensure that there are no elevated overburden dumps or final voids post-test quarrying and actual quarrying -Drilling sites will be progressively rehabilitated to create landscape like the surrounding undisturbed areas. -Unsuccessful test quarrying sites will equally be rehabilitated progressively -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. -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 for the development and subsequent quarrying.	-No complaints of night bright lights from the site by the nearest local communities. -No visual nuisance from the contrasting view of the koppies facing the frequented local/main roads	-Proponent Exploration / Mining Manager -ECO	None	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-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. -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.				
Archaeology and heritage	Accidental disturbance and destruction of archaeological or heritage objects and sites	-Identified of any archaeological significant objects on the site should not be disturbed but are to be reported to the project ECO who informs the National Heritage Council offices for further instructions and actions. -Be familiar with the National Heritage Council's Chance Find Procedure (please refer to **Appendix 1**) and if uncertain about the procedure should receive training by a suitably qualified	-Preservation of all artefacts that are discovered around project area -Cessation of work upon discovery/unearthing of unknown objects	Exploration / Mining Manager -ECO -Archaeologist	-Salvage equipment -Flag tapes -GPS (site marking) -Technical Staff/Consultant (Archaeologist to help identify and	As and when required, prior to site setup activities and upon encounter -Archaeologist to be present during the earth workings

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		archaeologist with respect to the identification of archaeological/heritage remains. -Use spotters during shallow excavation works -Survey the spatial extent and exact locations of know sites -Consider hiring a part time qualified Archaeologist during the exploration stage to help in identifying potentially unknown/unrecorded heritage resources on the koppies and ensure their protection.			advise on heritage object discovery)	
Social conflicts	Land Use Conflict Issues	-From the onset the project proponent must ensure that they maintain transparent and inclusive communication channels with the leadership (of Otjikakurukouje Traditional Authority) and communities of Orupembe and Onjuva as well as the two communal conservancies (Orupembe and Epupa)	-Bi-Annual community update meetings (or when required) with community leaders -No complaints of unaddressed raised issues	-Proponent -PRO	-Grievance logbook -Project Work schedules -Open communication channels	Throughout the project phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-The local government (e.g., the traditional authorities, leaders of the 2 conservancies and constituency councillors) must assume a leadership role in coordinating and promptly attending to any conflicts that arise between the affected communities and the project Proponent -The management of Zanite Investment 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				

5.3 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 5-3. <u>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.</u>**

Table 5-3. The Rehabilitation and closure measures after site closure

Aspect	Mitigation Measure(s)	Completion criteria
Stockpiled topsoil, disturbed and mined-out areas	- All exploration boreholes excavated pits and test quarries that will no longer be required for mining purposes will be backfilled. -The stockpiled topsoil on explored site areas that no longer serve purpose for mining phase, should be levelled. -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. - Mined-out areas on worksites should be rehabilitated by stockpiling and backfilling. -Provision of both financial and technical resources for progressive rehabilitation and post-exploration/quarrying activities should be made.	None
Re-vegetation	-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: • Prepare surface rehabilitation areas for the natural establishment of vegetation by undertaking the following: • Rip disturbed footprint to a depth of approximately 500 mm with suitable agricultural equipment to alleviate compaction. • 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.	-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. -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.

Aspect	Mitigation Measure(s)	Completion criteria
	• 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. • Undertake vegetation monitoring (including % recovery of un-revegetated sites) post closure to ensure rehabilitation success.	
Surface infrastructure	**Infrastructure for Potential Beneficial re-use** • Compile an inventory of infrastructure and equipment to potentially remain at closure, aligning to end land use plan. • Obtain legal authorisations from Farm owners or occupiers of land for infrastructure to remain and be transferred; and • Finalise agreements with third parties, along with transfer schedule. **Service infrastructure to be removed** • Remove all assets/equipment that can be profitably removed for salvage or resale. • Dismantle/demolish infrastructures such as offices, tanks, camps, ablution container; water storage container/tank, and accommodation containers. • Decontaminate hazardous waste storage tanks and containers at a dedicated decontamination bay in Arandis or to the nearest town with capable facilities. • 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. • Backfill excavations of disturbed infrastructure footprint areas through a cut to fill action. • Shape and profile the disturbed surface areas to match surrounding topography and to ensure free drainage, thus limiting run-off erosion. • Stabilise disturbed areas to prevent erosion and sediment mobilisation in the short to medium term until a suitable vegetation cover has been established. • Rip disturbed footprint to a depth of approximately 500 mm with suitable agricultural equipment to alleviate compaction; and • Establish vegetation species that mimic the surrounding flora by collecting seed from pristine bush and shrub land and actively planting before the wet season. **Measures relating to support Infrastructure**	-Formal transfer of ownership and liability of specific infrastructure -Independent sign-off by a qualified engineer confirming the safe and stable condition of all transferred infrastructure -All other infrastructure decommissioned to ground level and removed from site

Aspect	Mitigation Measure(s)	Completion criteria
	• Obtain legal authorisations for infrastructure to remain and to be transferred. • In addition, Identify and donate equipment to affected communities that can be reused and/or recycled • Dismantle the remaining overland pipelines and salvage as possible. • Seal open ends of buried pipelines and fully cover with nothing exposed. **Measures relating to transport Infrastructure** • Agreements will be put in place between Zanite Investment and local communities as well as the relevant authorities for roads to remain post closure for beneficial use by the communities. -Roads that will no longer be used by local community post closure will be rehabilitated as follows: • Access roads to completed/mined out ridges or ridges will be closed off to avoid re-creation of tracks over such areas. • Re-establish natural drainage, including the removal of culverts and/or trenching • Profile to be free draining and emulating the natural surface topography. • Rip access roads to a depth of approximately 300 mm with suitable agricultural equipment to alleviate compaction; and • Establish vegetation species that mimic the surrounding shrub/bushland by collecting seeds from pristine surroundings and actively planting before the wet season. **Measures relating to Electrical Infrastructure** • Remove generators offsite and demolish concrete bases. • Dispose of demolition waste at demolition waste site. • Clean up contaminated soils at the generator site, as required **Measures relating to crusher plant and Mobile Machinery/ Vehicles** Conveyors • Dismantle steel structures and demolish concrete footings; and • Dispose demolition waste at demolition waste site Crusher site • Dismantle/demolish crushing site and related infrastructure.	

Aspect	Mitigation Measure(s)	Completion criteria
	• Decontaminate crushing plant equipment at dedicated decontamination bay in Arandis or any nearest capable facility, upon agreements. • 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. • Clean up contaminated soils; and • Undertake general surface rehabilitation <u>Machinery and Vehicles</u> • Identify equipment that can be reused and/or recycled that will not be salvaged. • Remove remaining equipment offsite for sale or disposal at a registered waste site in Arandis; and • Clean-up contaminated soils.	
Above Ground Openings (quarry, diversion ditches)	• Place topsoil over the backfilled area. • Shape footprint area to be free-draining (aligned to site-wide routing). • Rip area to alleviate compaction; and • Establish vegetation.	None
Petroleum products	• Remove oil drums and petroleum products off site for resale/use. • Demolish the storage area and associated tanks in which petroleum products are stored. • Decontaminate at dedicated decontamination bay in Arandis or any nearby capable waste facility. • Demolish and excavate concrete foundations to 1 m below ground level, and • Clean up contaminated waste.	None
Contaminated soils	-Undertake a site-wide contaminated soil to determine the nature and extent of contamination, the sources of contamination and to identify appropriate remediation measures. -Rehabilitate moderately contaminated (inorganically contaminated) soils as follows:	-Inorganically contaminated soils are safely disposed of at the Arandis or any nearest capable and approved waste management site, subject to granting of relevant permits.

Aspect	Mitigation Measure(s)	Completion criteria
	• Excavate contaminated material to a depth of 300 mm and remove and dispose of at the Arandis landfill site or any nearest capable and approved waste management facility. -Rehabilitate moderately contaminated (organically contaminated) soils as follows: • Treat organic contamination by means of biological remediation via the establishment of a bioremediation site and monitor soil quality against a selected control site.	-Organically contaminated soils are effectively treated and compositions are restored to acceptable levels once compared with control sites.
Solid waste	• Sort and screen waste produced from the dismantling and demolition of infrastructure. • Crush decontaminated concrete, if required, to reduce uptake in waste cells. • Recycle waste that can be recycled/salvaged (e.g., steel) after decontamination; and • Dispose of inert demolition waste at the Arandis landfill, upon agreement with the Town Council	None
Quarry	Refer to **Table 5-4** 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).	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 5-4.**

Table 5-4. 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.

After-use solution	Suitability for natural (dimension) stone quarries
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 current conditions.
- Establishing long term trends in disturbed systems.
- Estimating inherent variation within the environment, which can be compared with the variation observed in another specific area.
- 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 crusher plant or other 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.
  - blasting operation details to ensure that the blasting design and execution plans are strictly being followed.
  - 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.

Appendix 1: Archaeology's Chance Finds Procedure (CFP) After Kinahan, 2020

Areas of proposed activities or developments 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:

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

Procedure:

Action by person identifying archaeological or heritage material:

a) If operating machinery or equipment stop work

b) Identify the site with flag tape

c) Determine GPS position if possible

d) Report findings to foreman

Action by foreman

a) Report findings, site location and actions taken to superintendent

b) Cease any works in immediate vicinity

Action by superintendent

a) Visit site and determine whether work can proceed without damage to findings

b) Determine and mark exclusion boundary

c) Site location and details to be added to project GIS for field confirmation by archaeologist

Action by Archaeologist

a) Inspect site and confirm addition to project GIS

b) Advise NHC and request written permission to remove findings from work area

c) Recovery, packaging and labelling of findings for transfer to National Museum

In the event of discovering human remains

a) Actions as above

b) Field inspection by archaeologist to confirm that remains are human

c) Advise and liaise with NHC and Police

d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed