



UPDATED Environmental Overview and Environmental Management + Rehabilitation Plan (EMRP) Report to Support RENEWAL and TRANSFER of the Environmental Clearance Certificate for continuation of small-scale quarrying and ongoing brownfield prospecting of blue sodalite for dimension stone production and semi-precious stones on mining claims 66887, 66888 and 66921 in the vicinity of Oroutumba village in the Epupa Constituency, Kunene Region, Namibia

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ECC Renewal & Transfer – small scale quarrying & ongoing prospecting of blue sodalite for dimension stone and semi-precious stones on Mining Claims 66887, 66888 and 66921

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LIST OF ABBREVIATIONS

DEAF	Department of Environmental Affairs and Forestry
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMRP	Environmental Management & Rehabilitation Plan
EMA	Environmental Management Act
ECC	Environmental Clearance Certificate
I&APs	Interested and Affected Parties
MAWLR	Ministry of Agriculture, Water & Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
MLIEC	Ministry of Labour, Industrial Relations and Employment Creation
MME	Ministry of Mines and Energy
MWT:	Ministry of Works and Transport

1 INTRODUCTION

Mr. Jacobus Zandberg (herein referred to as the Proponent) is the rightful holder of the 3 mining claims concerned, namely: 66887, 66888 and 66921 and intends to enter into a contract mining agreement with any local or international company which has financial, technical and equipment capacity to safely and profitably extract blue/ purple sodalite from these claims either for the production of dimension stone or semi-precious stones. Previously, Mr. Zandberg was in a mining contract agreement with Best Cheer Investments Namibia (Pty) Ltd (herein referred to as BC) for the same activities. The latter entity provided the necessary technical and equipment capacity support to the claim's holder. The quarrying of sodalite on these claims temporarily ceased in mid-2018 when the environmental clearance certificate expired, and thereafter, focus shifted towards moving the extracted and stockpiled sodalite products (both rectangular blocks and piles of stones) to the BC processing facility in Walvis Bay and/ or directly to the Walvis Bay port from where the products were shipped to offshore markets.

The proponent is obliged under the Environmental Management Act (Act no. 7 of 2007) and its Environmental Impact Assessment (EIA) Regulations of 2012, to renew the environmental clearance certification (ECC) to permit ongoing brownfield prospecting and small to medium-scale quarrying of sodalite rock every three (3) years. The renewed ECC shall in turn be used to support the renewal of the registration of the mining claims under Mr. Zandberg's name in accordance with the Minerals Mining and Prospecting Act of 1992. The current ECC was granted by the then Department of Environmental Affairs on 3rd July 2015, and expired on 3rd July 2018. However, this ECC was wrongly registered under Best Cheer Investment Namibia (Pty) Ltd which was rather only the mining contractor and did not hold any statutory prospecting or mining rights to the concerned claims. **For this reason, it must be noted that the new ECC being applied for subsequent to the submission of this report should be registered under the rightful claims holder, Mr. Jacobus Zandberg.** The mining claims were granted to Mr. Zandberg by the Ministry of Mines and Energy (MME) between January and February 2015 and expired in January/ February 2019.

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In order to fulfil the ECC renewal process OMAVI Geotechnical and Geo-environmental Consultants (herein referred to as OMAVI) was appointed to carry out an Environmental Overview Assessment (EA) and update the previous Environmental Management Plan (EMP). The updated EMP (or the Environmental Management & Rehabilitation Plan, EMRP, as it is referred to in this report) documents the current conditions and activities on the concerned license areas as well as the various impact mitigation and enhancement measures which have been implemented or are planned for implementation to better manage significant impacts which may be triggered by future small-scale sodalite prospecting and quarrying activities.

In identifying and assessing the risk levels of the various current and potential impacts, and developing suitable management measures, consideration was given to all stages of the project's value chain and/ or life cycle from brownfield prospecting, through quarry and support infrastructure construction to quarrying operations and ongoing site rehabilitation.

This document will be submitted to the offices of the Environmental Commissioner in the Ministry of Environment, Forestry and Tourism (MEFT) as well as the Office of the Mining Commissioner under the Ministry of Mines and Energy (MME) to assist these competent authorities in making an informed, knowledge-based decision on the renewal of the Environmental Clearance Certificate (ECC) for the small-scale quarrying activities to continue over the next three (3) years.

1.1 Objectives of this Report

The objectives of this report can be summarised as follows:

- To document the scope of activities that will be covered under the new Environmental Clearance Certificate (ECC);
- To provide a brief overview of current environmental, geological, topographical and visual landscape conditions within and around the mining claims; current conditions of the socio-economic profile of the area; and the general condition of habitats, current land uses, and existing infrastructure;
- To document the current environmental impacts incurred so far in the area as well as those that could be triggered by future operations;
- To update the previous Environmental Management Plan (EMP) so that it remains relevant to ongoing and future sodalite prospecting and quarrying operations; and
- To support renewal and transfer of the ECC, taking into account current and potential operational triggers of the significant impacts.

1.2 Project Location and Mining Legacy of the Area

Mining claims 66887, 66888 and 66921 are located in Oroutumba village in the Epupa Constituency, Kunene Region. The claims can either be accessed from Ruacana via the D3700 gravel road along the Kunene Revier, or from Opuwo in the south via the C43 and D3701 gravel roads. The approximate corner coordinates for the claims are provided in **Table 1-2**. Their respective distances from nearby towns of Ruacana and Opuwo are provided in **Table 1-1**. The mining claims fall on communal state land under the Kunene River Communal Conservancy as shown in **Figure 1-1**.

The coordinates of the two sites concerned are provided in **Table 1-2**.

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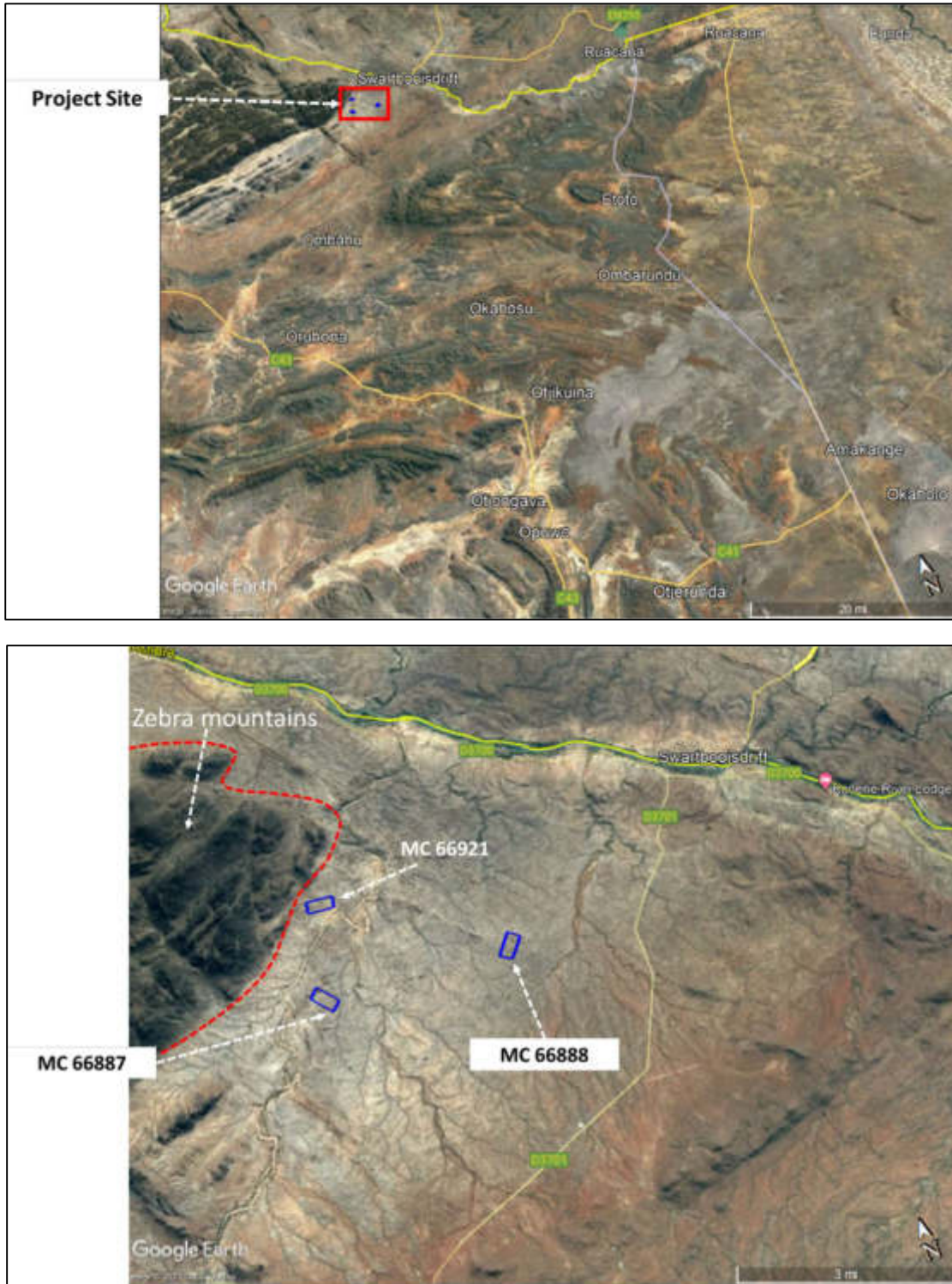


Figure 1-1. Locality maps of mining claims 66887, 66888 and 66921.

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Table 1-1. Measured distances to the mining claims area from nearby towns of Ruacana and Opuwo

MINING CLAIM	APPROX. DISTANCE FROM RUACANA VIA D3700 & SMALL ACCESS TRACKS	APPROX. DISTANCE FROM CAPITAL TOWN OF OPUWO VIA C43, D3701 & SMALL ACCESS TRACKS
66887	84 km	125 km
66888	85 km	125 km
66921	82 km	125 km

Table 1-2. Approximate corner coordinates of the mining claims

Project Location			
Approximate Site coordinates:	Mining claim 66887:		
	MC	Lat	Long
	66887	-17.361389°	13.758611°
		-17.365556°	13.762500°
		-17.367500°	13.760556°
		-17.363333°	13.756667°
	Mining claim 66888:		
	MC	Lat	Long
	66888	-17.363333°	13.802222°
		-17.365000°	13.804722°
		-17.369167°	13.801389°
		-17.367778°	13.798889°
Mining claim 66921:			
MC	Lat	Long	
66921	-17.343056°	13.761944°	
	-17.343333°	13.767778°	
	-17.345833°	13.767500°	
	-17.345556°	13.761667°	

The area of Oroutumba and surrounding areas have undergone mining operations during the last 60 years. Small scale mining (both artisanal and mechanized) of lumps of sodalite and other ornamental stones is presently ongoing in the area. The concentrated mining claims have also been quarried on a small scale in the past, including the extraction of large sodalite blocks by Best Cheer Investments Namibia (Pty) Ltd within the same blocks. It was also revealed that large-scale production of sodalite blocks took place on the nearby Mining License 40 during the period 1998 to 2006, and operations were subsequently downsized and ceased in 2017.

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1.3 The Proponent

Mr. Jacobus Zandberg is the holder of the 3 mining claims concerned in this assessment. Small-scale quarrying of sodalite was undertaken at selected and isolated spots within the claims by Best Cheer Investments Namibia until mid-2018. Thereafter, focus shifted towards moving the extracted blocks and semi-precious stones to the port of Walvis Bay for export purposes. No other activities have taken place on the claims since the temporary closure in mid-2018.

1.4 The Environmental Consultant

OMAVI Geo-technical and Geo-environmental consultants (hereinafter referred to as OMAVI) has been appointed by the proponent to act on their behalf as an independent environmental consultant to carry out an Environmental Overview, update the current Environmental Management Plan (EMP) and submit these documents to the Department of Environment Affairs and Forestry (DEAF) as part of the application for the renewal and transfer of the Environmental Clearance Certificate (ECC).

The Environmental Overview and the drafting of the Environmental Management & Rehabilitation Plan (EMRP) were conducted by a qualified and experienced environmental assessment practitioner, whose detailed curriculum Vitae (CV's) is submitted with this report.

1.5 The Current Environmental Clearance Certificate (ECC)

Based on the previous Environmental Scoping Assessment Report and Environmental Management Plan reports, the scope of activities covered under the expired ECC range from greenfield and brownfield prospecting to allow small-scale quarrying of sodalite rock and associated support activities (such as product stockpiling, transportation, access roads, operation of mechanical workshops, etc).

At the time of this assessment there were no ongoing quarrying operations on the concerned claims but historical small isolated open and partially backfilled quarry pits were observed within the claims during the site visit while much large pits were observed in the surrounding areas where quarrying of similar rock was historically conducted or is being conducted by other operators as well as by local artisanal miners. Patches of cleared ground and small poorly developed access tracks were also observed within the concerned claims. Quarrying activities on the concerned claims by the contractor miner, BC, were temporarily halted in mid-2018 following the expiry of the ECC. Some of the small open pits which sodalite was extracted were partially backfilled but others remained open as observed during the recent (February 2022) site inspection. The ECC issued for the above activities has since expired. The copy of the current and expired ECC is submitted together with this report.

1.6 The Application for Renewal of the Current ECC

For the project to remain compliant with local environmental legislation and ensure sustainability, an ECC renewal application has been launched with the Competent Authority (i.e., Ministry of Mines and Energy (MME)). This ECC renewal application has to be supported by an Environmental Overview and updated EMRP report which must be submitted to the Regulatory Authority, the Ministry of Environment, Forestry and Tourism (MEFT))'s Department of Environmental Affairs and Forestry (DEAF). The ECC Renewal Application was compiled and submitted to the MME on the 29 May 2022. **Additionally, an ECC transfer application was also submitted to DEAF together with this report to help support the transfer of the renewed ECC from Best Cheer Investments Namibia to Mr. Jacobus Zandberg.** The date stamped copies of the ECC Renewal and Transfer applications are attached to this report as **Appendix A**.

The Environmental Overview and updated EMRP report shall be submitted to the DEAF for evaluation and consideration for the issuance of a new ECC which must be registered under Mr. Jacobus Zandberg. The updated EMP includes information of changes that have occurred to the claim areas from the date of issuance of the expired ECC to date, a brief summary of the current condition of the environment, and lastly, the environmental management and mitigation measures that should be implemented going forward. It is recommended that the latter measures should form part of the set of conditions under which the renewed ECC must be granted if the Environmental Commissioner is satisfied.

1.7 Motivation for ECC renewal and continuation of project activities

The project is substantiated on the following merits:

- The demand for blue sodalite dimension stone as well as crushed sodalite crystals is picking up in key markets such as Asia. For this reason, the project proponent is eager to kick start production on the concerned claims so that they can contribute towards meeting this demand.
- The continuation of prospecting and quarrying activities on these claims will ensure local business sustainability in the broader community of Otjimumhaka because of the following possible livelihood improving opportunities:
 - Sourcing of local labour for the sorting of sodalite crushed stones and crystals.
 - An opportunity exists for local waste recycling companies to enter into offtake contracts for disposal of used oils, used tyres and scrap metals. This will be an effective waste management measure whilst providing business opportunity for local entrepreneurs.
 - Ad hoc earthmoving plant hire and mechanical maintenance opportunities are expected to arise for businesses with such capabilities in Ruacana and Opuwo.

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- Possible income opportunities for the Kunene River communal Conservancy through surface leave fees
- Direct job and skills development opportunities exist to the youths of Otjimuhaka and will continue to present themselves if larger quarries are developed and as new quarries open up.
- The payment of royalties and taxes to the relevant government institutions from the mining activities on the Mining Claim.

If ongoing brownfield prospecting and quarrying ceases on these claims, the above opportunities will either be lost or would not be realised.

1.8 The proposed ECC Renewal Application Process

The approach adopted by OMAVI in renewing the ECC can be summarised as follows:

1. Compilation of Background Information Document (BID) as a requirement to register the application with the Regulatory Authority (MEFT) – **already completed and submitted to MEFT.**
2. Compilation of the ECC Renewal and Transfer Applications, and submission to the Office of the Mining Commissioner in the Ministry of Mines and Energy (MME) (project Competent Authority) for notification and recommendations
3. Compilation of the Environmental Overview and Environmental Management and Rehabilitation Plan (EMRP). This document contains brief information of the project area's status, summary of the current and proposed project activities, and the updated management and mitigation measures.
4. Submission of the EMRP report to MEFT for evaluation and consideration for issuance of a new ECC.

2 PROJECT DESCRIPTION, ACTIVITIES AND PROCESSES

Historical and Current Project Activities, Infrastructure and Services

At the time of compiling this report there were no ongoing prospecting or quarrying activities or remnant infrastructure on the specific mining claims concerned. However, evidence of historical quarrying activities in the form of isolated patches of small discrete open pit quarries, remnant patches of product storage bays, and heaps of sodalite bearing crushed rock was observed across some of the claimed areas as shown in **Figure 2-1** below.

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Figure 2-1. Remnants of historical small-scale and possible artisanal quarrying of sodalite in the vicinity of MC 66887.

Envisaged Project Activities, Infrastructure and Services

The following activities, infrastructure and services are envisaged for the proposed project for dimension stone production sites:

- Exploration reverse circulation drilling in isolated targeted areas where sodalite ore is either known from historical quarrying or is partly exposed on the surface. Sites where exploration drilling results are positive will be followed up with more detailed and extensive prospecting techniques in the form of test quarrying. It is further envisaged that zones where continuous and less fractured seams of sodalite are encountered will strictly be preserved for the production of sodalite dimension stone blocks, and will therefore entail the following:
 - Full scale operation of small-scale isolated open pit quarries for the extraction and temporary storage of sodalite dimension stone. At this stage it is not clear how many of these quarries will be set up in each of the mining claims as that will be dependent on the results of the exploration drilling and test quarrying programs. However, at this stage it is envisioned that each dimension stone production site will include the following activities:
 - Topsoil and overburden stripping followed by quarrying and extraction of sodalite blocks up to 18 m³ in size using a combination of diamond wire saw and blade cutting tools, front end loaders, excavators, and tipper trucks
 - Continuous dewatering of open pit quarries (where necessary). Any rainwater or groundwater seepage from operational quarries will be regularly pumped out and stored in water storage tanks near the quarry

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and such water will be reused for dust suppression during block cutting and hauling, and also as a cooling agent on block cutting machines

- A block storage bay or platform will be created near each operational quarry for block sorting, temporary storage and loading. To minimise ground and landscape disturbance quarries that within a km of each other will share block storage bays, waste rock dumps as well as designated topsoil storage areas
- Stripping and stockpiling of surplus overburden and waste rock into designated overburden and waste rock dumps. All other waste rock and overburden will be used as fill for creating haul and access roads
- Surface clearing and creation, widening plus maintenance of existing and new access roads on site
- Ongoing prospecting (through RC drilling, visual field evaluation, and test quarrying) on new areas within the claimed areas
- Regular offloading of quarry support supplies and spares
- Regular loading and trucking of sodalite blocks
- Regular mechanical maintenance of vehicles, cutting machinery and earthmoving plant
- On site office/ administrative work and domestic space for accommodation purpose. These will be in the form of prefabricated structures which will be erected mid-way between the 3 mining claims, and will be installed on concrete slabs
- On site storage and refilling of 20 000 – 40 000L diesel tanks.
- On site re-fueling of all mobile plant.
- Regular laying out and shifting of dewatering and water supply PVC pipelines to and from active quarries
- On site temporary storage of liquid and solid waste in the form of used oils, used grease, used tyres, scrap metals, marble dust, and domestic/ office waste. Used diesel and grease are temporarily stored in plastic 5000L tanks before being disbursed to recycling companies.
- Operation of heavy-duty diesel powered gensets. These gensets are placed and/ mounted on concrete lined bunds but the bunds are not of sufficient size, and for this reason there is evidence of diesel spillages and soil pollution in the vicinity of these generators.
- It is recommended that for storage of sodalite dust earth dams should be constructed adjacent to the waste rock dumps and such dust must be disposed of there in a controlled manner.

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- Topsoil will be stockpiled near the cleared sites and must be protected and preserved for later use in rehabilitation works.
- Water to support quarrying operations will either be harvested from the open pits during the rainy seasons and stored in tanks, or will be carted from the Kunene River using water bowsers and ultimately pumped into water storage tanks on site.
- It is envisaged that each quarry will comprise approximately six (6) employees on site, 2 of whom will be Safety, Health and Environmental representatives. All the quarries will be operated under the direct supervision of a Quarry Supervisor who will be appointed prior to commencement of production.

Sodalite deposits where the rock mass is fractured or is considered too weak for the extraction of dimension stone blocks will be subjected to blasting to help win the sodalite ore. Blasted material will then be put through a primary crusher for further downsizing, and thereafter the crushed product will be sorted manually by hand into stockpile heaps of different sodalite quality materials. Crushing will be done in dry form to minimise impact on water resources.

The main infrastructure, machinery and services envisaged at each dimension stone quarry site shall include:

- Access and haul tracks/ roads. These will typically be in the range of 10m to 12m in order to accommodate heavy earth moving machinery.
- Prefabricated structures for accommodation, ablution facilities and site office. These will be powered by roof top solar panels. The approximate number of people to be accommodated on site will only become clear once it has been established how many quarries will be developed.
- Tipper, flat deck and water bowser trucks
- Front-end loaders, blade cutters, wire saw cutters, heavy duty diesel generators on concrete bunds, excavators, pneumatic drilling rigs for blocks,
- A single steel and corrugate sheet mechanical workshop and spares storage warehouse with concrete floors inside and around it to help contain any hydrocarbon spillages. This will be powered by a combination of heavy duty diesel generators and roof top solar panels.
- Perimeter fences with reflectors around each active quarry as well as around the workshop and accommodation sites.
- Plastic water tanks for temporary storage of water recovered from dewatering or from carting from the Kunene River.

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For areas where the sodalite occurs in patches or in a fractured rock mass the sodalite ore will be quarried, extracted and run through primary mobile crushers. After the primary crusher such ore will be sorted manually into heaps of different grades by hand. The heaps will be stored near the source quarries at designated bays, from where they will be loaded onto trucks. Top soil and overburden from those sites will be stockpiled separately and will be preserved for later use in rehabilitation works.

Key infrastructure, machinery and services at the envisioned quarries for producing crushed sodalite ore will include:

- A shared weighbridge will be constructed mid-way between the 3 claims. Every tipper truck leaving the crushed sodalite ore stockpiles will be weighed to determine the ore quantities
- Wheeled front-end loaders, an excavator, a bull dozer and tipper truck.
- The crushing process will be carried out using a combined set of mobile primary crushers, screens, and conveyor systems.
- The crushing plant and workshop, and Weigh Bridge will all be powered by heavy duty diesel generators to be installed on site. Diesel for the power generator and all plant will be stored on site in designated tanks which will be shared with the dimension stone production sites.
- Water supply for domestic consumption will also be sourced from the Kunene River. Depending on the labour force at each quarry one or more 10 000L water storage tanks will be installed near the crushing plants.
- It is anticipated that between 5 to 6 people will work at each crusher/ quarry site during normal operations

3 APPLICABLE LEGAL FRAMEWORK, POLICIES AND GUIDELINES

3.1 National Legislation

In Namibia all aspects related to mining and extraction plus processing of mineral resources are vested in the state and are regulated by the Ministry of Mines and Energy (MME) whereas sustainable exploitation and management of the environment and use of natural resources is regulated by the Ministry of Environment, Forestry and Tourism (MEFT).

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The Minerals Prospecting and Mining Act (Act No. 33) of 1992 is the principal act governing exploration, mining and beneficiation of mineral resources in the Republic of Namibia. From an environmental management viewpoint, this Act requires that an environmental impact assessment be undertaken prior to prospecting, mining/ quarrying and beneficiation operations, coupled with the development of implementable and measurable environmental management and monitoring plans where any changes to environmental conditions are anticipated. The Ministry of Mines and Energy is the custodian agency for the administration of the Mining Act.

Conversely, MEFT is the overseeing custodian agency for the administration and enforcement of the Environmental Management Act of 2007 (EMA), with the enforcement of the Environmental Impact Assessment Regulations of 2012 specifically being entrusted with the Department of Environmental Affairs and Forestry within MEFT. This Act stipulates that possession of an Environmental Clearance Certificate is a pre-requisite for the continuation of running or operating any activities that are listed under the Environmental Impact Assessment Regulations of 2012. The act further sets out under Section 58 and in the Government Notice No. 29 of 2012 a detailed framework and schedule for conducting Environmental Impact Assessments for mining and mineral processing companies or any entity that plans to undertake exploration, quarrying or mining, and/ or processing of mineral resources at any scale.

A review of the applicable and relevant local legislation, policies and guidelines to the existing operations and possible future activities is presented in this chapter. This review serves to inform the project Proponent, Interested and Affected Parties and the decision makers at MME and the DEAF of the requirements and expectations, as laid out in terms of these instruments, to be fulfilled for the existing and proposed activities to continue or commence, respectively. The applicable local (national) and where necessary regional/ international legislation, policies and guidelines are given in **Table 3-1 and** Error! Reference source not found..

Table 3-1. Applicable legislation, policies and guidelines to the ongoing and proposed quarrying activities

LEGISLATION CONSIDERED	CUSTODIAN ORGAN OF STATE	ASPECT OF PROJECT
Relevant Acts		
		The Namibian government has adopted several policies that promote sustainable development. Most of these originate in clauses of the Constitution of the Republic of Namibia. In Article 95 (i), the State undertakes to actively promote and maintain the welfare of the people by adopting policies aimed at the utilisation of natural resources on a sustainable basis for the benefit of all Namibians. Articles 91(c) and 95(l) are also of relevance

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LEGISLATION CONSIDERED	CUSTODIAN ORGAN OF STATE	ASPECT OF PROJECT
The Constitution of the Republic of Namibia (1990)	Government of the Republic of Namibia	<p>Relevant Acts</p> <p>to sound environmental management practice. In summary, these refer to:</p> <ul style="list-style-type: none"> • Guarding against over-utilisation of biological natural resources. • Pursuing sustainable natural resource use • Limiting over-exploitation of non-renewable resources. • Maintaining biological diversity • Ensuring ecosystem functionality. • Protecting Namibia's sense of place and character. <p>Through implementation of the mitigation measures set out in this Environmental Overview and Environmental Management and Rehabilitation Plan (EMRP), the owner of the ECC shall be advocating for sound environmental management as set out in the Constitution.</p>
Environmental Management Act No. 7 of 2007 and its 2012 EIA Regulations Government Notice 28-30 (Government Gazette 4878)	MEFT: DEA	<p>Part 2 of the Act sets out 12 principles of environmental management, summarized as follows:</p> <ul style="list-style-type: none"> • Community involvement in natural resources management, must be promoted and facilitated. • The participation of all I&APs must be promoted and decisions must consider the interest, needs and values of I&APs. • Equitable access to environmental resources must be promoted and the functional integrity of ecological systems must be considered to ensure sustainable systems. • Assessments must be undertaken for activities which may have significant effects on the environment or the use of natural resources. • Sustainable development must be promoted in all aspects relating to the environment. • Namibia's cultural and natural heritage including, its biological diversity, must be protected and respected.

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LEGISLATION CONSIDERED	CUSTODIAN ORGAN OF STATE	ASPECT OF PROJECT
		<p style="text-align: center;">Relevant Acts</p> <ul style="list-style-type: none"> • The option that provides the most benefit or causes the least damage to the environment, at a cost acceptable to society must be adopted to reduce the generation of waste and polluting substances at source. • The reduction, re-use and recycling of waste must be promoted. • A person who causes damage to the environment must pay the costs associated with rehabilitation of damage to the environment and to human health caused by the pollution. • Where there is sufficient evidence which establishes that there are threats of serious or irreversible damage to the environment, lack of full scientific certainty may not be used as a reason for postponing cost-effective measures to prevent environmental degradation; and • Damage to the environment must be prevented and activities which cause such damage must be reduced, limited, or controlled. • In terms of the terms and conditions attached to the current ECC the proponent is required to renew the ECC after every 3 years. Such renewal process is expected to review the current conditions of the environment, document ongoing and planned activities, evaluate how the ongoing and planned activities will likely alter the current conditions of the environment, and formulate impact management measures that speak to the current and future status quo of the affected project area. <p>The proponent has the responsibility to ensure that the proposed activities, as well as the proposed impact management measures, conform to the principles of this Act. In developing this EMRP, OMAVI has been cognizant of these requirements, and accordingly the process that was adopted has been undertaken in conformance with this Act and the EIA Regulations (2012). Several listed</p>

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LEGISLATION CONSIDERED	CUSTODIAN ORGAN OF STATE	ASPECT OF PROJECT
		<p>Relevant Acts</p> <p>activities in terms of the Act, are triggered by the ongoing and possible future activities as set out in latter sections of the report.</p>
<p>Mineral Prospecting & Mining Act (Act no. 33 of 1992)</p>	<p>MME and the Kunene River Communal Conservancy</p>	<p>Sections 50, 52, 54, 57 and 130 of this Act sets out provisions for environmental management for activities arising from mineral exploration, quarrying/ mining and beneficiation, as follows:</p> <ul style="list-style-type: none"> • Operators of quarries are required to prepare an ESA or EIA and an EMP and make revision of such EMP every 3 years • That the Operator of a quarry is liable to pay compensation where in course of the mining operations; any damage is done to the surface of land, roads, water source, cultivation, building or any other structure • That the Operator of a quarry cannot exercise any rights on a private land until the holder has entered into an agreement with the land owner regarding payment of compensation • That the Operator of a quarry shall take all necessary remedial steps to reasonable satisfaction of the minister for any damage caused by quarry operations on closure of such operations. • That the minister is empowered to direct the Operator of a quarry for carrying out good reconnaissance, mining and prospecting practices for the protection of the environment, and conservation of natural resources payment of liability fees and royalty and remedial steps for any damages and • That the Operator of a quarry shall report pollution in course of any operations and make remedial measures for such. <p>The abovementioned provisions are all relevant to the proposed activities and were thus considered in the Environmental Overview and EMRP updating process.</p>

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LEGISLATION CONSIDERED	CUSTODIAN ORGAN OF STATE	ASPECT OF PROJECT
Relevant Acts		
<p>Charter for Sustainable and Broad-Based Economic and Social Transformation in the Namibian Mining Sector 2014 – 2020 (The Namibian Mining charter)</p>	<p>The Namibian Chamber of Mines of Namibia</p> <p>The Kunene River Communal Conservancy</p>	<p>This charter aims to facilitate meaningful participation of historically deprived Namibians in the mining and mineral beneficiation industry. It has effectively been developed as an instrument to effect transformation and sets specific targets for mineral license holders and Operators of mining operations in Namibia</p>
<p>The Minerals Policy of Namibia, 2003</p>	<p>Ministry of Mines and Energy</p>	<p>This policy sets out guiding principles and directions while communicating the values of the Namibian people in pursuit of the development of the mining and mineral resources beneficiation sector.</p>
<p>Pollution Control & Waste Management Bill</p>	<p>MEFT and the Kunene River Communal Conservancy</p>	<p>This Bill serves to regulate and prevent the discharge of pollutants to air and water as well as providing for general waste management. The Bill repeals the Atmospheric Pollution Prevention Ordinance (11 of 1976). In terms of water pollution, it will be illegal to discharge of, or dispose of, pollutants into any watercourse without a Water Pollution Licence (apart from certain accepted discharges). Similarly, an Air Quality Licence will be required for any pollution discharged to air above a certain threshold. The Bill also provides for noise, dust or odour control that may be considered a nuisance. The Bill advocates for duty of care with respect to waste management affecting humans and the environment and calls for a waste management licence for any activity relating to waste or hazardous waste management.</p> <p>The proposed quarrying, storage and haulage of dimension stone blocks and crushed sodalite crystals as well as associated activities will likely result in continuous discharge of significant quantities of gaseous pollutants into air from the proposed operation of heavy duty diesel generators and earthmoving plant, as well as increased</p>

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		<p>Relevant Acts</p>
		<p>noise levels, dust generation, destruction of in situ soil structure during such operations.</p>
<p>Water Act (No. 54 of 1956)</p>	<p>MAWLR: Department of Water Affairs</p> <p>The Kunene River Communal Conservancy</p>	<p>Makes provision for several functions pertaining to the management, control and use of water resources, water supply and the protection of water resources.</p> <p>The Proponent shall prevent any potential pollution of groundwater and surface water. This Act is of significant relevance to this project because of the following reasons:</p> <ul style="list-style-type: none"> • The mining claim sites are in close proximity to the Ondoto River which is a tributary to the Kunene River. Hence, there is risk of surface water pollution • Water to be used in core drilling and wet quarrying will likely be sourced from the nearby Kunene River or tributaries. This will necessitate a water abstraction permit and can be expected to affect downstream flow volumes • The presence of loosened top and sub-soils will result in increased erosion during surface runoff. Surface runoff will also become more susceptible to pollution. • Water abstraction permits must be obtained prior to abstraction
<p>Water Resources Management Act (Act No. 11 of 2013)</p>		<p>This Act provides a framework for managing water resources based on the principles of integrated water resources management. It provides for the management, development, protection, conservation, and use of water resources.</p> <p>It is expected that water will be continuously recycled to the extent practical during quarrying. Crushing operations will be dry. Accordingly, it can be expected that the intake of new water will generally be low for these operations. Mitigation measures are included in the updated EMRP section of this report to reduce impacts on nearby watercourses that could not be avoided and</p>

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		<p>Relevant Acts</p>
		<p>to optimally manage water quality and water demands at these operations.</p>
<p>Forestry Act (Act No. 12 of 2001)</p>	<p>MEFT and the Kunene River Communal Conservancy</p>	<p>The Act provides for the management and use of forests and forest products.</p> <p>Section 22. (1) provides: "Unless otherwise authorised by this Act, or by a licence issued under subsection (3), no person shall on any land which is not part of a surveyed erven of a local authority area as defined in section 1 of the Local Authorities Act, 1992 (Act No. 23 of 1992) cut, destroy or remove - (a) vegetation which is on a sand dune or drifting sand or on a gully unless the cutting, destruction or removal is done for the purpose of stabilising the sand or gully; or (b) any living tree, bush or shrub growing within 100 m of a river, stream or watercourse."</p> <p>The proponent will apply for the relevant permit under this Act if it becomes necessary, particularly when new access roads and quarries are to be developed on virgin ground. It is inevitable that large sections of local forest will be cleared to pave way for access roads, support infrastructure such as mechanical workshops and potential quarries</p>
<p>Soil Conservation Act (Act No. 76 of 1969)</p>	<p>MAWLR and the Kunene River Communal Conservancy</p>	<p>The Act makes provision for the prevention and control of soil erosion and the protection, improvement and conservation of soil, vegetation and water supply sources and resources, through directives declared by the Minister.</p> <p>This Act is applicable to this project since stripping and disturbance of topsoil will take place during the creation, widening of quarries and access roads. Mitigation measures are included in the EMRP section to preserve topsoil and reduce impacts on topsoil where such soil has not yet been disturbed or removed. Measures to minimize sub-soil erosion have also been included in the updated EMRP</p>

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<p>Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)</p>	<p>MME: Petroleum Affairs Division</p>	<p>Relevant Acts</p> <p>Regulation 3(2)(b) states that “No person shall possess or store any fuel except under authority of a licence or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 litres or less in any container kept at a place outside a local authority area.</p> <p>This law is applicable to this project because used diesel, lubricants and hydraulic oils in excess of 600L will likely be stored on site in plastic tanks prior to being collected either for disposal or recycling.</p>
<p>National Heritage Act (Act No. 27 of 2004)</p>	<p>MEAC and the Kunene River Communal Conservancy</p>	<p>The Act makes provision for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. Part V Section 46 of the Act prohibits removal, damage, alteration or excavation of heritage sites or remains, while Section 48 sets out the procedure for application and granting of permits such as might be required in the event of damage to a protected site occurring as an inevitable result of development. Part VI Section 55 Paragraphs 3 and 4 require that any person who discovers an archaeological site should notify the National Heritage Council. Section 51 (3) sets out the requirements for impact assessment.</p> <p>No objects of heritage or archaeological relevance are known in the project area. It is likely that if any such resources were present at or near the active sites they have probably already been damaged or heavily disturbed due to the highly disturbed nature of the landscape. However, should any objects of heritage/ archaeological significance be identified during project activities, the work must cease immediately in the affected sites and the necessary steps taken to seek authorization from the Council.</p>
		<p>The Act serves to protect the public from nuisance and states that no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by</p>

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Public Health Act (Act No. 36 of 1919)	MoHSS: Occupational Health and the Kunene River Communal Conservancy	<p>Relevant Acts</p> <p>him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.</p> <p>The proponent and their contract miner must ensure that the quarries and associated activities are operated in a way that is safe to both the employees, the general public as well as domesticated and wild animals. Noise and dust emissions which could be considered a nuisance and/ or a health risk ought to be kept to acceptable levels. This is applicable during the quarrying, material extraction, sorting, storage and haulage activities. Additionally, the proposed block cutting and rock crushing processes entail usage of dangerous machinery as well as lifting operations that could cause severe injuries or even fatalities. Dust from the cutting and crushing of rock, and from overburden stripping processes could pose severe respiratory health issues in the short and long term. Lastly, the deep quarries and their associated steep slope pose a significant safety risk to workers and visitors. Suitable risk management measures have been provided in the EMRP to help minimize these risks.</p>
Labour Act, 2007	MLIEC	<p>Sections 3, 4, 5, 11, 16, 23-27, 44 and 135 make provision for the following:</p> <ul style="list-style-type: none"> • That a person may not employ a child under the age of 14 years • That children are prohibited for employment in a mine and other dangerous circumstances • That forced employment of persons is prohibited • That an employee is entitled to monetary remuneration daily, weekly, fortnightly, or monthly in cash, cheque, and direct deposit into a bank account • That the work hours of an employee are 45 hours in a week, over and above which an employee is entitled to additional payment overtime wage • That employees are entitled to (a) annual leave on the basis of the average number of days

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Relevant Acts		
		<p>worked over the year, (b) a day's sick leave for every 26days worked, (c) compassionate leave for a period of 5days in 12 months which is fully paid, and (d) leave on public holidays,</p> <ul style="list-style-type: none"> • That female employees that have completed 6 months of employment are entitled to 12 weeks of maternity leave, which can be extended for a further period of one month • That the minister is empowered to make regulations in relation to safety, health, hygiene, sanitation, and welfare of persons employed in or about mines, including sea-bed operations <p>The proponent and their mining contractor are expected to comply with the above provisions and as such the above provisions were accounted for in this report.</p>
Relevant Guidelines, Policies and Regulations		
<p>Mine Health & Safety Regulations (under section 138A of the Mining Act, 1992)</p>	<p>MME: Mine Safety & Services Division MoHSS: Occupational Health Division</p>	<p>These set of regulations are aimed at ensuring that mines are operated in a safe manner to prevent fatalities, injuries, and long-term health hazards. The regulations make provision for:</p> <ul style="list-style-type: none"> • Employee's right to leave unsafe working places • Obligation of a mine manager to provide for all safety measures in a mine or quarry • Reporting of accidents to the chief inspector and keeping a record of such accidents • Requirements for the mine manager to provide occupational health services at area of mining activity • Requirements for stability of excavations; provision of waiting areas; provision of fencing and gates; schemes for working in vicinity of water body. • Provision for mine dump or mine tailings facility • Ensuring that all parts of a mine are well ventilated with minimum standards of air quality

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		<p style="text-align: center;">Relevant Acts</p> <ul style="list-style-type: none"> • The mine manager's responsibility to formulate a scheme for safe movement of vehicles being use in the mine/ quarry • The mine manager's responsibility to formulate a scheme for identifying hazards at the area of mining activity and provision of appropriate protective equipment • Ensure that the mine manager provides first aid and firefighting equipment and procedures where exploration/ quarrying activities are being conducted <p>All the above-mentioned provisions are relevant to this project and were thus considered in the EMRP section.</p>
Hazardous Substance Ordinance, No. 14 of 1974	MoHSS and the Kunene River Communal Conservancy	<p>The ordinance provides for the control of toxic substances. It covers manufacture, sale, use, disposal and dumping as well as import and export. Although the environmental aspects are not explicitly stated, the ordinance provides for the importing, storage, and handling.</p> <p>This Ordinance is relevant to the project under review as potentially toxic substances such as diesel, hydraulic oils and blasting power are likely to be used on this project.</p> <p>A blasting permit will need to be obtained from the Inspector of Mines before conducting any blasting</p>
National Solid Waste Management Strategy of Namibia	MEFT and the Kunene River Communal Conservancy	<p>The Vision of this Strategy is for Namibia to become the leading country in Africa in terms of standards of solid waste management by 2028.</p> <p>The Specific Objectives of the Strategy are:</p> <ol style="list-style-type: none"> 1. To strengthen the institutional, organisational and legal framework for solid waste management, including capacity development. 2. To install a widespread culture of waste minimisation and to expand recycling systems. 3. To implement formalised solid waste collection and management systems in all populated areas, including under the administration of Regional Councils.

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LEGISLATION CONSIDERED	CUSTODIAN ORGAN OF STATE	ASPECT OF PROJECT
		<p>Relevant Acts</p> <p>4. To enforce improvements in municipal waste disposal standards.</p> <p>5. To plan and implement feasible options for hazardous waste management including healthcare waste management</p> <p>Various forms of solid wastes were generated at the historically mined sites and will be generated on future operations. These include office/ domestic litter, rock dust, waste rock, scrap metals, used tyres, used diesel and oils, used containers, scrap pipes and cables, etc. According to the management of Best Cheer (the previous mining contractor) most of these waste were removed from sites regularly either by recycling companies or are stored at designated sites within the operational area and are subsequently carted to suitable disposal sites within the region.</p>
<p>The Mineral Beneficiation Strategy of Namibia</p>	<p>MME and Ministry of Industrialization and Trade (MIT)</p>	<p>This national strategy was developed and launched in 2021 through collaboration between Ministry of Mines and Energy and the German Corporation for International Cooperation (GIZ), and aims to facilitate the realisation of full social and economic potential that can be derived from Namibia's minerals and to promote investment, trade and industrial development.</p> <p>This document provisionally identifies a selection from diamonds, coloured gemstones, zinc, industrial minerals (gypsum, dimension stone, limestone), iron and steel foundry products, battery minerals (lithium and graphite) and salt as pilot projects for mineral beneficiation in Namibia. The previous contract miner, Best Cheer Investment Namibia has demonstrated commitment and dedication to this strategy as it currently operates the 2 largest dimension stone processing facilities in Namibia. It is thus recommended that all sodalite dimension stone blocks to be sourced from these claims should be largely processed into finished products at any one of these facilities before being dispatched to local and overseas markets via the port of Walvis Bay.</p>

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LEGISLATION CONSIDERED	CUSTODIAN ORGAN OF STATE	ASPECT OF PROJECT
Relevant Acts		
Phase 3 to 5 – Best Practice Guide - Environmental Principles for Mining in Namibia during construction, operation and closure	MEFT inspectors, MME inspectors and the Kunene River Communal Conservancy	This best practice guide provides guidelines on integrated waste management for mining related processes during the construction, operation, maintenance of mining support infrastructure. The guidelines further consider closure of mining/ quarrying and mineral beneficiation projects, and is therefore relevant to this project

The current and proposed project activities are expected to trigger the listed activities summarised in Table 3-2.

Table 3-2. Summary of Listed Activities triggered by the ongoing and possible future operations as listed in the 2012 EIA Regulations

ACTIVITY	DESCRIPTION OF ACTIVITY	RELEVANCE OF LISTED ACTIVITY
Activity no. 2.1	The construction and operation of facilities for waste sites, treatment of waste and disposal of waste	The proposed quarry and crusher operations demand for the development of waste rock dumps in the vicinity of the operational quarries Additionally, it is proposed that dimension stone dust generated from the block cutting operations must be stored at designed tailings storage ponds in the vicinity of active quarries. Such ponds should have containment walls constructed from a combination of waste rock and overburden, and the dust must be disposed off inside such containment walls.
Activity No. 3.1	The construction of facilities for any process or activities which requires a license, right or other form of authorization, and the renewal of a license, right or other form of authorization, in terms of the Minerals (Prospecting & Mining Act), 1992	The proposed project activities require a valid mining claim registered with the Mining Commissioner's office. The renewal of such license for the concerned claims has been launched but can only be finalized once the ECC has been approved and issued by the Environmental Commissioner's office.

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ACTIVITY	DESCRIPTION OF ACTIVITY	RELEVANCE OF LISTED ACTIVITY
Activity No. 3.2	Other forms of mining or extraction of any natural resources whether regulated by law or not	The current and proposed project activities would require surface clearing, blasting and excavation over the footprints of new access roads, quarries, crusher plants, product stockpiling bays.
Activity No. 3.3	Resource extraction, manipulation, conservation & related activities	
Activity No. 9.4	The storage and handling of a dangerous goods, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 m ³ (30 000L) at any one location	Significant quantities of hydraulic oils, diesel, lubricants will be stored on site in sealed tanks
Activity No. 10.1 (b)	The construction of access roads	The proposed project activities will regularly include the creation and widening of access haul roads and tracks on the concerned sites

4 DESCRIPTION OF THE RECEIVING ENVIRONMENT (BASELINE)

This section provides an overview of the current status quo of the climatic, biological, physical and socio-economic landscape of the concerned sites through consideration and analysis of baseline data and information as deduced from field observations/ assessments made during the 1-day long site visit on 5th of March 2022, literature and engagements with representatives of the contract miner. Baseline information for various key receptors is summarised in this chapter:

- Infrastructure & utility services
- Land-use
- Climate (temperature, wind, rainfall)
- Biological environment (habitat class, fauna and flora)
- Geology, topography, soils and drainage
- Visual sense of place
- Air quality
- Socio-economic aspects (Demographics, regional economics, Health, Education, Employment, Business activities/ opportunities, Cultural heritage)

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The aim of this section is therefore to provide a baseline against which changes that may occur as a result of the proposed re-commencement of project activities can be measured, gauged and monitored through time.

4.1 Relevant Aspects of the Current Physical & Biological Environment

4.1.1 Land use

The project area lies on communal state land under the Otjikaoko and Vita Royal Houses as well as the Kunene River Communal Conservancy. The village of Oroutumba is characterized by small households made up of informal corrugated and forest wooden structures. Small scale cultivation of omahangu crops takes places at certain sections along the Ondoto river which runs along the western side of the village settlement area. In addition to subsistence stock and crop farming, significant portions of ground in the vicinity of Oroutumba village are characterized by historical and ongoing artisanal and small-scale mechanized mining of sodalite and other semi-precious stones. A more formal formalized and large-scale mining operation is currently being developed on mining License 40 by KNL Namibia (Pty) Ltd and Gecko Exploration (Pty) Ltd, which plans to set up a lumped production and processing facility for iron-titanium and rare earth element ore. This operation is expected to include a tailings storage facility, product stockpile bays, processing plant and waste rock dump.

Because of the anticipated conflict between the proposed mechanized quarry operations and the existing artisanal miners, it is recommended that the proponent supports the artisanal miners (either by purchasing some of their produce, or providing the necessary equipment to help them become more efficient in their product extraction process) in order to help maintain a good working relationship with artisanal miners from the community.

Based on visual observations the areas around the concerned mining claims are unoccupied and are largely used as pasture land for cattle and small stock although small isolated open quarry pits are present in some areas of these sites. It is envisioned that certain portions of ground overlain by the mining claims will no longer be available as pasture for small and large stock because they will form part of the mining footprint. Accordingly, it is recommended that the proponent finds means of compensating the community for the loss in such resource.

Considering the fact that exploration drilling and test quarrying is anticipated to occur on a much more extensive footprint within the concerned claims, land use conditions of the area will be altered during the exploration phase as well as over the operational life of any quarries which may be developed following the prospecting phase.

4.1.2 Climatic conditions

From an exploration and mining operations standpoint, the main climatic factors of importance are temperatures, wind and rainfall. These climatic factors are important for assessing the potential impacts of dust emanating from the mining process (crusher plant, dust or tailings storage ponds/ dams) and predicting directions and intensity of emission plumes.

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The direction and distance that plume travels can assist in planning the locations of mining infrastructure. Rainfall data is important to help plan for possible access constraints to the areas, planning of stormwater management structures and to serve as input into possible quarry dewatering during the rainy seasons. At the time of this assessment there were no weather stations in the concerned area. For this reason, climatic data and information provided is based on considerations of similar datasets for a nearby site (the Ruacana Rest Camp) as deduced from the meteoblue webpage: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/ruacana-rest-camp_namibia_3353398. The meteoblue climate diagrams are based on 30 years of hourly weather model simulations and give good indications of typical climate patterns and expected conditions (temperature, precipitation, sunshine and wind). The simulated weather data have a lower spatial resolution and therefore may not reproduce all local weather effects, such as thunderstorms, local winds, and local differences as they occur in mountainous areas. Climatic conditions of the concerned area can be expected to be as follows as per the data provided in Figure 4-1 to Figure 4-3 below:

- Average daily minimum temperatures can be expected to be around 20-21 degrees Celsius from January to March and between October and December, but should be expected to drop to between 10 degrees Celsius and 16 degrees Celsius in the winter months. Average daily maximum temperatures can be expected to be around 32 to 35 degrees Celsius from January to March and between October and December. The maximum temperatures tend to drop to as low as 28 degrees Celsius in the winter months.
- The average monthly rainfall for the area can generally be expected to be in the range of 25 to 50 mm, and is mainly experienced between November and March. The lowest rainfall may be expected between May and September with little to no rainfall anticipated during these months. Monthly precipitations below 30mm are mostly characteristic of dry conditions and high rates of evaporation for an area.

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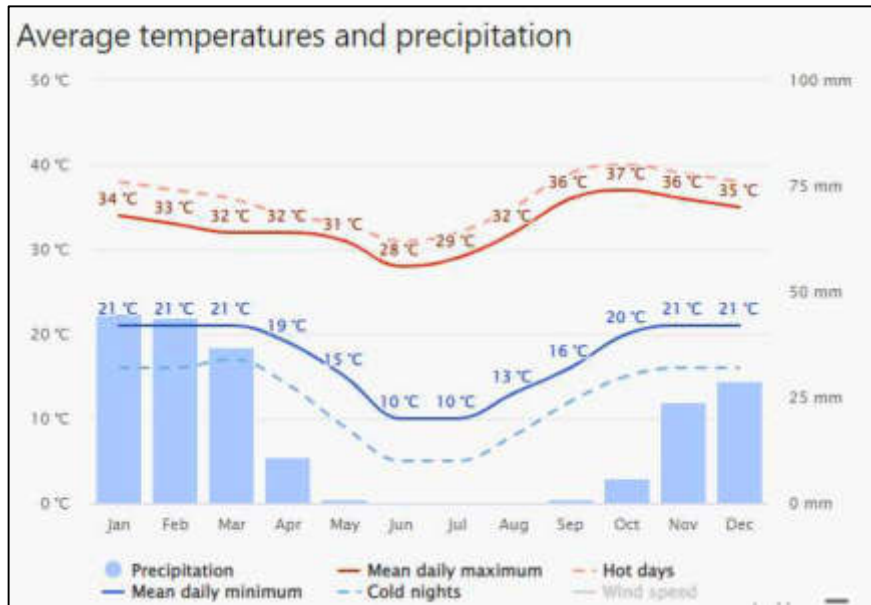


Figure 4-1. Average temperatures and precipitation

- Wind:** The wind direction, and the variability in wind direction, determines the general path air pollutants will follow, and the extent of crosswind spreading. Wind roses comprise 16 spokes, which represent the directions from which winds blew during the period. The colours used in the wind roses reflect the different categories of wind speeds. Wind in the area can be expected to predominantly blow from the ENE, E and ESE to W with average speeds between 5km/hr and 19 km/hr. Wind speeds can generally be expected to pick up during the cold months from April to August. Hence, the wind in the claimed area should be expected to blow towards to the black mountain range flanking the local river on the west.

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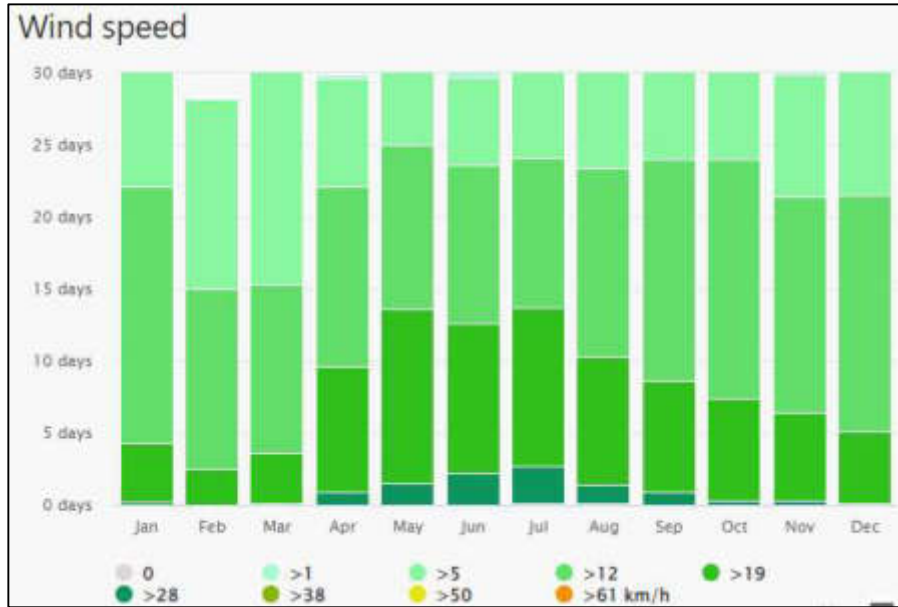


Figure 4-2. Days per month, during which the wind reaches a certain speed

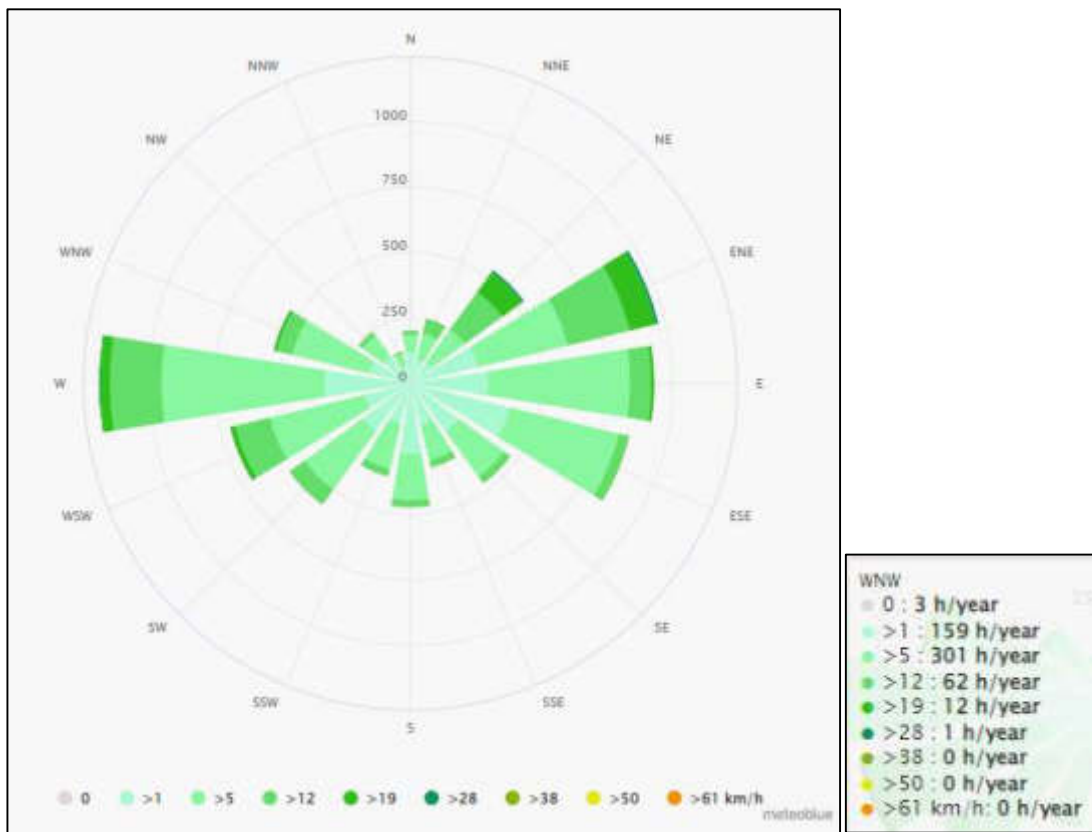


Figure 4-3. Hours per year the wind blows from the indicated direction. Wind speed is indicated in km/hr

Overall, the area classification of the area in terms of climate is considered to semi-arid and water deficit area with mean annual evaporations exceeding the mean annual precipitation.

4.1.3 The biological environment

4.1.3.1 Habitats and Flora

According to Mendelssohn *et al.* (2002), the site is in the Western Highlands biome, which is characterised by an Acacia Tree-and-Shrub Savanna vegetation type and a dominant vegetation structure of grassland and scattered trees. At the local scale the project area falls within the Kaokoveld centre of endemism, a biogeographical region rich in endemic and range-restricted plants and animals. Because of the remoteness of the region there is a dearth of data on biodiversity, but recent discoveries of plant species underline the conservation importance on a regional scale.

Based on site observations by the EAP team, two broad categories of habitats were identified for the concerned claim areas taking into considerations the topography, soil types, and structure of the vegetation (e.g., vegetation assemblages, heights of the vegetation, vegetation density, ground surface vegetation cover) observed. These can be grouped as:

- Mopane (***Colophospermum mopane***) shrubland and
- Drainage channels

The Mopane shrubland is dominated by *Colophospermum mopane* trees and shrubs, makes the bulk of the concerned claim areas and is generally characterized by gentle rolling hills topography bisected by small drainage channels and calcrete top highs. The *Colophospermum mopane* forms open woodland of homogenous height and structure, interspersed with *Catophractes alexandri* (refer to Figure 4-4). The substrate consists of sandy gravel soils comprising calcrete, and the bottom vegetation cover observed consists of sparse scattered grass. This habitat has been modified by human activities such as wood harvesting and livestock grazing. Both these activities are currently ongoing, and the village of Oroutumba is located in a degraded area in Mopane scrub abutting the Ondoto River. Roads and associated works will be located in this habitat. This habitat is considered to be least sensitive due to the generally high known recovery of the dominant vegetation, the Mopane trees/ shrubs, however care should be taken to minimize the footprint of grounds to be cleared as well as to maintain natural drainage flows.

Sodalite exploration (exploration drilling and test quarrying), mining (blasting, block cutting, open cast quarrying) and on-site semi processing will take place in the Mopane habitat. Hence, this habitat and its flora plus fauna will be adversely affected by the proposed activities.

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Figure 4-4. Typical vegetation on the mopane shrubland

The drainage channels habitat in the concerned mining claims is essentially made up of small localised drainage channels flowing into the Ondoto River. Although the Ondoto river is not intercepted by any of the three mining claims it, together with its tributaries are important habitat in the area for the following reasons. First, the small drainages and catchments cross-cutting the mining claims empty into the Ondoto river and from MC 66921 it is only about 6-8 km from where it flows into the Kunene River. Secondly, it is an important source area of high diversity in an arid landscape and a resource during drought years. Any activity in the catchments will affect the ecology of the Ondoto and Kunene rivers. The banks of the Ondoto river contain sparsely distributed large trees, few shrubs and ground cover in the form of annual plants such as grasses are expected to appear in summer and after rain. The substrate is sandy, with scattered rocks and boulders and a shallow stream. Plant species in the riverbed and on its banks include *Faidherbia albida*, *Acacia erioloba*, *Ficus cordata*, *Combretum imberbe*, *Ziziphus mucronata*, *Gymnosporia senegalensis*, *Aloe littoralis*, *Acacia reficiens*, *Boscia albitrunca*, and *Combretum apiculatum*. Collectively, these provide habitats to amphibians, reptiles as well as small mammals that rely on rocks for shelter, and therefore this habitat class is considered to be very sensitive. The river is an important resource for the Oroutumba community, and it has been modified by historic and current human activities such as grazing and harvesting. Cattle and goats were observed in the river, as well as daily human household activities such as water collection, laundry and swimming (refer to Figure 4-5). Development that is planned in this habitat includes linear structures such as access roads that will cross drainages.

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Figure 4-5. Typical landscape and vegetation of the drainage channels habitat

The cumulative impact of mining and associated development in the semi-arid zones means that development in such areas should be planned and implemented in a responsible manner and calls for suitable management measures to be implemented and monitored stringently.

4.1.3.2 Fauna

The sites were visited for 1 day, which limited the field work for visual inspection and observations. Further, due to the remoteness of the area very little research and/ or studies have been done in this area with respect to biodiversity, and as such literature is significantly limited. The reader is therefore informed that the information on fauna is largely based on the limited site observations and regional literature (Mendelssohn *et al.*, 2002) which has a limited local context. A brief summary of fauna that is likely to occur in the concerned project area is provided below.

Reptiles

According to Mendelssohn *et al.* (2002), the study area is located in a high diversity zone for reptiles, ranked third-highest in Namibia by distribution of number of species. Up to 66 species are likely to occur in the kaokoveld. Hence, the project area is an area of high concern for reptiles.

Birds

The Southern African Bird Atlas Project 2 (SABAP2) of 2020 records 254 species in the region, and the habitats of the study area are likely suitable for over 100 of these species. This is a high species richness.

Some of these species such as the Martial Eagle, Tawn Eagle, Angola Cave-chat, Verreaux's Eagle, Yellow-bellied Eremomela, Rüppel's Parrot, Wood Sandpiper and Cinderella Waxbill are classified as threatened or endangered in Namibia, thus indicating the sensitivity of the area.

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Amphibians

Distribution ranges (Du Preez & Carruthers, 2009) indicate that 20 frog species could potentially occur in the project area. Amongst this list some of the frog species such as the Marbled Rubber Frog and Pygmy Toad are endemic to Namibia, while others such as the Giant Bullfrog fall under the threatened category. The Kunene River and its tributaries together with their riparian vegetation contribute to the unexpectedly high potential diversity of amphibians in this arid area.

In order to preserve these species and ensure minimal disturbance to their habitats it is crucial that drainage channels leading from the hills into the Ondoto river remain unobstructed to maintain natural runoff patterns.

Mammals

The habitat characteristics of the project sites are limiting for mammal density. In addition, disturbance caused by subsistence farming, harvesting and historical and ongoing mining activities has likely contributed to low densities of large mammals and no signs of large mammals were observed during the site visit.

4.1.4 Geology and Soils

The project area is in the Eastern Kaoko Zone of the Kaoko Belt of northwestern Namibia. The northern part of the EKZ is dominated by the Kunene Anorthosite Complex (KAC). The project area is underlain by massive anorthosite and layered anorthosite - troctolite of the Kunene Complex. Variable amounts of sodalite occur as lenses, layers and breccias in several of the larger carbonatite dykes, but also at the direct contact of carbonatite with anorthosite.

The soils in this area are either Chromi-Leptic Cambisols or Petric Calcisols. The suitability of the soils for crop production ranges from low to moderate. The rocky and Calcisols areas have a low crop production potential. The other soil type closer to the Ondoto river renders a moderate crop production potential. The presence of open pit quarries and numerous access tracks/ roads from ongoing and historical mining in the area has led to soil erosion and the development of erosional gullies in some areas. It is further anticipated that the soil structure along these roads has most likely been altered due to traffic compaction.

Based on the site walk-over and visual assessment of exposures in historical open pits, the sodalite bearing rock units generally tend to occur at shallow depths.

4.1.5 Visual sense of place

The sense of place of the area has already significantly been altered and disturbed by the following activities:

- Vegetation clearing and overburden stripping near active and historical quarries, as well as near storage bays for crushers and product storage bays

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- Creation and expansion of access haul roads
- Site support infrastructure such as overburden dumps and stagnant and abandoned mobile crushers in the area

The historical historical and active quarry operations near Oroutumba village are however not visible from the D3700 gravel road which is a key travelling route for tourists visiting this part of the country.

In cognisance of the above, it makes sense to argue that adverse visual impacts currently exist within the project area, largely due to the presence of open quarry pits and if such quarries are extended the impacts will only grow.

Overall, adverse impacts on the sense of place and visual appearance of the area is expected to increase considering the fact that more quarries and associated support infrastructures such as roads, waste and overburden dumpsites, product storage and crusher plant areas will be developed over the next 3 years. The sense of place of the concerned area and surroundings is further is expected to deteriorate as a result of the upcoming Rare Earth Element mine in the vicinity of the project area.

4.1.6 Water Resources (Surface and Groundwater)

Surface Water and drainage

Topographically the project area slopes northwards towards the Kunene River and the Namibian - Angolan border. From a water supply point of view for the proposed dimension stone and sodalite ore crushers, two options are available. The first is the Ondoto River catchment and its tributaries and the second is the Kunene River located approximately 4 – 9km north of the concerned claims. The Ondoto River, a north flowing tributary of the Kunene River, drains the project area and comprises saturated alluvium (i.e. alluvial aquifer) in which a perennial borehole is sited, which is the main water source for the local community of Oroutumba.

The ephemeral Ondoto River runs along the Western boundary of the Oroutumba settlement with MC 66921 located to the west of the main river channel and MCs 66887 and 66888 located to the east. Due to its closeness to the claimed areas this river would be the obvious option for water supply to the envisaged operations, either through construction of production borehole(s) and reservoir tanks or dam from which water will then be carted to the exact operations. Two main concerns however arise: first is the sustainability of water supply considering that the river's catchment is located in an area with low and variable rainfall and as a result the river does not flow all year round, and secondly the adverse social impact on the surrounding community if the water source is over exploited by mining activities.

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The second option, which would be to source water from the Kunene River which is a perennial river with a much larger catchment area in excess of 100 000km², of which approximately 13% lies within the Namibian territory. The majority of the runoff is generated from rain falling between October and March over the highlands in Angola in the Upper Kunene, with the main river being fed by a dense network of tributaries. The Kunene River has an extremely high variation in flow (and consequently river levels) due to the high variability of mean annual rainfall across the basin, making the usage of fixed river abstraction infrastructure costly and also subject to flood damage. Hence, the most suitable water supply infrastructure on this river system would be wet wells and/ or floating raft systems.

According to the Directorate of Rural Water Supply (DRWS), the Kunene River is relatively unpolluted but it has a high sediment load making the water turbid.

Because the water demand for the planned operations is not yet well defined, it is recommended that once exploration drilling and test quarrying have been completed and the available resources have been well defined, a more detailed local hydrological and hydrogeological study of the two catchments must be conducted to establish sustainability of water supply as well as to identify the most suitable abstraction options and infrastructures.

It must be noted that whether water is to be abstracted from the rivers directly or from production boreholes, a valid water abstraction permit would have to be applied for at the Department of Water Affairs in the Ministry of Agriculture, Water and Land Reform. This must be done by the proponent once such boreholes have been sited, drilled and successfully pump tested.

4.2 Socio-Economic Aspects

4.2.1 Governance and Demographics

Namibia has been an independent and democratic state since 1990, and as a result it has sound governance and stable social, economic and legal frameworks. The concerned project is located in the Epupa Constituency which falls under the Kunene Regional Council. The Kunene Regional Council is responsible for the planning and development of the region for the benefit of its inhabitants by establishing, managing, and controlling towns and settlement areas. In the context of this project the relevant mandate of the Epupa Constituency and Kunene Regional Council management are:

- to provide and maintain an enabling and supportive governance framework that would allow local development enterprises such as this to operate efficiently and without unnecessary burdens
- enforce the implementation of labour and environmental management laws and regulations to prevent exploitation of workers, destruction of the natural environment, and together with the custodian ministry (the Ministry of Environment, Forestry and

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Tourism) hold quarry/ mine operators and mining claim holders accountable towards land rehabilitation and restoration post closure of their operations.

At the local level, the custodian Otjikaako and Vita Royal Houses as well as the Kunene River Communal Conservancy are mandated under the Minerals Mining and Prospecting Act of 1992 and the Traditional Authorities Act of 2000 (Act no. 25) to represent the interest of the directly affected communities, manage compensation benefits arising from ongoing and planned mining activities, and ensure that any funds arising from such compensation activities are appropriately managed and utilized to enhance the living standards of their communities.

According to the 2011 national census data from the Namibian Statistics Agency (NSA), between 2001 and 2011, the Epupa Constituency had a population of over 17,000 inhabitants while the town of Opuwo's population was 7,657. The devastating drought years since 2013, and more particularly that experienced in 2019, have caused many farmers to lose their livelihoods and have increased migration to Opuwo, ruacana and other towns in search for easier reach of drought-relief food from the government. This has put considerable strain on the Opuwo Town Council to provide basic services such as water, ablution and refuse removal in the informal settlements which have expanded rapidly. The drought has also put the Kunene Regional Council under considerable pressure to provide drought relief food on a going basis. These conditions have significant bearing on the urgency of the proposed mine operations as a substantial proportion of families are in dire need of jobs and income to build and sustain their livelihoods.

4.2.2 Education and Healthcare

According to the 2015 Planning Commission (Ashby 2019), the region has the highest levels of education deprivation of all the regions in the country, measured by educational attainment reached by people aged 15 to 59 inclusive. This is largely due to the strong anti-education cultural belief of the Ovahimba people.

Healthcare in the Epupa constituency is largely scarce and is mainly confined to major economic settlements such as Okanguati, which is far from the project area.

4.2.3 Infrastructure and Utility Services

At the time of this assessment the only infrastructure that existed on the respective claims is exploration and access tracks, some of which have probably existed for decades from historical mining. Based on visual observations the residences of Oroutumba mainly rely on fire wood and to a limited extent on small household roof top solar for power supply. NORED currently has a transmission line supplying the Otjimuhaka settlement, which is less than 10km from the Oroutumba village. Water for domestic and quarrying consumption is currently sourced from the Kunene River and is carted to the residences where it is temporarily stored in water storage tanks.

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It anticipated that as a result of the planned expansion of sodalite mining operations to incorporate Rare Earth Element mining by KNL of Namibia, plus the re-commencement of sodalite quarrying activities by other smaller operators, more infrastructure such as grid or solar power, pipelines and weigh bridges will be developed in the area.

4.2.4 Cultural Heritage and archaeological resources

Although the people themselves represent a rich and important heritage in terms of the lifestyle, traditions and ongoing cultural practices, the concerned Mining Claims concerned are not located in an area where documented sensitive sites are found. The possibility of there being some resources of archaeological resources such as graves and ritual sites can however not be ruled out, and for this reason it is recommended that the following measures be implemented by the project proponent:

- A chance find procedure must be implemented during all excavation and site clearing works and
- A site visit with local leaders must be undertaken prior to clearing or excavating any sites for roads, envisaged quarries, waste rock and overburden dumps, crusher plants and block or product storage bays to ensure that such sites are cleared of any graves and ritual sites.

5 ENVIRONMENTAL MANAGEMENT AND REHABILITATION PLAN

5.1 Purpose of the Environmental Management & Rehabilitation Plan (EMRP)

Regulation 8 of the Environmental Management Act's (EMA) (7 of 2007) Environmental Impact Assessment Regulations (2012) requires that a draft Environmental Management Plan (EMP) be updated regularly to ensure that at any given point in time it reflects the project's current state. The updated EMP is also a key requirement in supporting any renewals for Environmental Clearance. The "draft" term that is typically attached to this document has context in this regard to emphasize that the document (i.e. the EMRP) shall remain a working document which is to be updated continuously during the construction, operational and decommissioning phases of the project to account for variations in site conditions, technologies, socio-economic dynamics, exploration and mining methods being applied, business relationships between affected communities and project undertakers (i.e. the license holder and contractor miner), and the market's demands as well as to accommodate feedback or results from the recommended monitoring programs. A 'management plan' is defined as:

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

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The **EMRP is a legally binding document to the project proponent** and is one of the most important outputs of the EA process because it synthesises all the proposed impact mitigation or enhancement actions, as well as monitoring actions, set to a timeline and with specific objectives and assigned responsibilities. It provides a link between the impacts anticipated from the planned project activities, and the required environmental management actions on the ground during project inception and subsequent day-to-day operations. **It is important to note that the custodian person or entity who contravenes the provisions of this EMRP may face imprisonment and/or a fine.**

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

- **Construction and expansion of new quarries and support infrastructure** - the period during which new quarry sites and push-backs of existing quarries are cleared of vegetation, topsoil and sub-surface overburden is stripped and stockpiled in designated areas, barricading and fencing of existing and new quarries, construction and installation of support infrastructure and services are undertaken.
- **Operational phase** – this phase will involve full-scale operation of quarries for the extraction of both sodalite blocks and sodalite ore; sorting and storage of blocks and sodalite ore; primary crushing of sodalite ore; haulage of extracted blocks; ore and waste rock to designated stockpiling and product loading bays; maintenance of mobile earthmoving plant, power gensets, crushing and cutting machinery; re-fueling of diesel storage tanks and mobile plant on site; operation of power supply gensets; partial stockpiling and subsequent storage of dust generated from the extraction of blocks in designated impoundments near the quarry sites.
- **Decommissioning and rehabilitation** – decommissioning will take place once sodalite rock resource of acceptable quality has either been depleted, or when the open pit quarries become too deep to mine economically and safely. It is unlikely that the existing quarries will be decommissioned within the next 3 years (i.e., the validity period of the ECC that is being applied for). However, it is necessary to incorporate management measures that need to be implemented during decommissioning and post closure in case of sudden closure of the operations due to other factors such as prolonged dips in commodity prices and decline in product demand. The decommissioning phase represents the stage when quarrying of the sodalite ore and blocks will cease and the area shall be restored and rehabilitated to a state that is as close as possible to the surrounding natural environment.

5.2 Limitations of this Draft EMRP

The following limitations apply to this EMRP:

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- OMAVI Consultants assumes that all the project related information and data provided by the Proponent is correct and accurate, and that all necessary information has been disclosed which led to the development of this EMRP.
- It is also assumed that the relevant information obtained from different local literature consulted is accurate and;
- This EMRP has been compiled at a scoping level and on the assumption that there will be no significant changes to the ongoing and future project activities or the affected biophysical and social environment between the time of compiling this EMRP and the time of implementing this EMRP.
- The exact positions of targeted drill holes, test quarries, quarries to be extended and support infrastructures were not available at the time of compiling this report as those will only become clearer when exploration advances and as the resource gets refined. Accordingly, the EMRP will be updated every 6 months as exploration and mining advances to reflect new developments and information.

6 EMRP IMPLEMENTATION AND RESPONSIBILITIES

It is of paramount importance that suitably qualified and experienced human resources are appointed and given responsibilities to ensure the effective implementation and enforcement of the EMRP. This EMRP has identified the following key stakeholders as the primary custodians for implementing and enforcing the EMRP: The Group Safety Manager from the Contract Miner's team; Quarry Manager; Safety, Health and Environmental (SHE) Officer; Public Relation Officer (PRO), the Land Owners (relevant Traditional Authorities and the Kunene River Communal Conservancy); and License Holder. It should be noted that in practice, however, the first three roles may be assigned to and performed by one person.

A list of specific responsibilities to be undertaken under each position are provided below. **It should also be noted that the above-mentioned roles are delegated roles and therefore the License Holder and the contractor miner are ultimately responsible and legally compelled to implementing the EMRP.** Key responsibilities for other stakeholders are also listed below.

6.1 Group Safety Manager (Appointed by Contract Miner)

It is noteworthy to mention that since the quarrying operations on the concerned claims will likely be operated by a contract miner, most likely Best Cheer Investments Namibia in this case, the role of a Group Safety Manager becomes relevant. The Group Safety Manager shall be responsible for the following:

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- Continuously improve the health and safety performance at upcoming and operational quarries by developing, implementing, and enforcing effective risk management and incident prevention strategies such as site inspections, assessments, investigation of incidents and complaints, application of compliance powers, training and awareness raising.
- Participate in announced and unannounced inspections and assessment activities at quarry sites. Prepare and record assessment and inspection reports and inform operators of their compliance status in writing.
- Maintaining the necessary levels of knowledge in best practice, given the variety of legislative requirements and rapid changes in technology and anticipating the health and safety issues arising from new technology.
- Managing prescribed emergency procedures, such as fire drills and scope specific emergency tests.
- Identifying appropriate health and safety training for different hierarchical levels and ensuring all employees have adequate training for the job at hand.
- Develop safety, health and environmental criteria for contractor selection and monitoring contractor compliance and management.
- Approving and arranging for the purchase of safety equipment.
- Prepare regulatory enforcement and compliance notices to quarry SHE officers, assist in Creating, circulating, and enforcing a hazard assessment process, accident investigation procedures, as well as other health and safety policies, practices, and procedures.
- Leading or participating in the investigation of workplace accidents and non-compliance.
- Carry out enforcement activities to ensure quarry operations comply with health and safety standards. This includes issuing of written advice, improvement and prohibition notices.

6.2 The Quarry Supervisor

The Quarry Supervisor shall be responsible for the following:

- Enforce, manage and oversee the implementation of this EMRP and ensuring that the EMRP is updated regularly as more or new data and information is collected, as well as when significant changes are made to the operations.
- Issuing fines and formal disciplinary hearings to individuals who contravene EMRP provisions and if necessary, removing such individuals from sites completely.
- Setting up and managing the schedule for the day-to-day activities; taking into account that daily safety briefs should be held and recorded.

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- Liaison with all relevant interested and affected parties/stakeholders, and managing such relationships.
- Ensuring all incidents are recorded, documented and reported to the relevant authorities.
- Gaining the confidence of quarry workers, through the development of cooperative and open relationships.
- Dealing with quarry workers/ personnel who may have a limited understanding of their legal obligations, or who may be concerned at the possible implications of compliance action.
- Undertaking a bi-annual review of the EMRP and amending the document when necessary.
- Draw up waste disposal schedules and procedures for removal of office, accommodation, used spares waste from site.
- Ensuring that all permits required for the operation are obtained timeously and are available on site at all times. Such permits include the ECC, SHE related files, Oil storage certificate, and Export Permits for products that will be shipped out of the country.
- Take action on all immediate remediation measures recommended in this report.
- Overall safety and security of personnel on site
- Manage and resolve conflicts with employees

6.3 Safety, Health and Environmental (SHE) Officer/ Representatives

The SHE Officer will be responsible for the following activities:

- Planning, conducting and signing off site inductions to the workers on-site and visitors to the worksite(s).
- Providing first aid to injured employees and managing emergency response when an employee's injury severity exceeds first aid.
- Developing area-specific reference safety, health and environmental manuals for all critical work sites, as well as quick SHE checklists that workers and visitors/ contractors may use for quick specific job risk assessments. Critical work areas of significance include:
 - Active quarries (both test and operational quarries)
 - Decommissioned quarries
 - Workshop area
 - Crusher Plant area and associated pre- and post-crushing product stockpiling bays
 - Block sorting, storage and loading bays
 - Power supply genset area
 - Re-fueling station(s)

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- Haul roads
- Accommodation and offices area
- Recording, investigating and reporting all SHE related incidences on site, including documentation of practical mitigation measures that must be implemented to prevent re-occurrence.
- Ensure availability of all PPE for employees and visitors
- Ensuring that the requirements of the EMRP are carried out during applicable activities throughout the project life span.
- Continuously review performance of monitoring programs outlined in the EMRP and regularly give feedback to the MEFT on these through bi-annual environmental reporting.

6.4 Public Relations Officer (PRO)

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

- Liaising between the quarry operators, the landowners and any officials from relevant Competent Authorities.
- Ensure effective and timeously communication with stakeholders, media (if necessary) and the public.
- Managing public relations and dispute issues.
- Preparing and submitting public relations, labour issues reports, if required.
- Collaborating with personnel and maintaining project-related open communication among personnel.
- Ensuring timely communication or notices of any special planned activities to interested and affected parties
- Assist the Quarry Manager in resolving internal and external disputes

6.5 The Land-Owners (Management of the Kunene River Communal Conservancy & the relevant Traditional Authorities)

- Review monitoring data and take decisions on any desired remediation measures necessary to circumvent aggravated circumstances
- Actively participate in stakeholder forums
- Make use of the grievances mechanisms to communicate issues to the Proponent and/ or to relevant authorities
- Manage and monitor legal compliance, especially with regards to socio-economic aspects
- Review bi-annual environmental performance reports
- Sanction poor performance and non-compliance where appropriate through directives, penalties and fines

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- Provide necessary administrative and permitting support to the project proponent where necessary

6.6 The License Holder

The license holder together with their contractor miner are ultimately responsible for implementing and enforcing the EMRP. His/ her key roles shall include but not limited to:

- Review monitoring data and take decisions on any desired remediation measures
- Request the contract miner to cease operations to remedy any aspects that do not conform to the requirements of the EMRP
- Review and enforce implementation of the impact management measures proposed in this EMRP
- Ensure compliance to the Mineral Prospecting and Mining Act of 1992 as well as the Environmental Management Act of 2007 by ensuring that claim registrations and environmental clearance certificates are always valid
- Review bi-annual environmental reports to ensure that the Contract Miner is effectively implementing impact management measures and monitoring programs stipulated in the EMRP.
- Ensure that any contracts or agreements entered into between them and the Contract Miner includes clauses that enforce the implementation of the EMRP

6.7 Ministry of Mines & Energy, Ministry of Environment, Forestry & Tourism and other relevant Organs of State

- Conduct Audits of the Environmental conditions of the sites from time to time and advise on any changes required or actions to be taken against operators, etc
- Terminate any expired permits such as the ECC and/ or claim registrations
- Validate data and information provided in the EMRP and bio-annual environmental reports, as well as monitoring data

6.8 Technical Staff and Consultants

- To safely and effectively monitor various technical parameters related to soil preservation/ protection; ground stability of quarry slopes/ sidewalls; employee/ contractor health; water resources management; waste management; and mechanical designs of various equipment on site.

Because the three (3) mining claims are in close proximity to each other all 3 sites can be handled and managed by one Group Safety Manager, Quarry Supervisor, PRO and SHE personnels.

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The Proponent and contract miner should familiarise themselves with these commitments in detail and should acknowledge their obligation to the specific management actions detailed in Tables contained in the following sections.

7 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN ACTIONS

This chapter presents a list of impact enhancement and/ or mitigation measures (management plan actions) for this project.

The aim of the management plan actions presented in Tables below is to enhance potential benefits and prevent potential adverse impacts to the extent possible. Where adverse impacts cannot be avoided, measures are provided to reduce, minimize or manage the significance of these impacts to the extent practical.

These management plan actions are a "translation" of mitigation measures recommended to manage the potential impacts identified for the possible future operations on these sites.

7.1 Impact Enhancement/ Mitigation Actions AND Monitoring

The management plan actions for the enhancement of potential benefits and mitigation of potential adverse impacts are presented in Table 7-1 below. This table covers the following aspects:

- Project activities and aspects for which management actions are required.
- Proposed impact enhancement/ mitigation measures for each project activity and aspect;
- Key performance indicators for monitoring success levels of management actions;
- Responsible person(s) for implementing the proposed impact management actions;
- Resources (physical, knowledge/ skills as well as time) required to effectively implement management actions and monitoring programs, and
- Implementation timeframes for the proposed impact management actions.

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Table 7-1. Management Plan Actions for Developmental, Operational, and Decommissioning/ Closure Phases of the Project

Aspect or Activity	Impact	Mitigation Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
ADVERSE IMPACTS						
Presence of quarry wall slopes, side slopes of haul roads, and loose waste rock on waste rock dumps + haul roads	<ul style="list-style-type: none"> - Potential slope instability of the operational quarry walls and side slopes of haul roads following heavy rains and blasting - Possible rock falls from upper sections of quarry walls, and mobilization of loose waste rocks from sides of haul roads and waste rock dump slopes 	-Monthly site inspections of all active quarries and rock cuts by a geotechnical engineer or engineering geologist to assess stability or distress of pit walls, haul road side slopes and thereafter design, recommend and oversee implementation of stabilization measures where necessary	<ul style="list-style-type: none"> -Presence, frequency and extent of ground cracks, evidence of sloughing & distress in the side slopes, evidence of loose rocks -General condition of walls and side slopes (is there evidence of slumping, loose material at base on slope, overhanging material, excess seepage from walls and side slopes) 	<ul style="list-style-type: none"> -Group Safety Officer (holds overall responsibility) - Quarry Supervisor - SHE Officer -Geotechnical Engineer/ Geotechnical Consultant 	<ul style="list-style-type: none"> Technical Staff (Geotechnical Engineer, geotechnical contractors) Excavator or TLB to flatten out over-steepened slopes. Other machinery to implement slope stabilization measures Funds to implement the above 	Once every quarter and as and when signs of ground instability or distress are detected/ observed
Soils	<ul style="list-style-type: none"> - Potential loss of topsoil during clearing, grabbing and stripping works if top soil is not stockpiled & subsequently protected. Potential loss of top soil due to erosion near sites where the soil has been loosened by 	-Top soil overburden should be stockpiled in designated areas during clearing, grabbing and stripping operations. Currently, there is no evidence on any of these sites for such practice being enforced, even where	<ul style="list-style-type: none"> -Record any evidence of new traffic tracks outside of designated access roads by means of photographs -Record evidence of new erosion gullies or channels on slopes or road shoulders (photographs) 	<ul style="list-style-type: none"> -Health and Safety Officer (to seek input from Consultants with Soil Conservation knowledge) -Hired soil conservation scientist 	<ul style="list-style-type: none"> -Technical Staff (Soil Conservation Scientist to offer training and monitor depth profiles as well as contamination levels) - Budgets to seek services of such specialists, to effect monitoring, to extend concrete bunds of oil 	<ul style="list-style-type: none"> -Throughout the operational phase -Once every 6 months for monitoring depth of soil profile and contamination levels

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
	<p>excavation works and blasting</p> <p>-Destruction of soil structure through excavation works, compaction works & traffic compaction along access roads</p> <p>-Soil Erosion due to increased runoff along access road and over block/ sodalite ore stockpiling bays where soils have been hardened as a result of traffic compaction</p> <p>-Soil Contamination and Pollution from hydrocarbon spillages, especially near the workshop site and around oil storage tanks. This is partly due to the inadequate size of the concrete pads and bunds around these facilities</p>	<p>historical quarrying has taken place</p> <p>-Use calcareous subsoils for placement of surface covers on new and/ or expanded access roads. Place fertile topsoil as top cover during decommissioning and rehabilitation of access roads, building platforms, backfilled quarries</p> <p>- All soils contaminated by oil spillages should be scooped out to their entire depth and safely disposed off at designated solid waste dumps in Opuwo, ruacana. Concrete pads and bunds around all oil storage tanks should be expanded in size and height, respectively to limit any spillages onto surrounding soils. It is further highly</p>	<p>-Record evidence of soil contamination by oil spills</p> <p>- Monitor depth of soil profile and contamination levels every 6 months in areas on runoff & submit such with bi-annual environmental reports</p> <p>- Photographs of concrete pads installed around hydrocarbon storage tanks. Technical drawings with the dimensions of such pads should be included in the first update of the EMRP post construction</p>		<p>storage tanks and workshops, and to scoop up and dispose off contaminated soils, to rehabilitate erosion gullies</p>	

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Aspect or Activity	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		<p>recommended that a concrete pad extending at least 5m around any mechanical workshops should be constructed to minimize risk of soil contamination by oil spillages</p> <p>- Minimize disturbed footprints as much as practically possible at any given time over the sites by, for instance, ensuring that vehicles only drive within the existing and new road reserves, raising heights of waste rock dumps to optimal geotechnically stable levels to minimize areal footprints, stockpiling blocks on top of each other at the storage bays instead of establishing spatially extensive storage bays across the sites. Limit the number of block and sodalite ore stockpiling bays to one per mining claim in order to</p>				

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Aspect or Activity	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		<p>minimize footprint of disturbed ground.</p> <ul style="list-style-type: none"> - All contaminated soils should be scooped up and transported to designated waste disposal sites in Opuwo and Ruacana. The concrete bunds on which tanks for new and used oils are to be placed must be sized to extend up to at least 1.5m from the edge of the tanks in order to be able to contain any spillages -Enforce punishment for non-compliance in the form of disciplinary hearing. - Provide soil conservation training to relevant staff such as operators of trucks, workshop mechanics, crusher operators & other earthmoving machinery operators - Create designated containment dams for 				

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		the storage of dust generated from block cutting process. To prevent excessive migration of the fine dust particles into the in situ soils, a compacted layer of silt sand mixtures or finer must be placed at the bottom and along the upstream slopes of such dam facilities during the construction phase to act as filter layer for the fines				
Land Use	- undisturbed ground/ sites within the claimed are currently habitats for wildlife and also serve as brozing/ grazing land for cattle, goat and sheep. Once developed into quarrying operations these sites will likely be fenced off and become inaccessible to the fauna, which in turn may interferer with migration/ movement patterns of these animals, and initially	-Fence off new quarry sites to minimize risk of animals from falling into quarries - Impose strict speed limits of 40km/hr across operational sites - Conflicts and land-use grievances are recorded and attended to timeously	- Quarry sites effectively fenced off with access control gates - Evidence of collision incidences in the form of photographs - During each site assessment when bi-annual audits are being conducted, an array of photographs from each mining claim site operations must be included in the bi-	-Quarry Site Supervisor (holds overall responsibility) -SHE & PR Officers - The Land Owners	-Funds to acquire fencing material & install the fences; funds to compensate families as a result of relocation; funds to compensate Traditional authority for lost grazing ground and pasture -Labour force to fence off sites	- Compensations must be concluded before any families are relocated and prior to commencement of mining -A record of land-uses through time included in the form of photographs and written records in the bi-annual reports

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
	<p>trigger conflict between workers and wildlife due to invasion of their territories. This will alter the land-use dynamics of these areas</p> <p>- Inherently, communal conservation and mining will conflict each other because of their inherent differences in objectives.</p> <p>- Increased movement of trucks within and around the sites will conflict with current land use of small and large stock grazing and may increase vehicle-animal collisions. Such collisions may in turn trigger disputes between the contract miner, the license</p>	<p>- Adequately compensate families that may be affected by relation process. Additionally, the proponent will have to find means of compensating the relevant Traditional Authority for possible loss of grazing ground and pasture</p> <p>- The SHE officer of the mining company shall work in close conjunction with the conservancy leadership to ensure effective implementation of the EMRP, minimize adverse impacts on the natural environment and community, ensure compensation agreements are effected</p>	<p>annual report to help build a record of land-use changes over time</p>			

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
	<p>holder and the local community</p> <p>- There are traditional homesteads in the vicinity of the MCs. With blasting likely to be an ongoing and regular production activity, it is anticipated that some of the homesteads within the zones of influence of blasting will need to be relocated to safe grounds, thereby resulting in potential loss of sense of ownership of land, disturbance of family/ cultural values, etc</p>					
	<p>- Changes to landscape aesthetics and topography due to creation and expansion of access roads, quarries, product stockpile bays, waste rock dumps, and the erection of civil</p>	<p>- Minimize the spatial extent of disturbed footprint at any given time by limiting cleared ground which is required for widening the current access roads and open pits. Make quarries as deep as safely possible</p>	<p>- Progressives report and document areal extent of cleared/ disturbed ground through delineation of such areas from quarterly drone photogrammetry and satellite images. Based on that reconcile extent</p>	<p>- Quarry Site Supervisor (holds overall responsibility)</p> <p>- SHE</p> <p>- The Land Owners</p>	<p>- Funds for quarterly drone surveys and monitoring of disturbed footprint</p> <p>-</p>	<p>-Ongoing throughout the operational phase of the quarrying/ crushing operations</p>

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
Landscape & Sense of Place	structures to be used as workshops or accommodation	<p>to the extent practical to limit spatial footprint of disturbed ground. This must be done taking into consideration geotechnical stability issues</p> <p>- Re-use existing access roads as much as possible and avoid creation of new ones to the extent possible</p> <p>- Backfill mined out pits immediately as quarrying progresses. Also rehabilitate access roads to any such quarries as soon as operations at the associated quarries cease</p> <p>- During the decommissioning phase restore and landscape the disturbed ground to a landform that blends in well with the</p>	of ground disturbed with footprint areas of the open quarry pits/workshop areas, etc to help assess if there is room for downsizing extent of ground disturbed.			

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		surrounding environment - Limit the height of waste rock dumps and stockpiled blocks/ crushed ore so that they are not excessively visible from public district roads				
Fauna	- Potential destruction of organisms and habitats from blasting, bulk earthworks, dust generation, frequent movement of vehicles, illegal firewood collection and hunting, etc - Increase animal fatalities from possible collisions with moving traffic - Potential disturbance of animals and	- Implement harsh forms of punishment for non-compliance to illegal hunting - Prevent groundwater drawdown by abstracting groundwater volumes within permitted abstraction volumes as stipulated in the groundwater abstraction permit - Minimize noise pollution from crusher machine and mobile plant by ensuring that are fitted	- Do wild animal counts within each mining claim prior to commencement of activities to establish baseline. Thereafter, do animal counts quarterly - Document, record any evidence of ground contamination - Monitor rate and extent of drawdown around active boreholes - Record all incidences of trapped animals and	- Quarry Supervisor - SHE - The Land Owners (especially the conservancy committee)	- Funds and personnel to implement monitoring	-Ongoing throughout the operational phase of the quarrying/ crushing operations

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
	<p>interference with their behaviour due to increased movement of people and vehicles</p> <p>- Light pollution at night and noise pollution from blasting</p> <p>- Trapping of animals in unfenced pits</p> <p>- Groundwater drawdown (critical for survival of amphibians in the drainage channel habitats)</p> <p>- Contamination of soils and water</p> <p>- Impacts linked to on-site accommodation of staff (e.g. poaching, illegal hunting)</p>	<p>with noise proof canopies. Maintain such canopies regularly and service machinery regularly</p> <p>- Fence of active and decommissioned pits, and put access control gates</p> <p>- prevent and minimize soil and water contamination from oil spillages and introduction of drilling fluids by using emergency spill scoops, lining floors of workshops/ storage tanks with concrete bunds, storing drilling/ blasting chemicals in designated area and containing them around active drilling/ blasting sites</p>	<p>animal/ vehicle collisions</p>			

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
Vegetation	<p>- Destruction, disturbance of flora and habitats by creation of access roads, pits, drawdown of groundwater, increased water turbidity due to ingress of soil from erosion</p> <p>- The proposed quarrying and crusher activities will take place on the mopane shrubland which comprises relatively dense vegetation. Additionally, water abstraction from boreholes and rivers will affect drawdown which is a great source of soil moisture for flora.</p> <p>- Increased population density due to influx of workers and accommodating those personnel on sites may trigger illegal fire wood collection</p>	<p>- Minimize disturbed footprint as much as practically possible by utilizing existing roads, waste rock dumps, storage bays</p> <p>- Limit removal of vegetation by optimally using existing access roads, raising waste rock dumps and product stockpile optimally.</p> <p>- restrict groundwater abstraction by strictly adhering to accepted abstraction rates and volumes stipulated in abstraction permits</p> <p>- Rip traffic compacted grounds around product storage bays and access roads to facilitate plant growth and re-establishment</p>	<p>-Monitor the following parameters post reclamation & rehabilitation works: vegetation re-establishment over all sites (using satellite of drone imagery over time); % vegetative cover; vertical structure of vegetation; plant health; richness and abundance of indicator species; type and extent of erosion; presence and extent of invasive alien plants</p> <p>-</p>	<p>-Quarry Site Supervisor (holds overall responsibility)</p> <p>-Environmental Health and Safety Officer</p> <p>- The Land Owners</p> <p>The License Holder</p>	<p>-Funds for flora restoration program over decommissioned areas</p> <p>-Technical Consultants to help with implementing and monitoring vegetation restoration program</p> <p>- Funds to implement vegetation restoration earthworks</p>	<p>-Ongoing throughout the project's life cycle. It is preferred that restoration plans be implemented on an ongoing basis when new roads, storage bays and quarries are decommissioned</p>

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		<ul style="list-style-type: none"> -Restrict movement of vehicle and machinery to existing roads and tracks to prevent unnecessary damage to vegetation -Develop and implement a site - specific vegetation restoration plan for the product storage bays and access roads, with input from a botanist who is familiar with the vegetation landscape of the area 				
	<p>-Solid waste pollution due to littering and storage of domestic and industrial (scrap metal, empty containers, waste wood, used tyres, waste concrete & construction) waste at or near the quarry, workshop and accommodation/ office sites</p>	<ul style="list-style-type: none"> - Office & domestic waste must be collected in different skips on site & then disposed off at the municipal dump sites in Opuwo or Ruacana regularly, as and when the need arises. - Scrap metals, used tyres, used containers & used oils/ grease & lubricants must be disposed through 	<ul style="list-style-type: none"> - Site wide evaluation of the general condition of all waste storage sites must be conducted as part of the bi-annual environmental audits - A register of all waste generated on site is kept 	<ul style="list-style-type: none"> - Group Safety Manager & Quarry Site Supervisor - SHE Officer - The Land Owners - The License Holder 	<ul style="list-style-type: none"> -Funds to acquire waste storage bins/ drums; move & store waste; to acquire waste moving machinery -Funds to hire an independent environmental consultant to conduct bi-annual environmental audits 	<p>Ongoing throughout the life of the quarrying/ crusher operations</p>

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
<p>Waste (used oils + lubricants, marble dust, waste rock, sewage, scrap metals, used pipes, used cables, domestic & office waste, used broken containers/ tanks, waste water from recycling process, used spares, used tyres)</p>	<p>-Soil pollution due to ingress of blasting powder</p> <p>-Waste pollution due to usage & on-site storage of used oils, grease, lubricants, used broken containers, pipes and cables, & scrap metals</p> <p>- Landscape pollution due to the construction and raising of waste rock dumps and product stockpiles</p> <p>- Possible leakage of sewer water from broken septic tanks</p> <p>- Possible contamination of water used in the block extraction process by hydrocarbons.</p>	<p>offtake contracts with recycling companies who can buy the waste at discounted prices. Such contractors shall collect the waste from site on a regular basis</p> <p>- Process water from the stone cutting & block extraction process must be recycled, temporarily stored in on-site tanks & reused in the stone cutting process.</p> <p>- This EMRP recommends that going forward dust from the stone cutting process must be disposed off either in abandoned quarries or within designated lined containment earth dams constructed near active quarries</p> <p>-A record of all waste generated at the quarries shall be kept on site. Such record shall show daily records of</p>	<p>- All waste disposal agreements & permits are available on site</p> <p>- Monitor process water quality, as well as daily consumptions</p> <p>- All access roads have an surfacing layer of crushed aggregates from waste rock. This will help lower volume of waste rock to be stockpiled</p> <p>- Containment earth dams for storage of dust from stone cutting process are constructed and commissioned immediately</p> <p>- A record of all solid and liquid waste collected by offtake recycling companies</p>		<p>- Funds to crush some of the waste rock and spread those over all access roads</p> <p>- Funds for constructing earth dams for disposal of dust waste</p> <p>- Funds for erecting fences around designated waste storage areas</p>	

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		<p>quantity of slurry/ dust trucked to abandoned quarries or to the proposed containment dams, and a report shall be submitted bi-annually as part of the bi-annual environmental reporting of such records</p> <p>-Used tyres may also be painted in reflective colours & used to mark the edges of access roads, bends, quarries</p> <p>-Waste separation at source will be enforced by availing clearly labelled or differently coloured general waste (paper, plastic, metals, organic waste) rubbish bins near active sites. These must be emptied weekly at the nearest municipal waste dumpsite</p>	<p>for recycling purposes by is kept on site</p> <p>- Waste off-take agreements are available on site for presentation to MME and MEFT inspectors</p>			

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		-All hazardous waste such as oil drums, and grease should be stored in secure demarcated off and overhead covered areas. Such areas must also have a concrete floor for spillage containment purposes.				
Air Quality	<p>-Dust generated from bulk excavation work during stripping, on operational quarry and crusher sites, vehicular movements on haulage access road</p> <p>- Production of gaseous substances from burning of diesel from running mobile machinery</p>	<p>- Establish dust levels around the site by installing dust monitoring buckets</p> <p>-Apply a thin (150 – 300 mm thickness) layer of crushed waste rock aggregates as cover on access roads to minimize dust generation</p> <p>- Transport dust from block cutting processes to the proposed disposal earth dams containment sites in a slightly moist state</p>	<p>-Monthly dust level monitoring by installing dust buckets around the active sites</p> <p>- Continuous monitoring for ambient dust/particulate (PM10 and PM2.5), bi-annually</p> <p>-All employees must do a mandatory health check every 6 months to monitor impact on their respiratory systems. Keep statistics of such results on site</p>	<p>- Quarry Site Supervisor</p> <p>-SHE Officer</p>	<p>-Funds to implement the dust and air quality monitoring program, including the bi-annual personnel health checks</p> <p>- Budgets to produce crushed aggregates from waste rock to be used for cover layer of roads</p> <p>-Technical Specialists (Air quality)</p>	Ongoing throughout the life of the operations

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		<ul style="list-style-type: none"> - Cover vehicles carrying dusty materials with a fine net to prevent materials being blown from the vehicles - Strictly enforce speed limits to approximately 30 – 40 km/hr to minimize the creation of fugitive dust within the project boundary - Avoid vehicles from idling and keep vehicles well maintained to minimize particulate and gaseous emissions - Adopt a wet cutting process in the quarries to minimize dust generation - Where drilling of blocks is required to downsize blocks , the drill must be fitted with dust capture equipment -Reduction in unnecessary traffic volumes within the 				

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		<p>project area by utilizing high capacity trucks;</p> <p>-All personnel onsite to wear appropriate PPE</p>				
Noise Pollution	<p>-Increased nuisance to the community due to increased noise levels arising from stone cutting, block extraction machinery, and blasting as well as from the regular movement of trucks in the general site area</p>	<p>-Limit operational times to period between 06h00 and 18h00.</p> <p>- Schedule trucking of products from the quarries and product storage bays to markets during low traffic hours</p>	<p>- Effectiveness of noise canopies by recording and monitoring noise levels from various distances</p>	<p>- SHE Officer</p>	<p>-Technical Specialists (noise, where necessary as warranted by intensity of public complains or the monitoring results)</p>	<p>Ongoing throughout the life of the operations</p>
		<p>- All crusher and mobile machinery fitted with noise canopies for noise pollution reduction</p> <p>- Provide timeously notice to community for planned blasting. Possibly share the blasting schedule with immediate communities</p>				

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		- All workers and visitors must be provided with appropriate PPE				
Surface Resources	Water - Several small drainage channels run through the mining claims. This poses possible risk of pollution of runoff water through hydrocarbon spillages and subsequent washout into this channel, with the consequence of compromising surface water quality - Possible ingress of large sediment loads during rainy seasons from erosion of loosened soils - Possible diversion or interception of drainage channels by access roads and quarries, thereby	- Install and maintain efficient concrete-lined oil and grease traps or sumps around above-ground fuel storage tank, workshops, and ensuring that emergency spillage kits are available and installed under all operational machinery. This measure must be formalised into a procedure that should be part of the emergency response plan for each site - All areas where fuels or grease is stored or applied must be concrete lined	-Implement a monthly surface water quality monitoring program by sampling from any open water bodies in the vicinity of the operational and decommissioned sites. Target levels must comply with the Namibia's effluent water targets or any other similar local standards - Abstracted volumes to be reported as part of the bi-annual environmental audit reporting	- Quarry Site Supervisor - SHE Officer - Land Owner (a representative to be dedicated for observing and confirming volumes abstracted)	-Funds to design and construct the proposed surface water management structures (e.g. diversion ditches, concrete pads, rainwater storage tanks) implement the monitoring program - Funds to acquire and fit flow meters onto water bowsers and storage tanks -Technical Specialists (Water Specialist)	Ongoing throughout the life of the operations. Water quality downstream of abstraction points and downstream of the active sites should continue for some years post decommissioning to help monitor water quality levels and recoveries/improvements in water quality with time

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
	<p>impacting areas of possible recharge</p> <p>- Runoff over access roads and from exposed open pit quarries that lie above the surrounding natural ground level will likely be susceptible to an increase in turbidity levels and an increase in solids content as they come into contact with loose soils and dust. This will compromise the physical quality of runoff in the vicinity of the operational sites due to erosion. Rainwater damming in the quarries is also at risk of being polluted by coming into contact with hydrocarbon spilled hydrocarbons.</p> <p>- Possible over-abstraction in the rivers will adversely affect</p>	<p>-Attenuate surface runoff by using on-site storage and water management infrastructure (e.g. runoff storage sumps, low gradient ditches, clean runoff diversion ditches) around the operational sites</p> <p>- Avoid over abstraction by recording volumes abstracted from rivers. Measurements can be obtained by fitting flow meters mounted to abstraction pumps</p> <p>- Maintain a no-disturbance buffer of about 100m from all drainage channels to limit disturbance proximal to the</p>	<p>- storm water management structures (diversion ditches) have been constructed, are maintained around the pits and crusher areas. This should be reported as part of the bi-annual environmental audits</p>			

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
	flow volumes downstream	<p>channels as they are deemed sensitive</p> <p>-Divert clean water from all active sites (quarries, workshops, parking lots, crusher sites, the proposed dust containment dams) through construction of gently sloping diversion ditches</p> <p>- Rainwater damming in quarries should immediately and continuously be pumped into water storage tanks and subsequently utilized in quarrying activities. Minimizing the volume of dammed water reduces risk of prolonged exposure to hydrocarbons and other</p>				

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		physical pollutants such as drilling fluids and blasting powder				
Groundwater Resources and use	<p>- Current and potential future boreholes are or will be in the saturated alluvium which are pervious and therefore susceptible to ingress of external pollutants suspected in seepage water.</p> <p>- Groundwater pollution may occur through seepage of spilled hydrocarbons, blasting powder and drilling fluids via seepage through the pervious alluvium.</p> <p>- possible drawdown due to over-abstraction.</p>	<p>- Implement bi-monthly groundwater monitoring by sampling water for standards quality control testing from boreholes in the vicinity as well as from boreholes located downstream of the operations and in the vicinity of the quarries and crushers.</p> <p>- Limit abstracted volumes to permissible volumes stipulated in the abstraction permit</p>	<p>-Implement monthly groundwater sampling and quality monitoring. Current water quality baseline levels must be established over a period of 3-6 months prior to commencement of activities, and subsequent water quality values must be benched marked against those baseline values to determine if there are increasing levels of groundwater contamination. The baseline values established in this manner may also be compared to selected</p>	<p>- Quarry Site Supervisor</p> <p>- SHE Officer</p> <p>- The Land Owners</p>	<p>-Funds to implement the baseline establishment and monitoring program</p> <p>-Technical Specialists (Water Specialist)</p>	<p>Ongoing throughout the life of the operation and post decommissioning</p>

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
			<p>control borehole water quality levels</p> <p>- records of abstracted volumes, signed by representatives of both the Contract Miner and a representative of the conservancy are kept on site and are availed for review</p>			
Conflict on responsibility of rehabilitation between different quarry operators	- The area of Oruotumba comprises several other claims operated by other miners, and access roads plus boreholes and water abstraction points are typically shared between such operators. This is likely to create issues of blame game and who should take responsibility when issues of non-compliance arise	- A centralised agreement should be entered into between the Kunene River conservancy and all mine operators in the Oruotumba area pertaining to the usage of shared access roads, shared boreholes, shared river abstraction points. Such agreements should clearly stipulate that in case of non-compliance all	- review any issues pertaining to the usage of shared infrastructure on a bi-annual basis	- Group Safety Manager And Quarry Supervisor - SHE	- Legal fees for drafting comprehensive contracts/ agreements	Ongoing throughout the operation

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		operators involved shall be held liable and be responsible for any damages caused				
Occupational Health and Safety	<p>-Short to Long-term safety effects from exposure to lifting operations, risks of possible slips and falls, working near high energy earthmoving, crushing and cutting machines, working with electrical cables in wet environments, working in partially flooded quarries</p> <p>-Short to Long-term health effects from dust, noise, exposure to sun rays</p>	<p>-Proponent must avail adequate and appropriate PPE to all workers and visitors</p> <p>-Timeously recording and reporting of all health and safety incidences, together with actions taken & recommendations on mitigation measures going forward</p> <p>-Develop an MOU with the Local Healthcare Centres in Opuwo/ Ruacana for service provision to the local workforce</p> <p>-Enforcement of speed limits and sanctions for any personnel found in</p>	<p>- Incident reports are captured and appended to the bi-annual environmental audit reports</p> <p>- Regular health screening of workers</p> <p>-Bi-annual health and safety audits completed to form part of the broader bi-annual environmental audit</p>	<p>- Quarry Site Supervisor and Group Safety Manager</p> <p>- SHE and PR Officers</p>	<p>-Funds to acquire health and safety related equipment and audits; and to pay for employee medical services</p> <p>-First Aid training for at least 2 personnel at each work site</p>	Ongoing throughout the life of the operations

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		<p>violation of speed limits, including senior staff and contractors' and sub-contractors' employees</p> <p>- Ensure that edges of all quarries are barricaded and that warning signs of steep edges and "do not enter" are mounted to those barricades</p> <p>-Appropriate signalling of moving heavy machinery</p> <p>-All drivers to be given safety education focussing on speed and conflicts between pedestrians, rail traffic and animals</p> <p>- Enforce controlled access to the operational sites to minimize public exposure to dust, safety risks, etc</p> <p>- Ensure that SHE representatives are continuously trained for first aid</p>				

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
Security of the operational sites	-Security threats to workers due to presence of valuable goods on site and anger triggered by recent retrenchments/ fired workers, employment of personnel from elsewhere instead of locals	-Appoint a security company to safeguard entrance to all sites -Install flood light at the operational sites to facilitate visibility during the night. - Quarry and crusher operators must develop and maintain a good and harmonized working relationship with community	-Record and report (timeously) all theft, injury related incidences	- Quarry Site Supervisor - SHE and PR officers	- Funds to procure security services & equipment - Human resources to serve as security personnel	Ongoing throughout the life of the operations
Land use conflict	- There is currently high risk of possible conflict with the upcoming iron and Rare earth element Mine they will likely share some roads - There are current land use conflicts with large and small stock farming activities as	- The contract Miner and the rare earth element mine operators will need to enter MOU on this aspect - The contract miner and management of the	- Evaluate whether such MOU are in place during the bi-annual environmental audits	- PR Officer - Other mine operators - The Land Owners	- Funds to handle any legal battles that may arise	Implement before the rare earth element mine starts to operate

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
	<p>some mining grounds may take up grazing/pasture areas</p> <p>- Inherently, the objectives of the communal conservancy and the proposed mining are conflicted</p>	<p>conservancy must identify which objectives to compromise on</p>				
Disputes/ Grievances	<p>-Risk of compromised relationships between Licence Holder and Contract Miner, with community leaders and community members, or the upcoming rare earth element Mine</p> <p>- Possible land and mining rights disputes with other mine operators in the area</p>	<p>-Have a complaints logbook. Monitor grievances, take the necessary actions, and provide feedback timeously</p> <p>- Written memorandums of understanding should be entered into between the license holder/ contract miner and the holders of EPLs or Mining Licenses covering or in close proximity to the</p>	<p>- Monitor community grievances and provide feedback</p> <p>- Monitor grievances launched by neighbouring mine operators</p> <p>- Record all complaints or disputes encountered and document how they were effectively managed</p>	<p>- Group Safety Manager</p> <p>- Quarry Supervisor</p> <p>- Land Owners</p>	<p>- Funds to handle any legal fees for litigation and court processes</p>	<p>Ongoing throughout the life of the operation</p>

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		<p>concerned Mining Claims. The Axillary Committee in the MME can be engaged to help facilitate this process</p> <p>- Sign Memorandums of Understanding with operators of the upcoming rare element mine on mining boundaries, any shared water supply boreholes for future operations, etc</p> <p>- License Holder, Land Owners and Contract Miner to continuously revisit their agreements and to the extent practical should resolve disputes internally. Have independent senior</p>	<p>- Bi-annually report on all dispute related matters raised and how they were handled</p>			

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
		legal practitioners to manage such contracts				
Roads	<p>- Regular transportation of heavy blocks and crushed sodalite ore by trucks have had a damaging effect on the conditions of public gravel roads due to possible overloading</p> <p>- Increased movement of traffic due to frequent transportation of products will have ripple adverse impacts such as increased dust levels, increased animal-vehicle collisions, lowered visibility on gravel roads for smaller vehicles</p>	<p>- Contractor Miner could be obliged to contribute towards quarterly maintenance of the existing gravel road by availing machinery or contribute towards hiring contractors</p> <p>- Contractor Miner must install and operate a weigh bridge near the operational block storage yards in order to limit truck loads</p>	- A record of progress towards one of the 2 impact management measures proposed must always be included in the bi-annual environmental reports	<p>- Contract Miner</p> <p>- MME and MEFT</p> <p>- Roads Authority</p>	- Machinery and/ or funds for road maintenance	- throughout the lifespan of the operations
POSITIVE IMPACTS						

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
Continuation of Employment and acquisition of technical skills	<ul style="list-style-type: none"> -Employment opportunities for youth. -Transfer of technical skills in the natural stone extraction + cutting and crushing industry 	<ul style="list-style-type: none"> -Regular and accessible (transparent) dissemination of the human resources and employment policy to interested and affected communities -Complaints of inequality and discrimination in job selection and in jobs must be documented together with remedial measures -Ensure that every job occupied by a foreign national has a local under-study to ensure on the job training of the under-study 	<ul style="list-style-type: none"> -For every key job occupied by a foreign national evaluate skills learned by local under-study at the end of each production year - Monitor employment levels of local youth - Conduct a review of skills acquired at the end of each year by running anonymous surveys 	<ul style="list-style-type: none"> -Quarry Supervisor Site - PR Officer 	<ul style="list-style-type: none"> -On the job training resources 	Ongoing throughout the life of the operation
	<ul style="list-style-type: none"> - Possible new opportunities for empowerment of local SME contractors, 	<ul style="list-style-type: none"> -Procure support services (cleaning, machinery maintenance, security 	<ul style="list-style-type: none"> -Every 6 months review contracts awarded for support services to assess extent of local 	<ul style="list-style-type: none"> -Quarry Supervisor Site 	<ul style="list-style-type: none"> - Annual procurement budget that is reserved for local businesses 	Ongoing throughout the life of the operations

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
Local Empowerment and Procurement Opportunities	retailers through sub-contract work relating to security services, cleaning services, block & final product transportation, sourcing of diesel, off take agreements for some waste (e.g., used tyres, used oil/ grease/ lubricants, scrap metals and used tyres), supply of food products such as maize meal, carting of water from boreholes or the rivers, labour based clearing of roads -Opportunities for local companies to procure support services such as cleaning, marketing, cooking, and supply of spares	and product transportation services from local previously disadvantaged contractors) and spares locally from nearby towns - Evaluate proportion of annual procurement budget spent on contract works and supply of goods by local SMEs or local businesses. This must form part of the bi-annual environmental reports	previously disadvantaged contractors	- PR Officer		
Continuation of benefits & generation of possible new	- Financial benefits to the Land Owners through payment of surface land lease levies	- Surface land lease and Contract Mining agreements must be in place and reviewed on an ongoing basis	-	- Land Owner - Contract Miner Senior Representative	- Annual budget for land lease levies and contract mining fees	Annually

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
benefits to Land Owner and Claims Holder	- Possible assistance with maintenance of roads, fences and borehole infrastructure and other community development projects			- License Holder		
Revenue for Government	<p>- Revenue collection for government through various forms of taxes (income tax, VAT, export levies) and export duties from sale of blocks and crushed ore</p> <p>- Payment of Mining Claim renewal fees</p> <p>- Indirect financial benefits to organs of state such as Namport, Road fund through port handling fees, fuel levies, product storage & shipping services</p>	-The proponent must pay all relevant taxes applicable under the constitution of the Republic of Namibia. Such taxes should be apportioned based on quantities of products shipped out	- Evaluate taxes & other fees paid to government when conducting the bi-annual environmental audits	<p>- Contract Miner</p> <p>- MME</p> <p>- Licence Holder</p>	-	Ongoing throughout the life of the operation

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Aspect or Activity	Impact	Mitigation Enhancement Measure(s) /	Key Performance Indicator (KPI)	Responsible Party	Resources Required	Timeframe of management action(s)
EMRP implementation and training	Lack of EMRP awareness by the identified responsible persons listed above; limited understanding of the measures set out in the EMRP, and implications thereof; lack of accountability by the Competent Authority to enforce the measures stipulated in this EMRP	<p>An EMRP non-compliance penalty system should be developed & implemented by the License holder, Land Owners and the Competent Authority</p> <p>- Awareness of this must be made to all employees & must form part of induction process as well as be incorporated in any legal agreements between the Land Owners and the License Holder/ Contract Miner</p> <p>- The Contract Miner should appoint SHE Officer to be responsible for managing and enforcing the EMRP implementation and monitoring on site.</p>	<p>- All required Plans or Procedures and systems are developed and are in place</p> <p>- Safety, Health and Environmental (SHE) Officer is appointed & held accountable for any oversight of key measures presented in the EMRP</p> <p>- Annual budgets for the contract miner must reflect the funds allocated for the implementation of the EMRP</p>	<p>- Group Safety Manager</p> <p>- SHE & PRO</p> <p>- License Holder (shall hold Contractor Miner accountable)</p> <p>- Land Owner</p> <p>- Contract Miner</p>	<p>- Funds to implement impact management measures, monitoring programs, Records of EMRP implementation Plans and Systems</p> <p>- Allocation of annual budgets to support and ensure implementation of the EMRP</p>	Throughout the life span of the operation

8 MONITORING AND REPORTING PROGRAMS

In accordance with Environmental Best Practice monitoring of environmental aspects shall place throughout the period of operations as well as post decommissioning until such time that the site's landform has been declared stable by the Office of the Environmental Commissioner. The licence holder and their contract miner have indicated that they welcome the Department of Environmental Affairs and Forestry (DEAF) to inspect the concerned sites after the renewal of the ECC to ensure that all the information provided in this document are reflective of the site's current conditions and future plans. The DEAF must receive a report concerning environmental matters of the sites on a bi-annual basis.

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 from the on-set of the project. The environmental monitoring programme will also ensure compliance to the recommended mitigation measures and best practice environmental standards. In totality, the environmental monitoring plan/ programme will serve the following purposes:

- To establish a baseline, that is, gathering information on the basic site characteristics to establish current conditions against which all future measurements can be benchmarked. This shall be implemented prior to the commencement of any work;
- To establish long term trends in disturbance systems;
- To estimate inherent variation within the environment, which can be compared with the variation observed in another specific area;
- To make comparisons against a standard, guideline or target levels.

The following monitoring tools/ techniques are recommended for this project going forward:

- **PHOTOGRAPHS** must be used to provide evidence and verify compliance with respect to the following aspects:
 - Confirm stability of side slopes for the quarries, the recommended dust containment dams, and waste rock dumps;
 - Provision for runoff diversion ditches around quarries, workshop areas, storage sites for fuel and used oil products;
 - Provision for dust and noise suppression facilities, e.g., crushed waste rock aggregates cover layer on access roads;
 - Conditions of all access roads and evidence of the recommended surface wearing course of crushed aggregates;
 - Evidence for the installation and extension of concrete pads around all oil storage and genset sites to limit risk of soil contamination from oil spillages.

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- Changes to the topography, aesthetic landscape and vegetation cover 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, temporary storage of all waste disposed off through offtake arrangements and others;
- Conditions of the waste rock dumps as well as the block storage bays
- Evidence that the proposed weigh bridge to limit truck loads is operational and being utilized;
- Evidence of installation of a low permeability compacted layer or liner at the bottom and along the upstream side slopes of the proposed dust containment dams
- Evidence of the recommended quarry edge barricade fences
- Evidence for stormwater/ runoff management, and to show that drainage channels are not obstructed

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 AND INSPECTIONS** must be carried out during site set up works and operations in order to ensure compliance with the following mitigation measures:
 - Conditions of open pit slopes, waste rock dumps, the recommended dust disposal dams, access roads;
 - Validity of all operating permits and agreements such as the ECC, Mining Claims, agreements with land owner, ground and surface water abstraction, etc;
 - Improved working practices/ management procedures at all work sites;
 - Landscaping works at decommissioned sites;
 - Compliance to provision of appropriate and adequate PPE;
 - Validity of calibrations for the weigh bridge;
 - Compliance to recommended safe practice such as holding daily safety meetings and conducting daily inspections on vehicles, mobile plant and stone cutting machinery;
 - Compliance to reporting of all safety, health and environmental incidences through inspection of safety books, reports and files;
 - Effective waste handling at all working areas. Effective implies that proof of the effectiveness of the measure must be submitted or documented;

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- Visual inspection for general cleanliness and good management practices within the site;
- Effectiveness of dust and noise suppression measures on access roads, in workshops, near the crusher areas and in the quarries;
- Effectiveness of widened concrete bases and raised concrete bunds for oil spillage control around all oil storage tanks, in workshops and under the base of oil bearing components on the crusher
- **RECORDS** of activities to monitor compliance towards the following mitigation measures:
 - Records of all communications to the general public on temporary interruptions to usage of the D3700 and D3701 gravel roads due to planned maintenance activities;
 - Records of water volumes abstracted from river and boreholes weekly, as well as records of the water quality monitoring program;
 - Records of all communications to the general public on blasting notices and notice for evacuations within the zone of influence of planned blasts;
 - Record of all safety, health and environmental incidences, remediation actions taken, and cause analysis;
 - Maintenance runoff diversion structures and top soil erosion control structures;
 - Records of daily working hours;
 - Records of daily inspection logs for all vehicles, mobile plant, crusher plant and cutting machinery;
 - Records of any complains launched concerning the ongoing and planned activities;
 - Records of grievances of any form that may affect production;
 - Documentation records of remediation measures implemented to rehabilitate oil contaminated soils with clear summaries of what was done and photographic evidence. This should be implemented by the next bi-annual audit.
 - Whether data records being collected for monitoring purposes are actually being utilized by the contractor miner to assess trends and continuously improve on the recommended impact management and mitigation measures;
 - Evidence of site recovery post rehabilitation
 - Counts of the following parameters to determine the success of the revegetation program:
 - Plant density and vegetation recovery on rehabilitated grounds
 - Plant growth
 - Plant and animal fatalities recorded monthly

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- Weed infestation

- **CONTINUOUS UPDATE OF SITE LAYOUT MAPS AND PLANS** to indicate locations of key structures and all monitoring tools or instruments being utilized on each of the sites at any given point in time during the operational phase. Such layout plans should encompass the following:
 - Boundary fence (if any) of each site, including access gates and barricade fences for the open pits;
 - Haul roads;
 - Block storage bays, waste rock dumps, top soil stockpile areas;
 - Drainage diversion channels and the recommended marble dust containment dams;
 - As-built plans of all crusher plants and associated structures such as product stockpiles, haulage routes, etc
 - As-built workshop and associated re-fueling stations;
 - Yards for used oils, grease, scrap metals, used tyres and used spares;
 - As-built positions for all dust fallout stations in the vicinity of the open pits, haul roads and the recommended marble dust containment dams;
 - Every quarter the Quarry Site Supervisor must ensure that a record of the areal extent of each quarry is reported
- **AIR QUALITY MONITORING:** at least one (1) dust fall out bucket should be installed at 120° angle covering upwind & downwind directions around each of these structures:
 - The open pit quarry areas
 - The crusher plant areas
 - The haul access roads and
 - The recommended dust containment dams
- **SURFACE WATER AND GROUNDWATER MONITORING:** Monitoring of surface water (in drainage channels, the Ondoto River) and boreholes at upstream and downstream locations of each active site should be implemented by the next bi-annual environmental audit. It is recommended that this takes place at least once every quarter given the scarcity of water in the area which makes preservation of water a key necessity for this area. It is recommended that the water samples should be analysed for pH, EC, Turbidity, SS, TDS, Total Alkalinity and Total hardness. In addition, water levels should be monitored to establish rate and extent of drawdown

9 CLOSURE (Decommissioning & Rehabilitation)

9.1 Context and Background

In the context of this report closure of the quarrying and crusher operations shall include cessation of block and sodalite ore quarrying and crushing activities, including the decommissioning and removal of any support infrastructure associated with these activities, and rehabilitation of the affected sites.

The objectives of the closure, decommissioning and rehabilitation phase for this project can be summarized as follows:

- Create a safe, stable and beneficial use landform (e.g., suitable for the current/ initial use such as grazing pasture) after termination of all quarrying, crushing and associated activities that would blend in well with surrounding undisturbed land uses of the general area;
- Rehabilitate disturbed land to a condition that is self-sustaining or one where maintenance requirements are consistent with the agreed post-quarrying and crushing land use. Possible end uses for large open pit quarries for this project would be fenced off water storage dams that have been battered to safe and stable slope angles. For the workshop and workers accommodation structures a possible end use could be rehabilitating the prefabricated/ containerized and corrugated sheet structures to be utilized as churches, community gathering halls, schools or clinics or even as small museums documenting the mining heritage of the Oruotumba area
- Preserve the downstream water quality by ensuring that post closure surface waters that leave the site are not degraded to a significant extent.
- Comply with generic relevant regulatory requirements and attain regulatory consensus on the successful closure and rehabilitation of the site. Currently, Namibia does have some guidelines that could be drawn from in so far as closure and rehabilitation of mining operations is concerned. These include:
 - Best Practice Guidelines for Care and Maintenance, Closure and Completion developed by the Namibian Chamber of Environment in 2019
 - Guidelines for Preparing Mine Closure Plans of 2015 developed by the Department of Mines and Petroleum of Western Australia
- To the extent practical complete rehabilitation works during operations on an ongoing basis, and in a cost-effective manner whilst achieving the primary socio-economic and developmental intent of the project.

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- Produce a final “walk away” landform that is stable and that blends aesthetically into the surrounding landscape, yet as far as possible does not impend possible future land uses.

9.2 Site Reclamation & Rehabilitation

The following actions or practices are proposed to ensure that the operational quarry, crusher, equipment maintenance sites are restored and rehabilitated to acceptable levels, and have a beneficial end-use. The recommended implementation approaches and activities for the proposed decommissioning and rehabilitation works are also provided here.

Table 9-1 provides the decommissioning, rehabilitation and closure measures to be implemented to ensure that requirements of the Environmental Management Act of 2007 are met to the extent practical.

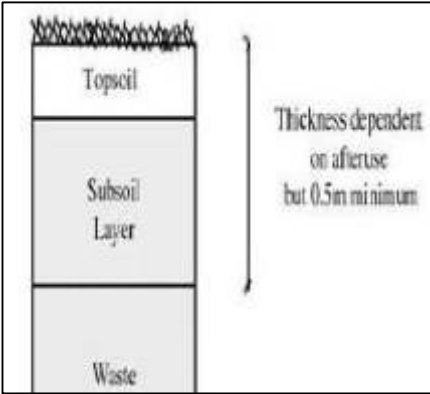
Table 9-1. Recommended Closure Measures

ENVIRONMENTAL ASPECT	REHABILITATION ACTIONS	COMPLETION CRITERIA
Surface preparation, reshaping & Construction considerations	<ul style="list-style-type: none"> - Ripping of soil will be undertaken along access/haul roads, crusher platforms, over the product stockpiling bays, and previous accommodation/ workshop facilities. Ripping is important in assisting rapid tree growth through deep root growth and enhanced soil water infiltration. The ripping depth must be sufficient to penetrate any near-surface rock or clay. Inadequate site preparation and weed control are often the two biggest single factors responsible for tree revegetation failure. Thorough site preparation will be undertaken to ensure rapid establishment and growth of seedlings. All areas proposed for seeding will be deep ripped to an approximate depth of 400 – 500 mm. Where ripping on slopes is required, the ripping will be undertaken around the contour of the land at right angles to water flow 	<ul style="list-style-type: none"> - Access/ haul roads, areas of decommissioned & dismantled structures have been ripped, reshaped, graded, - Photographic record present
Top Soil Preservation and Management	<ul style="list-style-type: none"> - During the creation of new roads, open pits, containment dams, crusher platforms, product stockpiling bays, waste rock dumpsites, etc a maximum stockpile depth of 3m will be maintained for top soil heaps to preserve viability and reduce soil deterioration - Going forward it is recommended that top soil stockpiles are protected with sediment fencing and planted with a sterile cover crop - Surface drainage in the vicinity of the topsoil stockpiles should be configured so as to direct any runoff around the stockpile - Where the stockpile is not wholly contained within the “closed loop” water management system, temporary sediment control measures such 	<ul style="list-style-type: none"> - Photographic evidence of top soil stockpiles preserved in designated fenced off sites, surrounded by runoff diversion channels, revegetated

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ENVIRONMENTAL ASPECT	REHABILITATION ACTIONS	COMPLETION CRITERIA
	<p>as sand bags should be used to prevent sediment from leaving the disturbed areas. Stockpiles will be placed in areas, so as to avoid impediment of natural localised drainage lines and minimise the likelihood of water ponding against the stockpile</p> <p>- stripping of top soil from designated top soil stockpile within the disturbed area will be undertaken when the soil is in a slightly moist condition thus reducing damage to soil structure and minimizing risk of dust generation. Stripped material should be placed directly onto the disturbed areas and spread immediately. The top soil should be re-spread in the reverse sequence to its removal, so that the organic layer, containing any seed or vegetation, is returned to the surface. Re-spreading on the contours will aid runoff control and increase moisture retention for subsequent plant growth. Re-spread topsoil shall be levelled to achieve an even surface, avoiding a compacted or an over-smooth finish</p>	
Revegetation	<p>- The sites contain native vegetation and the entirety of the sites has had or will have some modification to the natural vegetation. It is expected that the revegetation program will re-establish native trees/shrubs/ground covers and will stabilise and reshape exposed areas. The program will entail deep ripping to actively promote infiltration of water, which will enhance soil moisture requirements for direct tree seeding and minimise surface run-of.</p> <p>-All surface infrastructure areas (fence, access control structures, accommodation/ office facilities, product stockpiling bays, access/ haul roads, crusher areas) affected by the project will be re-vegetated using local plant species. The following revegetation measures will be implemented over the disturbed site:</p> <p>Prepare surface rehabilitation areas for the natural establishment of vegetation by undertaking the following:</p> <ul style="list-style-type: none"> • Rip disturbed footprint to a depth of approximately 500 mm with suitable agricultural equipment to alleviate compaction; • For areas that are heavily compacted (e.g., access roads, crusher platform areas and product stockpiling bays), rip with construction equipment to a depth of at least 1 m, and over-rip with agricultural equipment in order to create suitable conditions for vegetation establishment; spread a layer of subsoil & stockpiled topsoil as per sketch below; and ameliorate soils as required. 	<p>- Exotic weed species are not observed to be elevated in abundance when compare to the regional setting as reported by a trained independent botanist</p> <p>-Monitoring sites are established on site 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%</p>

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ENVIRONMENTAL ASPECT	REHABILITATION ACTIONS	COMPLETION CRITERIA
	 <ul style="list-style-type: none"> • Allow for natural establishment of a viable self-sustaining vegetation community, in keeping with the surrounding natural environment, or establish pioneer vegetation species as per findings of dedicated rehabilitation trials to be run from the start of the project; and • Undertake vegetation monitoring (including % recovery of un-revegetated sites) post closure to ensure rehabilitation success 	<p>when compared to the average of the control sites.</p>
Contaminated Soils	<p>-Undertake a site-wide contaminated soil assessment to determine the nature and extent of contamination, the sources of contamination and to identify appropriate remediation measures;</p> <p>-Rehabilitate moderately contaminated (inorganically contaminated) soils as follows:</p> <ul style="list-style-type: none"> • Excavate contaminated material to the full depth of the contaminated ground, and remove and dispose off at closest approved landfill sites. <p>- Rehabilitate moderately contaminated (organically contaminated) soils as follows:</p> <ul style="list-style-type: none"> • Treat organic contamination by means of biological remediation via the establishment of a bioremediation site and monitor soil quality against a selected control site. 	<p>-Inorganically contaminated soils are safely disposed off at closest approved Landfill, subject to granting of relevant permits</p> <p>-Organically contaminated soils are effectively treated and compositions are restored to acceptable levels once compared with control sites</p>
	<p><u>Infrastructure for Potential Beneficial re-use</u></p> <ul style="list-style-type: none"> • Compile an inventory of infrastructure and equipment to potentially remain at closure, aligning to end land use plan; Consider the various options listed I the preceding section for possible end used of structures • Obtain legal authorisations from Land Owner on infrastructure that must remain and be transferred; and 	<p>-Formal transfer of ownership and liability of specific infrastructure left on sites</p>

ECC Renewal & Transfer – small-scale quarrying & ongoing prospecting of blue sodalite for dimension stone and semi-precious stones on Mining Claims 66887, 66888 and 66921

ENVIRONMENTAL ASPECT	REHABILITATION ACTIONS	COMPLETION CRITERIA
Surface Infrastructure and Equipment	<ul style="list-style-type: none"> • Finalise agreements with third parties, along with transfer schedule <p><u>Surface infrastructure to be removed</u></p> <ul style="list-style-type: none"> • Remove all assets/equipment that can be profitably removed for salvage or resale; • Dismantle/demolish infrastructure; • 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 <p><u>Measures relating to support Infrastructure</u></p> <ul style="list-style-type: none"> • Obtain legal authorisations for infrastructure to remain and to be transferred; • In addition Identify and donate equipment to Land Owner that can be reused and/or recycled • Dismantle the remaining overland pipes, and salvage as much as possible; • Seal open ends of buried pipelines and fully cover with nothing exposed <p><u>Measures relating to transport Infrastructure</u></p> <ul style="list-style-type: none"> • Agreements will be put in place between the License Holder/ Contractor Miner and the Land Owner as well as other relevant authorities as to which roads shall remain post closure for beneficial use by farmers. <p>-Roads that will no longer be used post closure will be rehabilitated as follows:</p> <ul style="list-style-type: none"> • Re-establish natural drainage; 	<p>-Independent sign-off by a qualified engineer confirming the safe and stable condition of all transferred infrastructures such as workshop areas</p> <p>-All other infrastructure dismantled to ground level and removed from site</p>

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ENVIRONMENTAL ASPECT	REHABILITATION ACTIONS	COMPLETION CRITERIA
	<ul style="list-style-type: none"> • 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 <p><u>Measures relating to Electrical Infrastructure</u></p> <ul style="list-style-type: none"> • Remove flash flood lights offsite and demolish concrete bases; • Generally all underground services should be made safe and left buried in the ground. <p><u>Measures relating to crusher plant and Mobile Machinery/ Vehicles</u></p> <p><u>Machinery and Vehicles</u></p> <ul style="list-style-type: none"> • Identify equipment that can be reused and/or recycled that will not be salvaged; • Donate some of the mobile crushers to the community to help them continue with small scale quarrying and processing of sodalite ore more efficiently 	
Fencing and Site Access	<p>- Fencing and gates will be erected and maintained to exclude and prohibit the movement of persons and vehicles into areas that have been rehabilitated. The fencing and gates will be routinely checked and repaired where necessary.</p> <p>- Barbed wire fencing will not be utilised for site access given the environmental impacts this has on local fauna species. Plain wire and rural fencing with therefore only be utilised.</p> <p>- Signs will be placed in prominent locations to indicate areas that are undergoing rehabilitation and gates will be locked to prevent unwanted vehicle, person access and disturbance</p>	- Photographic evidence provided in bi-annual monitoring reports
Void Rehabilitation and Management	<p>- The main aim will be to ensure that the open pit quarries will be left geotechnically stable and that the remnant void has a beneficial use.</p> <p>- Given the likely sizes of the final pits, these areas will not be completely backfilled to pre-quarrying day levels, but rather will be reshaped and stabilised with a 1:4 batter or flatter for possible conversion into usable water storage dams for the farm. This will avoid the creation of a formal 'void', as the land will be placed to positive use</p>	<p>- Photographic evidence of battered and partially backfilled slopes</p> <p>- Shallow test quarries are completely backfilled with waste rock material</p>

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ENVIRONMENTAL ASPECT	REHABILITATION ACTIONS	COMPLETION CRITERIA
		excavated, and rock blinding is effectively implemented
Surface water	<p>The following actions are to be undertaken:</p> <p><u>For Surface Water</u></p> <ul style="list-style-type: none"> • Bi-annual monitoring of surface water sites for quality – for at least 5 years post closure or until site relinquishment criteria have been achieved; and • Conduct biomonitoring at selected downstream sites for at least 5 years or until site relinquishment criteria have been achieved. 	-Water samples taken from sampling points downstream of the site are within the National effluent quality specifications for a 12-month period
Cover system for affected sites (crusher platform sites, product storage bays, workshop areas, weighbridge areas, access roads, waste rock dumps, dust storage dam sites)	<ul style="list-style-type: none"> • After ripping and grabbing earthworks on specific affected sites such as the block storage bays, access roads, etc a cover system must be installed. Such cover system should comprise at least a 250 mm thick layer of subsoil spread across the entire site, and that should be overlain by another 250 mm layer of top soil. For sites that are sloped, such soil layers must be placed along contours to minimize erosion and lost of such cover. 	- subsoil & topsoil placed and spread across the site as a thin cover, and ultimately revegetated
Sudden or Unplanned Closure	<p>- In the event of unplanned closure some of the objectives, processes and implementation timeframes may change. However, the practice of progressive rehabilitation and quarry/ crusher operations closure planning including adequate financial provisioning should be in place at all times. This forms a strong foundation in the event of unplanned closure, to provide the highest chance of a successful closure to the satisfaction of the relevant agencies and stakeholders.</p> <p>- The following general site requirements will be completed under a sudden unplanned closure:</p> <ul style="list-style-type: none"> • Notify workers and contractors, as well as the land owner(s), license holder, and relevant government authorities; • Review and update the Rehabilitation and Closure Plan; 	- Written records for each of the recommended rehabilitation measures are filed, kept safe and are available for review by relevant authorities

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ENVIRONMENTAL ASPECT	REHABILITATION ACTIONS	COMPLETION CRITERIA
	<ul style="list-style-type: none"> • Designate a contact person(s) for authorised access to the site and project management of rehabilitation and closure; • Where required, demolish prefabricated structures, infrastructure; Donate structures that are safe for use to the community; • Remove or store all mobile equipment from the site, salvage and sell machinery/infrastructure to assist with closure costs; • Continue regular inspections of the sites until the MEFT is satisfied with rehabilitation and restoration levels; and • Establish a schedule for environmental and rehabilitation monitoring. 	

10 CONCLUSIONS

10.1 Summary

Based on the above review of the potential future quarrying and crushing operations, the likely impacts from the planned operations, and the proposed impact management measures it is concluded that the planned operations from the concerned sites generate a number of significant adverse impacts such as:

- Local disturbance and possible destruction of sensitive habitats such as near the drainage channels
- Visual impacts arising from raised waste rock dumps, product stockpiles
- Erosion of loosened soils with possible ingress of sediment loads into the Ondoto river, thereby increasing the turbidity levels
- Localized destruction of soil structure from traffic compaction and creation of product stockpiling bays and platforms for structures such the mobile crusher, prefabricated accommodation/ office structures
- Deterioration of public gravel roads if truck loads are not managed correctly
- Possible land and mining rights conflict with the upcoming rare earth element mine, as well as with land occupation as there are homesteads in the areas;
- Competing land use from conflict with grazing land
- Possible disputes on accountability for rehabilitation could arise because of presence of open pits from legacy mining operations
- Possible soil contamination from hydrocarbon spillages, and from accidental ingress of drilling fluids and blasting powder;
- Low levels of formal education amongst community members may lead to over exploitation of community members as workers and cheap labour;

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- Possible stress on water resources due to concentration of mining activities could result in excessive drawdowns with severe adverse impacts on water supply security for the Oruotumba community, and possible destruction of habitats that rely on alluvium aquifers as a water source. This could have severe detrimental impacts on the community, especially considering that the area is already drought stricken

Despite these however, if the impact management actions and monitoring programs recommended in this report are strictly implemented and maintained, the author believes that the impacts can be reduced to acceptable levels.

10.2 Closing Remarks

The aim of this report was to provide a review of the current environmental conditions in the 3 claimed areas concerned; document what activities have been carried out in the areas before as well as those planned going forward; provide an understanding of how the planned activities are likely to interact with or affect the biophysical and socio-economic environment of the area; present the scope of activities that are to be covered under the new ECC; and formulate pragmatic impact management actions and monitoring measures with allocated clear roles and responsibilities to guide the re-commencement of quarrying and crusher operations in an improved and environmental friendly manner.

Overall, due to the already highly disturbed nature of area arising from a long history of sodalite mining in the area by various operators, the overall potential environmental and socio-economic changes to be expected on the current environment are largely considered to be limited. There is however one main concern that needs to be given careful attention by the competent authority, and that is the risk of water supply security from community boreholes. Considering that in addition to concentrated sodalite quarrying and crushing activities there is now also a rare earth element mine coming up, there is a high risk of stressing the alluvial aquifers in the area, and therefore stringent monitoring of water levels and drawdown must be enforced.

Based on this and the anticipated projected residual risks that remain from the impacts identified after implementing proposed mitigation measures, it is recommended that an Environmental Clearance Certificate can be issued; subject to the full implementation of the impact management and monitoring measures outlined in this report.

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