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# ENVIRONMENTAL MANAGEMENT PLAN (EMP) FOR THE GOBOBOSEB SMALL-SCALE MINING (SSM) HOTSPOT IN ERONGO REGION



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## LIST OF ACRONYMS

ANFO:	Ammonium Nitrate/Fuel Oil
DEAF:	Department of Environment and Forestry
DoF:	Directorate of Forestry
DWSSC:	Directorate of Water Supply and Sanitation Coordination
ECC:	Environmental Clearance Certificate
EIA:	Environmental Impact Assessment
EMA:	Environmental Management Act
EMP:	Environmental Management Plan
GDP:	Gross Domestic Product
GSN:	Geological Society of Namibia
HWC:	Human Wildlife Conflicts
I&APs:	Interested and Affected Parties
MC/s:	Mining Claim/s
MC/s:	Mining Claim/s
MEFT:	Ministry of Environment, Forestry and Tourism
MIT:	Ministry of Industrialization and Trade
MLIREC:	Ministry of Labour, Industrial Relations and Employment Creation
MME:	Ministry of Mines and Energy
MoHSS:	Ministry of Health and Social Services
NAMPOL:	Namibian Police
NEPL:	Non-Exclusive Prospective License
NPC:	National Planning Commission
PPP:	Public Participation Process
SSMs:	Small-scale Miners
SWMU:	Solid Waste Management Unit
TA:	Traditional Authority
TLB:	Tractor-Loader-Backhoe
ToR:	Terms of Reference
UNDP:	United Nations Development Programme

# **1. INTRODUCTION AND BACKGROUND**

## **1.1 Introduction**

The small-scale mining activities at Farm Goboboseb mainly include artisanal and semi-mechanized methods which are used in extracting a wide range of gemstones such as amethyst, topaz, smoky quartz, rock crystals, etc. There are about 80 Small-scale Miners (SSMs) operating at Farm Goboboseb of which the majority are self-employed. About 31 mining claims (MCs) have so far been registered while 32 MCs have been applied for in the Goboboseb area.

Although small-scale mining activities have been taking place for many years in this area, there has not been any Environmental Management Plan (EMP) in place. In the past, SSMs have been issued with an Environmental Clearance Certificate (ECC) upon completion of the Environmental questionnaire and signing a pro-forma Environmental Contract. The absence of an EMP means SSMs have been operating without or with little guidance on the mitigation of various negative environmental impacts associated with their activities.

The Ministry of Mines and Energy (MME) with assistance from the United Nations Development Programme (UNDP) is facilitating the development of the Environmental Management Plan (EMP) and subsequent issuing of Environmental Clearance Certificates for SSMs at Farm Goboboseb, Erongo region. This EMP was prepared in line with Section 3.7 (1) (o) of the Environmental Impact Assessment Regulations and the client's Terms of Reference. The EMP contains aspects of the proposed management and mitigation measures to be taken to address the negative environmental impacts and enhance measures for the positive environmental impacts identified in the environmental scoping report. It also addresses the need for compliance monitoring for significant impacts. Although the implementation of this EMP is the ultimate responsibility of SSMs or Mining Claim holders, a multitude administration of different institutions is also required. This is not a standalone document; however, it must be read in conjunction with the Environmental Scoping report.

## **1.2 Objectives of EMP**

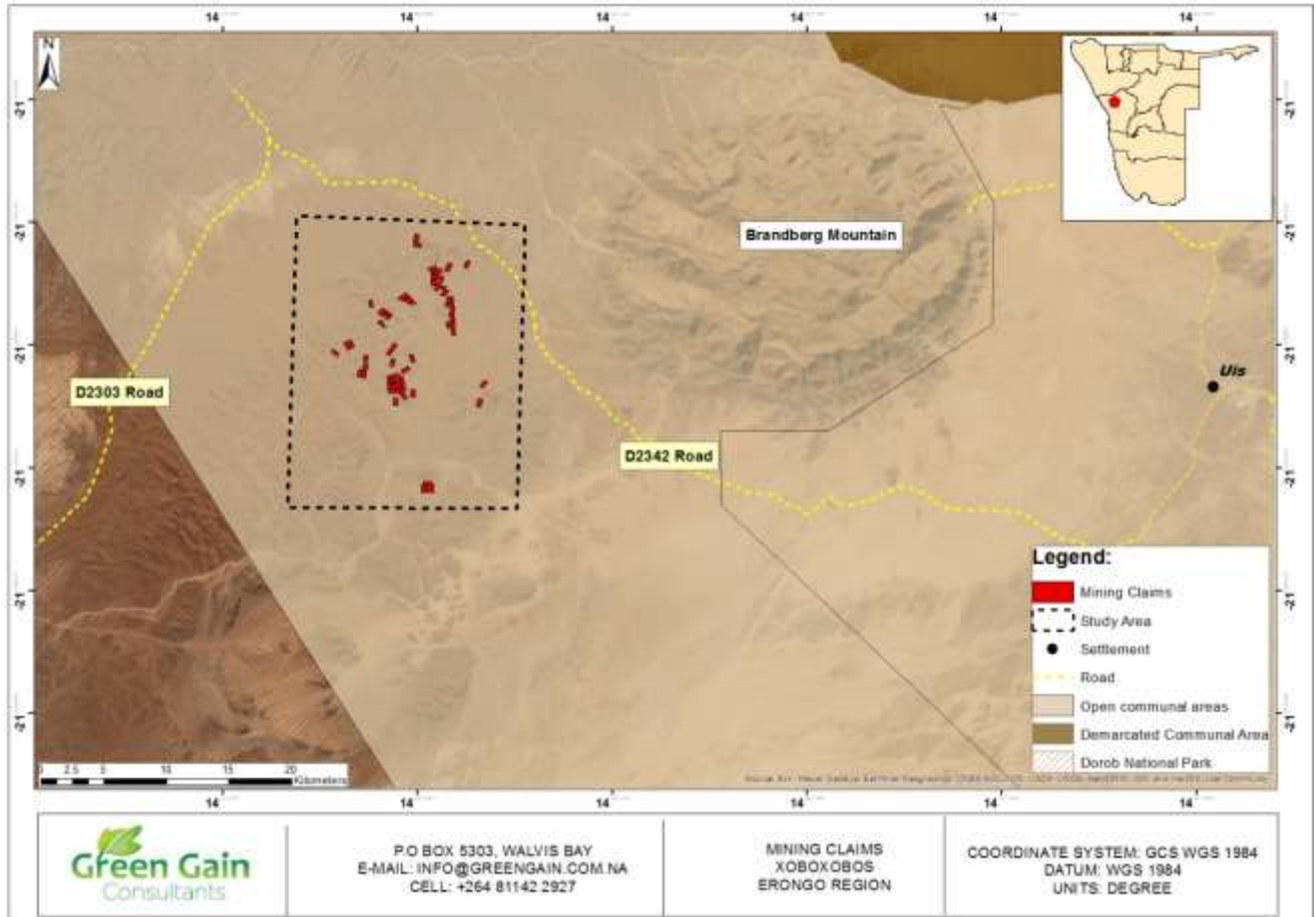
The specific objectives of this EMP are to.

- Present measures to avoid, lessen and mitigate adverse impacts on various environmental components, protect environmental resources, and enhance the value of environmental components where possible.
- Define the roles and responsibilities for the implementation of environmental management and mitigation measures.
- Explain the need for compliance with regulatory provisions and guidelines at local, regional, and national levels.
- Formulate operational standards for continual improvement in environmental performance and reduce adversity of potential impacts.
- Explain procedures for compliance monitoring and reporting to the relevant competent and regulatory authorities.
- Formulate procedures for environmental rehabilitations and post closure provisions.

## 2. DESCRIPTION OF SMALL-SCALE MINING AT GOBOBOSEB

### 2.1 Locality of the Study Area

Farm Goboboseb is located approximately 80 km west of Uis and west of the D2342 road from Uis to Brandberg mine. Its geographical coordinates are 21°15'00" South, 14°10'30" East.



**Figure 1: The study area**

This EMP has been prepared specifically for small-scale mining activities taking place or planned at Mining Claims (MCs) depicted in Figure 1 above and as listed on the Mining Claim list of the MME.



## 2.2 Description of small-scale mining activities

There are about 80 SSMs operating at Farm Goboboseb of which  $\pm 50$  is self-employed and working in groups of 6-20 people per MC and about 30 SSMs are employed by different MC holders. The SSMs at Farm Goboboseb are currently not organized in a formal association but have a local committee which handle all operational issues.

There are two types of small-scale mining methods used, namely, the artisanal or manual method and semi-mechanized method. The artisanal or manual method is mostly used by SSMs who are self-employed and lack support of machineries and equipment. The method involves manual digging and excavations of identified pegmatite veins or reefs using pick mattocks and spades and extraction of crystals with chisels and hammers or hand picking. The blasting technique is rarely used by SSMs, which involves the use of handmade explosives. The common abrasives used in manufacturing handmade explosives for the artisanal method are Alliant Power (gun powder) and Smokeless propellant.

The semi-mechanized method is used by SSMs with good resource base and/or with support of machineries and equipment such as Tractor-Loader-Backhoe (TLB), Excavators, Air compressors etc. Blasting is also occasionally done for large scale rock breaking. The most common abrasives used in blasting for the semi-mechanized method are emulsion, cartridges, Ammonium Nitrate/Fuel Oil (ANFO) and gunpowder. The amount of explosive required depend largely on the number and sizes of shot holes and the types of abrasives used.



Figure 2: Degree of impacts of SSMs at Farm Goboboseb

Below is a summary of Small-scale mining activities at Farm Goboboseb.

**Table 1: Key aspects of small-scale mining activities at Goboboseb**

Artisanal/Manual	Semi-mechanized
<p><u>Main activities</u></p> <ul style="list-style-type: none"> <li>• Manual digging and excavations</li> <li>• Hand drilling (generator powered hand driller)</li> <li>• Occasional blasting with handmade explosives (gunpowder)</li> </ul> <p><u>Status of employment (current)</u></p> <ul style="list-style-type: none"> <li>• Total No. of SSMs: ±50</li> <li>• Total No. of MC holders: 4</li> <li>• No of SSMs per MC: 6 - 20 people</li> </ul> <p><u>Temporary accommodations</u></p> <ul style="list-style-type: none"> <li>• Tents</li> <li>• Corrugated iron sheet</li> <li>• No ablution facilities</li> </ul> <p><u>Tool, Equipment/Machineries</u></p> <p>Pick mattock, Shovel, Chisel, Hammer, Generator</p> <p><u>Blasting</u> Technique: small-scale Abrasives: Alliant Power (gun powder) &amp; smokeless propellant.</p> <p><u>Environmental footprint</u></p> <ul style="list-style-type: none"> <li>• Excavations: 1 - 1.5m deep</li> <li>• Water usage: 50 - 60l/group/month</li> <li>• Fuel usage: 40 - 60l/group/month</li> <li>• Wood: 20 - 50kg/site/month</li> </ul>	<p><u>Main activities</u></p> <ul style="list-style-type: none"> <li>• Mechanical digging, trenching, excavations, and rock breaking</li> <li>• Air compressor and jack hammer</li> <li>• Occasional large-scale blasting (by registered companies)</li> </ul> <p><u>Status of employment (current)</u></p> <ul style="list-style-type: none"> <li>• Total No. of SSMs: ±30</li> <li>• No. of MC holders: 6</li> <li>• No of SSMs per MC: 4 - 6</li> </ul> <p><u>Temporary accommodations</u></p> <ul style="list-style-type: none"> <li>• Corrugated iron sheet</li> <li>• Portable ablution facilities</li> </ul> <p><u>Tool, Equipment/Machineries</u> Hydro/air compressor, Excavator, TLB, Generator, Chisel, hammer, pick mattocks, shovel, and Pick-up vehicle.</p> <p><u>Blasting</u> Technique: large-scale Abrasives: Emulsion, Cartridges, Ammonium Nitrate/Fuel Oil (ANFO) and Gunpowder</p> <p><u>Environmental footprint</u></p> <ul style="list-style-type: none"> <li>• Excavations: &gt;3m – 5m deep</li> <li>• Water usage: 1500l - 2,500l/group/month</li> <li>• Fuel usage: 800l - 1000l/group/month</li> <li>• Wood: 20 - 50kg/site/month</li> </ul>

The environmental impacts associated with these small-scale mining methods considerably differ in nature, scale, and intensity. This EMP has been prepared for both artisanal and semi-mechanized methods. Hence, SSMs must focus on the proposed management and mitigation measures that are applicable to their operations.

### 3. IMPLEMENTING THE ENVIRONMENTAL MANAGEMENT PLAN

#### 3.1 Role Players and Responsibilities

The implementation of this EMP is an ultimate responsibility of the SSMs or MC holders. However, the implementation also requires various administrations of authorities at local, regional, and national levels as described below.

**Table 2: Roles and Responsibilities**

Role Player	Responsibilities
<b>1. Institutions</b>	
<p>1.1. MME Competent Authority</p>	<p>The Ministry of Mines and Energy has the overall responsibility and mandate to regulate the exploration and mining activities. Some of the responsibilities relevant to Small-scale mining are as follows.</p> <ul style="list-style-type: none"> <li>• In terms of Section 10 of the Environmental Regulations, MME is a relevant competent authority. Hence, on receipt of the Scoping Report and the EMP, MME must forward applications to the Environmental Commissioner to obtain Environmental Clearance Certificates as well as the documents referred to in regulation 7(2).</li> <li>• Department of Mines               <ul style="list-style-type: none"> <li>○ Registration of Non-Exclusive Prospective Licence and Mining Claims to authorize mining activities</li> <li>○ Issuing of transport permits</li> <li>○ Small-scale Mining Division should conduct regular inspections</li> <li>○ Provide training to SSMs on the content of this EMP and other legal requirements as per item 3.2 of this report.</li> </ul> </li> <li>• The Department of Controlled Minerals and Minerals Development shall assist SSMs to compile quarterly and annual reports on the mining activities.</li> <li>• Mineral Ancillary Rights Commission should oversee the consultative process between SSMs and affected landowners and resolve conflicts when they arise.</li> <li>• Geological Survey of Namibia should provide geo-technical support i.e. geo-data, laboratory services etc. to SSMs to enable them in making informed decisions.</li> </ul>

<p>1.2. MEFT Regulatory Authority</p>	<p>The Ministry of Environment, Forestry and Tourism is the Regulatory Authority in terms of the Environmental Impact Assessment Regulations and has the following responsibilities:</p> <ul style="list-style-type: none"> <li>• Department of Environmental Affairs and Forestry (DEAF) is responsible to oversee the implementation of the EMP.</li> <li>• Moreover, DEAF is also responsible for conducting compliance monitoring, reviewing of environmental and incidental reports and approval of renewal, transfers, and amendments of ECCs.</li> <li>• The Directorate of Forestry (DoF) must enforce relevant Regulations of the National Forest Act, monitor vegetation clearance, and ensure control of invader species and forest fire etc.</li> <li>• The Directorate of Wildlife and National Parks should assist Conservancy Management Committee in resolving human-wildlife related conflicts.</li> </ul>
<p>1.3. MAWLR</p>	<ul style="list-style-type: none"> <li>• Ministry of Agriculture Water and Land Reform with assistance from Erongo Communal Land Board must resolve land use conflicts, i.e. Land Tenure, grazing areas, settlements etc.</li> <li>• The Directorate of Water Supply and Sanitation Coordination (DWSSC) shall provide water abstraction permits as well as to monitor water utilizations at the site in accordance with the contractual agreement. This can be done by means of regular site inspections and assessments.</li> </ul>
<p>1.4. MLIREC</p>	<p>The Ministry of Labour, Industrialization and Employment Creation has the mandate to provide labour (industrial) relations and employment and social protection services as per of Constitution of the Republic of Namibia and to ensure compliance with the Labour Act, No.11 of 2007, Affirmative Action Act, No. 29 f 1998 (Employment Act).</p> <p>The Division of Labour should carry out specific activities as follows.</p> <ul style="list-style-type: none"> <li>• Conducting labour inspections.</li> <li>• Investigating workplaces complaints.</li> <li>• Conducting workplace accident investigations; and</li> <li>• Conducting stakeholders' meetings when</li> </ul>

1.5. MSS	The Ministry of Safety and Security should provide control of manufacturing, storage and usage of explosives as prescribed by the Arms and Ammunition Act No.07 of 1996 and the Explosives Act of 1996.
1.6. Traditional Authority	<ul style="list-style-type: none"> <li>• Provide consent to existing and new MC holders.</li> <li>• Conduct regular meetings with SSMs operating in their areas and resolve conflicts between community members and SSMs that may arise.</li> </ul>
1.7. Tsiseb Conservancy	<ul style="list-style-type: none"> <li>• Provide consent to existing and new MC holders.</li> <li>• Ensure that existing and new SSMs carry out their activities in accordance with the land use zoning map and this EMP.</li> <li>• Monitoring and inspection by conservancy game guards.</li> <li>• Conduct annual meetings with SSMs to address issues of concerns and ensure a good working relationship.</li> </ul>
<b>2. SSMs and MC holders/Proponents</b>	<ul style="list-style-type: none"> <li>• Be fully conversant with this Environmental Management Plan, and all relevant environmental legislation.</li> <li>• Ensure that all stipulations within the EMP are communicated and adhered to by all employees or sub-contractors where applicable.</li> <li>• Implement various applicable mitigation measures outlined on Table 5-7 of this EMP.</li> <li>• Conduct monitoring of identified environmental receptors as per Chapter 6 of this EMP.</li> <li>• Signing of Environmental Contracts with MEFT-DEAF</li> <li>• Obtain necessary permits, licenses, consents etc. as outlined on Table 3 of this report.</li> <li>• Compile and submit environmental monitoring reports to MEFT every twelve months as per Section 5.4 (1) and (2) of the Environmental Impact Assessment Regulations. The purpose of the monitoring report is to provide progress on the implementation of the EMP.</li> <li>• MC holders should ensure the renewal of ECCs every three years and Mining Claims every after three years and thereafter, every after two years.</li> </ul>

### **3.2 Awareness and Training**

It is important to ensure that all SSMs have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimization of environmental harm.

To achieve effective environmental management, it is important that SSMs and their employees are aware of their responsibilities in terms of the relevant environmental legislations and the contents of this EMP. This can be achieved through conducting training for SSMs.

Environmental training for SSMs should typically include the following aspects:

- Basic understanding of the key environmental features of the site and the surrounding environment.
- The significant environmental impacts, actual or potential, as a result of their activities.
- The environmental benefits of improved personal performance.
- Their roles and responsibilities as well as importance in achieving conformance with the environmental policy and procedures.
- The potential consequences of deviating from specified operating procedures.
- The mitigation of negative impacts.
- The importance of not littering.
- The need to use water sparingly.
- Waste management strategies.
- Awareness on the importance of archaeological and historical sites that are found in the surrounding and the need to conserve them.
- Awareness on the fauna and flora of special concern.
- The need for environmental rehabilitation and proper decommissioning during and after mining operations.

## 4. LEGAL FRAMEWORK AND OPERATIONAL STANDARDS

### 4.1 Legal Compliance

Small-scale mining activities affects several sectors such as land, forestry, water, energy, trade etc. Hence, various licenses, permits, consents are required to ensure due diligence and legal compliance.

**Table 3: Legal Compliance requirements**

Aspect	SSM Activities	Legal Requirement/s	Reporting Frequency	Regulatory Authority
<b>Mining</b>	-Mining and exploration, transportation, and marketing of gemstones	-Non-exclusive prospecting license  -Mining claim  -Ancillary rights  -Transport permit  -Export permit for international market	-Quarterly and annual reports.  -Renewal of MCs after three years and thereafter, every two years.	MME
<b>Land tenure</b>	-Mining, accommodation and supporting infrastructures	-Consent letter from the traditional authority.  -Leasehold agreement	-None	MAWLR
<b>Environment</b>	<u>Listed Activities</u> mining, quarrying, blasting and waste management	-EMP -ECC	-Annual reports -Renewal of ECC after three years	MEFT
<b>Vegetation</b>	-Forest permit, -Wood collection	-Forest permit	-None	MEFT-DoF
<b>Water</b>	Water abstraction	-Water abstraction permit	-None	MAWLR-DWSSC
<b>Waste Management</b>	-Effluent discharge  -Solid waste generation, disposal	-ECC -Effluent discharge permit	-None	MEFT, MAWLR-DWSSC
<b>Energy</b>	-Storage of fuel  -Solar plant  -Gas storage facilities	-ECC for +200liter  -ECC for 30MW solar plant  -ECC for storage of 30 cubic of liquefied petroleum gas	-None	MME MEFT
<b>Health and Safety</b>	-Manufacture, storage, use of explosive containing gunpowder and other listed abrasives  -Mining (excavations, blasting etc.).	-Explosive permit  -Blasting certificate	-None	NAMPOL-Explosive Unit  MME

## **4.2 Minimum Operational Standards**

Small-scale mining activities must adhere to the following minimum operational standards for effective implementation of the Environmental Management Plan.

### **4.2.1 Mining Claim Area**

- Any person who wants to carry out any prospecting or mining operations in the communal land must notify the Chief or Traditional Authority, prior to the making of any application as contemplated in the Minerals (Prospecting and Mining) Act, No.33 of 1992.
- All MCs should be pegged and registered in accordance with Section 16-45 of the Minerals (Prospecting and Mining) Act, No.33 of 1992.
- The mining area must be clearly demarcated by using beacons at its corners, and along its boundaries if there is no visibility between the corner beacons.
- The prospecting and mining of the group of minerals registered for in the MC, shall only take place within this demarcated mining area.
- Areas with abundance of protected species (*Welwitschia mirabilis*) are noted and such sites must be avoided and considered as no-go zone areas.
- The Conservancy Management Committee may prohibit the conducting of prospecting and mining operations in highly vegetated or sensitive areas.

### **4.2.2 Access Roads**

- Existing roads shall be used as far as practicable.
- Access road to the new sites and the campsite must be established in consultation with the Conservancy Management Committee.
- Permit for accessory works should be obtained from MME before creation of new roads.
- The construction, and location of access roads to District roads should be in accordance with the requirements laid out by the Roads Authority (RA).

### **4.2.3 Temporary Accommodation**

- All SSMs intending on establishing temporary housing facilities should also obtain separate consent from the local Traditional Authority in this regard as per the Communal Land Act of 2005.
- The temporary accommodations should not be a place of abodes, hence only people that are directly involved in the mining operations can stay at the camping site.



- SSMs may not be allowed to keep domestic animals, such as goats, sheep, donkey, cattle etc. without a prior approval from the Traditional Authority. Pets and companion animals such as dogs, cats etc. must be under control.

#### **4.2.4 Toilet Facilities and wastewater handling**

- As a minimum requirement, the holder of a mining claim shall provide pit latrines for employees and proper hygiene measures shall be established. According to the general Health Regulations, at least one toilet for each group of 15 people (adults) and a separate toilet for male and female.
- All ablution facilities should not be less than 200 meters, from any stream, or borehole.
- All ablution facilities should be connected to septic tanks or conservancy tanks.
- Only wastewater from domestic activities shall be allowed to these tanks and any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and removed from the site, either for resale or for appropriate disposal at a recognized facility.

#### **4.2.5 General and hazardous waste handling**

- SSMs shall always make suitable covered containers available for the disposal of waste.
- General wastes should be collected and disposed of at the Uis disposal site. All recyclables should be collected separately and sent to the nearest recycling center.
- No waste should be buried or burned on site.
- All used oils, grease or hydraulic fluids shall be placed in separate containers, and these containers will be removed from the site on a regular basis for disposal to Walvis Bay Landfill site (Note: not to be disposed of at Uis disposal site).
- All spills should be cleaned up immediately to the satisfaction of the Mining Inspector.
- No SSM should manufacture, store, or use explosives without a valid license as per the Arms and Ammunition Act (Act No.07 of 1996).

## 5. MANAGEMENT AND MITIGATION MEASURES

### 5.1 Table 4: Management of Biophysical Impacts

Below are the proposed mitigation measures to avoid, prevent and mitigate the identified potential impacts of small-scale mining activities to the biophysical environment during the operational and decommissioning phases.

Significant Impacts	Source of Impacts	Proposed Mitigation Measures	Responsibility of Action Implementation	Monitoring Actions and Responsible Authority
<ul style="list-style-type: none"> <li><b>Vegetation loss or destruction</b></li> </ul>	<p>-Potential impacts on vegetation through; trampling, clearance, dust generation, soil disturbance and veld fire.</p>	<ul style="list-style-type: none"> <li>Minimize vegetation clearance and avoid damage to sensitive areas.</li> <li>Use existing access roads as far as possible.</li> <li>Only vegetation that are directly affected by the mining activities should be removed.</li> <li>Areas with abundance of <i>Welwitschia mirabilis</i> should be excluded from mining.</li> <li>Adhere to speed limit of 40km/hr. in the conservancy area.</li> <li>Rehabilitate the area by backfilling excavations.</li> <li>Fireplaces should be well secured to prevent fire outbreaks.</li> </ul>	SSMs	Inspection around the mining area by the Conservancy Committee and MEFT- DoF.
<ul style="list-style-type: none"> <li><b>Loss or reduction of local Fauna</b></li> </ul>	<p>-Mining operations in sensitive areas could cause large habitat fragmentation</p>	<ul style="list-style-type: none"> <li>All “No-go-zone areas” as identified in the scoping report must be avoided.</li> </ul>	SSMs	Inspection around the mining area by the Conservancy Guards and

	<p>and drive away wildlife from their natural habitats.</p> <p>-Mining and other anthropogenic activities in wildlife zones may cause conflicts with wildlife.</p> <p>-Settlement in wildlife areas may also lead to illegal poaching.</p>	<ul style="list-style-type: none"> <li>• Adhere to the speed limit of 40km/hr. in the conservancy area.</li> <li>• Mining should be done strictly during daytime and no operations during nighttime.</li> <li>• Campsites must not be placed in wildlife zones.</li> <li>• Trapping, chasing, or killing of wildlife (both large and small) is prohibited.</li> <li>• The movement of pet animals such as dogs, and cats must be under control.</li> </ul>		MEFT-Wildlife and Nature Conservation Division.
<ul style="list-style-type: none"> <li>• <b>Destruction of Topography, Landscape and Drainage</b></li> </ul>	<p>Open pit mining cause disturbance on larger areas and decrease the sense of place and aesthetical value.</p> <p>Changes in the topography caused by the mining activities could alter wind direction, flow of surface water and aesthetic appearance of the area.</p>	<ul style="list-style-type: none"> <li>• Waste rocks should properly and carefully be disposed of and where possible, excavations from mining activities should be rehabilitated.</li> <li>• Waste rocks and overburden should not be placed in riverbeds or main drainage.</li> <li>• Important topographic views should be preserved.</li> </ul>	SSMs	Inspections by MME
<ul style="list-style-type: none"> <li>• <b>Ecological degradation and habitat fragmentation</b></li> </ul>	<p>Small-scale mining activities, especially those using semi-mechanized method have potential to cause large scale habitats fragmentations.</p> <p>The intensification of Small-scale mining operations will degrade the ecological functions and ecosystem connectedness.</p>	<ul style="list-style-type: none"> <li>• Minimize vegetation clearance and disturbances.</li> <li>• Only designated access roads should be used and a minimum driving speed of 40km/hr should be allowed within the conservancy area.</li> <li>• Sensitive habitats i.e. riverbeds, valleys, caves should be avoided.</li> </ul>	SSMs	Inspections by MME and Conservancy Management Committee

<ul style="list-style-type: none"> <li><b>Soil erosion and contamination</b></li> </ul>	<ul style="list-style-type: none"> <li>-De-vegetation of the area due to mining will increase soil erosion by wind or water and increase suspended sediment loads in nearby streams and rivers.</li> <li>-Contamination from spillage, leakages, and direct discharge of pollutant in the soil.</li> </ul>	<ul style="list-style-type: none"> <li>The topsoil should be properly and securely stockpiled and should not be mixed with overburden and should be backfilled after mining.</li> <li>Soil conservation measures such as berms and gabions should be used on-site to help reduce erosion. Any cases of erosion should be contained.</li> <li>Vehicles and equipment with oil leaks should be inspected and properly maintained.</li> <li>Spillage or leakage should be contained, and contaminated soil should be carefully removed and disposed of at the Uis waste disposal site.</li> </ul>	SSMs	Inspections by MME
<ul style="list-style-type: none"> <li><b>Disturbance of geology</b></li> </ul>	<ul style="list-style-type: none"> <li>-Unintended disturbance of geotechnical of the soil during mining and exploration.</li> </ul>	<ul style="list-style-type: none"> <li>Obtain geo-technical data from the GSN to make informed decisions on mining and explorations.</li> </ul>	SSMs	Inspections by MME
<ul style="list-style-type: none"> <li><b>Water Resources pollution and increased demand</b></li> </ul>	<p><u>Pollution</u></p> <ul style="list-style-type: none"> <li>-Pollution of fresh water sources from mining activities and poor handling of mine waste.</li> </ul> <p><u>Increased demand</u></p> <ul style="list-style-type: none"> <li>-Water is a very scarce commodity in the area, hence, using water in mining operations will increase the local demand significantly.</li> </ul>	<ul style="list-style-type: none"> <li>Wastewater should not be discharged directly in the environment. It should be collected and disposed of at the nearest oxidation ponds or wastewater treatment plant (Uis or Henties Bay).</li> <li>Waste rocks and overburdens should be disposed away from water sources and in such a way that there is no contact with drainage or freshwater.</li> <li>Water should be primarily used for domestic purposes.</li> </ul>	SSMs	Record keeping for monthly water use by SSMs.
<ul style="list-style-type: none"> <li><b>Groundwater contamination and over-abstraction</b></li> </ul>	<p><u>Contamination</u></p> <ul style="list-style-type: none"> <li>-Groundwater sources could be easily</li> </ul>	<ul style="list-style-type: none"> <li>Mining camps should be equipped with portable toilets connected to a septic tank.</li> </ul>	SSMs	All SSMs interested in drilling borehole(s) should carry out monitoring

	<p>contaminated from poor waste handling.</p> <p><u>Over-abstraction</u> -Groundwater of the area is of poor quality and limited quantity, hence, over-abstraction will deteriorate the quality further.</p>	<ul style="list-style-type: none"> <li>All borehole drilling should be approved by the DWSSC under the MAWLR.</li> <li>Un-productive boreholes should be rehabilitated or decommissioned.</li> </ul>		<p>groundwater quality every year or as required by MAWLR during the life span of mine</p>
<ul style="list-style-type: none"> <li><b>Air pollution</b></li> </ul>	<p>-The major source of air pollution is fugitive dust from excavations, loading, transportation, hauling of waste rocks, as well as wind erosion of open pits.</p>	<ul style="list-style-type: none"> <li>Minimize dust generation and where possible provide dust suppression i.e. sprinkle with water.</li> <li>Adhere to the minimum speed limit 40km/hr. within the conservancy zone.</li> <li>Avoid excavation during windy days/times.</li> </ul>	SSMs	<p>Inventory of all dust generating activities and ensure regular inspections.</p> <p>Inspections by MME</p>
<ul style="list-style-type: none"> <li><b>Land Degradation</b></li> </ul>	<p>-Land degradation could occur because of surface disturbance, vegetation clearance, reduced/disturbance of grazing areas, water, and wood over utilization and resources over-extraction.</p>	<ul style="list-style-type: none"> <li>Cutting down of trees for wood collection should be prohibited. Vegetation that are already damaged should be used for firewood.</li> <li>All spillage and contaminated soil should be carefully removed and disposed of at the Uis disposal site.</li> <li>Mined out areas should be rehabilitated after mining.</li> </ul>	SSMs	<p>-Inspections by MME</p>

## 5.2 Table 5: Management of Socio-economic Impacts

Below are the proposed mitigation measures to avoid, prevent and mitigate the identified potential impacts of small-scale mining activities to the socio-economic environment during the Operation and Decommissioning phase.

Significant Impacts	Description of the Impacts	Proposed Mitigation Measures	Responsibility	Monitoring Actions and Responsible Authority
<b>Non-compliance</b>	<p><u>Lack of awareness</u> SSMs are likely to ignore the requirements of this EMP and continue with their activities as usual if they are not provided with training on this EMP. This will mean that the identified environmental impacts of small-scale mining activities will continue unabated.</p> <p><u>Administrative support</u> Due to the fact that most of the administrative support for small-scale mining is only done in Windhoek, SSMs often find it difficult to travel long distances to acquire legal documents, thus continue with the illegal mining activities.</p>	<ul style="list-style-type: none"> <li>SSMs should be given training on the content of this EMP and should be made aware of the legal requirements and due diligence. The training should be given in the respective vernacular languages.</li> <li>Since Erongo Region has a substantial number of small-scale miners, MME should consider decentralizing the small-scale mining administrative support to the Swakopmund office.</li> </ul>	MME	MME should have proof that all SSM attended training before start mining.
<b>Public Health and Safety</b>	<p><u>Blasting and Drilling</u> -The noise, dust and vibration and noxious gases caused by blasting and drilling is not only a nuisance to people but also a health hazard. Moreover, abrasive material and the surface being blasted may</p>	<ul style="list-style-type: none"> <li>Only use blasting abrasive and explosive listed under Group I and II of the Explosive Act No. 26 of 1956.</li> <li><i>gunpowder, nitro-glycerine, dynamite, guncotton, blasting powders, fulminate of mercury or of other</i></li> </ul>	SSMs/blasting companies	Inspections by MME and NAMPOL

	<p>contain toxic materials (e.g., lead paint, silica) that are hazardous to workers and residents.</p> <p><u>Excavations:</u> Uncovered excavations, pits and trenches from mining activities are a safety hazards for animal and humans. People and animals are at risk of falling or being trapped into the unrehabilitated pits and trenches.</p> <p><u>Nuisance</u> According to the Labour Act, No.11 of 1992) a nuisance is described as noise, dust and odor pollution. Fugitive dust (sand and soil) will be dominant on dry sunny days due to excavation, backfilling and the operation of heavy equipment. Mining implements and machinery could also generate high level noise which could be regarded as a nuisance to the employees and residents.</p>	<p><i>metals, coloured fires, and every other substance, whether similar to those herein mentioned or not, which is used or manufactured with a view to produce a practical effect by explosion or a pyrotechnic effect.</i></p> <ul style="list-style-type: none"> <li>• Use abrasives that can be delivered with water (slurry) to reduce dust.</li> <li>• Blasting should ONLY be carried out by a registered company/person.</li> <li>• Police Clearance should be obtained from the local NAMPOL offices.</li> <li>• No major blasting should take place within 1km from residential areas.</li> <li>• Keep people away from the blasting area.</li> <li>• Provide a Blasting Notice by means of a sign board onsite.</li> <li>• Excavated areas must be backfilled and properly rehabilitated</li> <li>• Identified wildlife corridors and sensitive habitats in the area must be avoided.</li> <li>• Noise level at semi-mechanized sites should not exceed 85db (Health and Safety Regulations No.156).</li> <li>• Provide regular maintenance of all</li> </ul>	<p>SSMs</p> <p>SSMs</p> <p>SSMs</p>	<p>Inspections by MME</p> <p>Inspections by the MLIREC</p>
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		<p>equipment/machines to reduce noise generation.</p> <ul style="list-style-type: none"> <li>• Employees should always wear PPE.</li> <li>• Apply soundproof to operational machineries/equipment</li> <li>• Operations should be limited to daylight hours (8:00-19:00). Avoid operating during odd hours and nighttime.</li> </ul>		
<b>Explosions and fire outbreaks</b>	<p><u>Use and storage of fuel for mining purposes.</u> If not properly stored, fuel could cause fire outbreaks. Uncovered fuel may also be poisonous to animals through drinking, especially if stored in large quantity.</p> <p><u>Wood collection</u> Uncontrolled firewood collection could lead to deforestation and cause land use conflicts with the conservancy or residents.</p>	<ul style="list-style-type: none"> <li>• SSMS are advised to keep less than 200L of fuel at the site as per the Petroleum Products Regulations of 2000.</li> <li>• Petrol should be stored in underground sources while diesel should be kept at properly secured site.</li> <li>• Collection of firewood should be minimized, and permission should be obtained from the local Forestry office (Uis office) when a large quantity of wood is required.</li> <li>• SSMS are advised not to engage in wood selling businesses without a Permit from MEFT-DoF.</li> </ul>	SSMs	<p><b>MME</b></p> <p><b>MEFT-DoF</b></p>



<b>Visual appeal and aesthetics</b>	Temporary housing structures and excavated pits may also be visible from the road and not necessarily visually attractive to tourists or visitors to the area.	<ul style="list-style-type: none"> <li>• Temporary structures should be made of local materials available and should be comparable to the local landscapes.</li> <li>• Control of fugitive dust by suppression or reduce dust generating activities</li> </ul>	SSMs	Inspections by MME
<b>Visibility</b>	Mining activities generate excessive dust which causes visual intrusion in the area.	<ul style="list-style-type: none"> <li>• If lighting is to be used onsite, it should be installed in such a manner that it does not cause annoyance to the local wildlife and residents.</li> </ul>	SSMs	Inspections by TA and Conservancy Committee
<b>Waste Generation</b>	SSMs activities generate different types of waste such as waste rocks, litter, scrap metals, and sewage waste. If not properly handled it could cause various environmental impacts, i.e. contamination of fresh water sources, pollution of the surrounding environment etc.	<ul style="list-style-type: none"> <li>• Topsoil and waste rocks should be backfilled in the trenches where possible.</li> <li>• General waste generated on site should be gathered, collected regularly and properly disposed at the nearest Municipal or approved disposal site (Uis).</li> <li>• Hazardous waste i.e. used oil, batteries generated should be collected and transported to specialized waste collectors for proper disposal procedures. No dumping or littering should be allowed.</li> <li>• Unwanted and old temporary structures not in use must be removed from the site and disposed of by the owner.</li> </ul>	SSMs	Inspections by the Erongo Regional Council and MEFT-SWMU

<p><b>Land use conflicts and competition</b></p>	<p>-Mining activities are likely to compete with other land users for resources such as land, water etc.</p> <p>Expansion of mining activities may encroach on community lands. Destruction of the environment through mining may render the land not suitable for agriculture and livestock keeping and hence force traditional communities to migrate in search for more fertile lands. This also will cause interference with the livelihood activities of the local communities.</p>	<ul style="list-style-type: none"> <li>• All SSMS operating in the area should get consent from the local TA and Conservancy Committee.</li> <li>• No permanent dwellings should be erected on site without prior approval from TA.</li> <li>• SSMS should demonstrate respect to local cultural, heritage or political status of the local people.</li> <li>• SSMS and MC holders should obtain consent from the Conservancy Committee prior to pegging of claims.</li> </ul>	<p>SSMS</p>	<p>Issuing of Ancillary Rights by MME in collaboration with TA and Conservancy Management Committee.</p>
<p><b>Temporal Housing for Employees</b></p>	<p>The absence of basic services will lead to pollution of the environment because of poor sanitation or lack of waste management.</p> <p>Uncontrolled fire could result in fire outbreak.</p> <p>Placing Temporary housing structures in remote areas or wildlife habitats might result in HWC.</p>	<ul style="list-style-type: none"> <li>• All SSMS are required to have access to a pit latrines and proper hygiene measures shall be established.</li> <li>• Fireplaces should be at secure sites and the fire should be put off after use.</li> <li>• The housing areas should be at secured sites and movement of people during night hours should be limited.</li> </ul>	<p>SSMS</p>	<p>Inspections by TA and the Communal Land Board</p>
<p><b>Archeological impacts</b></p>	<p>Potential impacts on artefacts may arise from excavation and other mining activities.</p>	<ul style="list-style-type: none"> <li>• No mining Activities should be allowed in places of nomadic pastoral importance.</li> </ul>	<p>SSMS</p>	<p>Inspections by NHC</p>

	<p>If uninformed, some SSMS might temper with the rock paintings or places of heritage importance.</p>	<ul style="list-style-type: none"> <li>• All mining activities should be limited to 10km from the Brandberg National Monument.</li> <li>• Should there be places of archeological importance discovered during the exploration or mining, it must be reported to the National Heritage Council for possible preservation.</li> </ul>		
<p><b>Diseases, theft, poaching and increasing demand of natural resources as a influx of People in the Area</b></p>	<p><u>Transmission of HIV and AIDS</u>          -HIV and AID is one of the prevailing diseases in Erongo region. Most people who are involved in mining are unmarried or they leave behind their spouses. In cases of unsafe sex practices, there is a high chance for transmission of HIV.</p> <p><u>Theft and Poaching</u>          -Uncontrolled movement of people in search for opportunities could also contribute to criminal activities such as poaching or theft.</p> <p><u>Increase demand of natural resources</u>          -Uncontrolled movement of people in the area could also put pressure on local</p>	<ul style="list-style-type: none"> <li>• Educational awareness sessions should be implemented on HIV/AIDS for all the SSMS.</li> <li>• All SSMS who are employed or seeking for employment at the area should be registered with the Traditional Authority and local SSMS committee.</li> <li>• Education is key to prevention. SSMS must be informed &amp; of the value of the fauna in the area. Rules and regulations regarding the illegal harvesting of the fauna must be made clear.</li> <li>• SSMS sites should not be a place of abode, hence only people who are actively involved in mining should be allowed to stay at the mining sites.</li> </ul>	<p>SSMS</p>	<p>SSMS Register for the area by TA</p> <p>Health awareness campaigns by Regional Councilor in collaboration with MoHSS,</p>

	available resources such as land, water, energy etc.	<ul style="list-style-type: none"> <li>• SSMs must keep records of water and energy usage.</li> </ul>		
<b>Increased traffic volumes</b>	<p>-Uncontrolled movement of vehicles will result in deterioration and trampling of vegetation and drive away wildlife in their habitats or grazing/browsing sites.</p>	<ul style="list-style-type: none"> <li>• Adhere to the speed limit of 40km/hr. within the conservancy zone.</li> <li>• Only use existing access roads.</li> <li>• New roads should be created in consultation with the Conservancy Management Committee.</li> </ul>	<p>SSMs All visitors</p>	<p>Inspection by Conservancy Committee/Guards and NAMPOL-Traffic Section</p>
<b>Occupational Safety and Health impacts</b>	<p>-SSMs are exposed to several occupational health risks such as injuries, infections or even fatalities during operations. This can be aggravated by lack of knowledge, nature of work and lack of protective gear/PPE.</p> <p>- SSMs are also at risk of physical fatigue and exhaustion. This is contributed by carrying heavy loads, working long hours, walking long distances, and engaging in heavy duty work.</p>	<ul style="list-style-type: none"> <li>• Training should be given to SSMs to encourage them to be committed toward maintaining Safety and Health as well as protection of the environment.</li> <li>• Introduce appropriate technologies which will reduce the workload.</li> <li>• Working time should be limited to 8hrs as prescribed in the Labor Act. SSMs are also encouraged to. <ul style="list-style-type: none"> <li>○ Equip themselves with Personal Protective Equipment (PPE),</li> <li>○ Keep First Aid Kits onsite and receive regular health check-ups.</li> </ul> </li> </ul>	<p>SSMs</p>	<p>Inspections by MME</p>

### 5.3 Table 6: Enhancement Measures for the Positive Impacts

Below are the proposed management measures to enhance the identified positive impacts of small-scale mining.

Significant Impacts	Description of the Impacts	Proposed Mitigation Measures	Responsibility of Action Implementation
<b>Employment Creation</b>	The sector provides employment to several people which include self-employment. However, due to the informal status of the sector, there are also a lot of labor malpractices.	<ul style="list-style-type: none"> <li>There is a need for enforcement of the Labor Act and address all existing labor malpractices. i.e. minimum wages, working hours. occupational health and safety issues etc.</li> </ul>	<b>MLIREC</b>
	The administrative support for small-scale mining is based in Windhoek, hence, SSM must travel long distances to get the necessary support. This affects the efficiency of their operations, discourage some and force others to conduct illegal mining activities.	<ul style="list-style-type: none"> <li>Decentralization of the administrative support by bringing the service closer to them (i.e. Small-Scale Mining Assistance Center in Swakopmund-Erongo region).</li> <li>Regular inspections by MME – inspectors to resolve conflicts.</li> <li>Information on the mining, environmental management, trade etc. should be made readily available and in a simplified manner for SSMs.</li> </ul>	<b>MME</b>  <b>MIT</b>
<b>Secondary Opportunities</b> (value addition, secondary business and job opportunities etc.).	Very little processing takes place in the country as high-quality crystals are usually cleaned and sold as raw products to tourists and international customers. On the other hand, lower quality crystals and gems are not fully utilized and sometimes only get polished into simple jewelries.	<ul style="list-style-type: none"> <li>Export of unprocessed gemstones should be discouraged.</li> <li>Establish support for establishment of gemstone polishing factories in the country.</li> </ul>	<b>MIT</b>
<b>Economic Contribution</b>	Despite the support that the sector continues to receive from the government and non-governmental	<ul style="list-style-type: none"> <li>SSM should be supported with the latest technologies to allow them</li> </ul>	<b>MME</b>

	<p>agencies, small-scale miners are still finding it difficult to operate efficiently due to high input costs, lack of appropriate tools and uncompetitive prices for their products.</p> <p>Due to lack of access to markets, SSMs are often price takers and can make the deserved profits.</p>	<p>to operate efficiently and effectively.</p> <ul style="list-style-type: none"> <li>• There is need for disseminating latest market related information and with the price determination for gemstones so that SSM can sell their products at the right prices and to make profit.</li> </ul>	
<b>Source of Livelihood</b>	<p>Small-scale mining activities at Goboboseb hotspot alone provide a source of livelihood for more than 80 families through employment creation and income generation.</p>	<ul style="list-style-type: none"> <li>• Collaborative efforts from all government sectors to formalize, expand and sustain this sector.</li> </ul>	<b>National Planning Commission</b>
<b>Gender Issues</b>	<p>Small-scale mining industry also project jobs for women through polishing and trading gemstones.</p>	<ul style="list-style-type: none"> <li>• More women should be trained and encouraged to participate in this sector.</li> </ul>	<b>MME</b>

## 6. ENVIRONMENTAL MONITORING DURING THE OPERATIONAL PHASE

To ensure continual improvement in environmental performance and reduce adversity of potential negative impacts, it is advisable to keep monitoring the identified environmental receptors. This compliance monitoring is the ultimate responsibility of respective regulatory authorities. Monitoring activities should be done at different interval/frequencies as indicated in the table below and should be done throughout the mining life span.

**Table 7: Compliance Monitoring**

Issue to be monitored	Monitoring Objectives	What need to be monitored	Frequency and means of Monitoring	Responsibility
<b>Water</b>	-Sustainable utilization of water resources	-Water quality -Aquifer potential	Biannual reports	MAWLR
<b>Pollution</b>	-Prevent contamination and pollution	-Waste management	Quarterly reports	SSMs
<b>Soil</b>	-Ensure soil conservation	-Soil exposure, pollution, contamination, and soil erosion by windy conditions and water	Monthly	SSMs
<b>Vegetation</b>	-Avoid land degradation and encroachment	-Monitor the presence of any new plant species at the mined area and removal of any invading species i.e. <i>prosopis</i>	Annually (after rainy season)	SSMs
<b>Air quality</b>	-Ensure air quality	-Dust emission	Daily	SSMs
<b>Noise level</b>	-Ensure noise level is at the required standard (85dB)	-Ambient noise level at mining site	Daily	SSMs
<b>Occupational Health Diseases</b>	-Ensure safety of SSMs and their families.	-Occupational related diseases i.e. silicosis, lung diseases etc.	Annual health check-up	MoHSS
<b>Implementation of the EMP</b>	-Ensure compliance to this EMP and adherence to the regulative measures	-Adherence to the EMP and legal requirements	Quarterly reports	MEFT

## **7. MITIGATION MEASURES: DECOMMISSIONING PHASE**

### **7.1 Closure and Land Rehabilitation**

For any mining activities, whether small or large scale, there is great disturbance to be expected at the mined area such as destruction of the natural vegetation and creation of open trenches leaving the area prone to soil erosion. This may result in further degradation of the environment if left un-rehabilitated. Thus, it is imperative for SSMs to rehabilitate the disturbed area to its natural or nearly its natural state.

According to the EMA, No.07 of 2007 and the Minerals (Prospecting and Mining Act), No.33 of 1992, the Mining Claim holder must take the responsibility to reclaim and rehabilitate the disturbed land at the end of prospecting and mining operations. The mine closure in terms of small-scale mining operations will occur whenever a mining claim is suspended, cancelled, lapsed or the site has been abandoned or and the holder does not wish to renew the right. The abandonment of mining claims shall be done in accordance with Section 43 (1) of the Minerals (Prospecting and Mining Act), No.33 of 1992.

### **7.2 Closure Objectives**

Depending on the nature or scale of the mining operations and supporting infrastructures installed onsite, the following closure objectives should be met.

#### **7.2.1 Rehabilitation of the Mining Area**

The objective of rehabilitation with respect to the area where mining/prospecting has taken place is to leave the area level and even, and in a natural state containing no foreign debris or other materials. The following actions should be implemented by SSMs or MC holders at the decommissioning and closure of their mining activities.

- All trenches shall be filled and levelled properly as far as possible.
- Where possible, the area should be re-vegetated/re-planted with local vegetation. Where re-vegetation is not possible, the area shall be re-seeded with local adapting species under the supervision of the DoF in the MEFT.
- All structures constructed by the miner and which will no longer be required by the conservancy, TA or landowner shall be removed and/or rehabilitated to the satisfaction of the conservancy management or TA/landowner.
- The areas shall be cleared of any contaminated soil, which must be disposed of properly.



- As outlined in the Monitoring Section, SSMS or MC holders are required to keep an effective control programme for the eradication of invading species and other exotic plants on a regular basis over the prospecting/mining area. The action should be repeated at the abandonment or closure of the mining operations.

### **7.2.2 Rehabilitation of Temporary Housing/Camping Site**

- On completion of operations, all infrastructure, equipment, plant, temporary housing, and other items used during the mining period must be removed from the site.
- All buildings, structures or objects on the vehicle maintenance yard and secured storage areas shall be dealt with in accordance with the Minerals (Prospecting and Mining Act), No.33 of 1992.
- General waste of any description, including scrap, rubble and tyres, should be removed entirely from the mining area and disposed of at the Uis disposal site. It is not permitted to be buried or burned on the site.
- Finally, rehabilitation shall be completed within a period specified by the Ministry of Mines and Energy.
- Photographs of the campsite, before and during the mining/prospecting operation and after rehabilitation, shall be taken at selected fixed points and kept on record for the information of the MME.

### **7.3 Post Closure**

The main aim of post closure rehabilitation is to establish an acceptable and sustainable post-mining land use. Given the nature of the affected environment and the adjacent land uses (conservancy), the most suitable post-mining land use will be open grazing and browsing area mainly by the desert wildlife. The other objective is to enhance tourist attraction in the area.

Hence, all mining structures and temporary accommodation and maintenance workshop should be removed from the site by the respective owners. Other permanent infrastructure such as roads, boreholes should be reserved for the community and conservancy as public infrastructures. Finally, the area should be returned close to the natural state as far as possible.