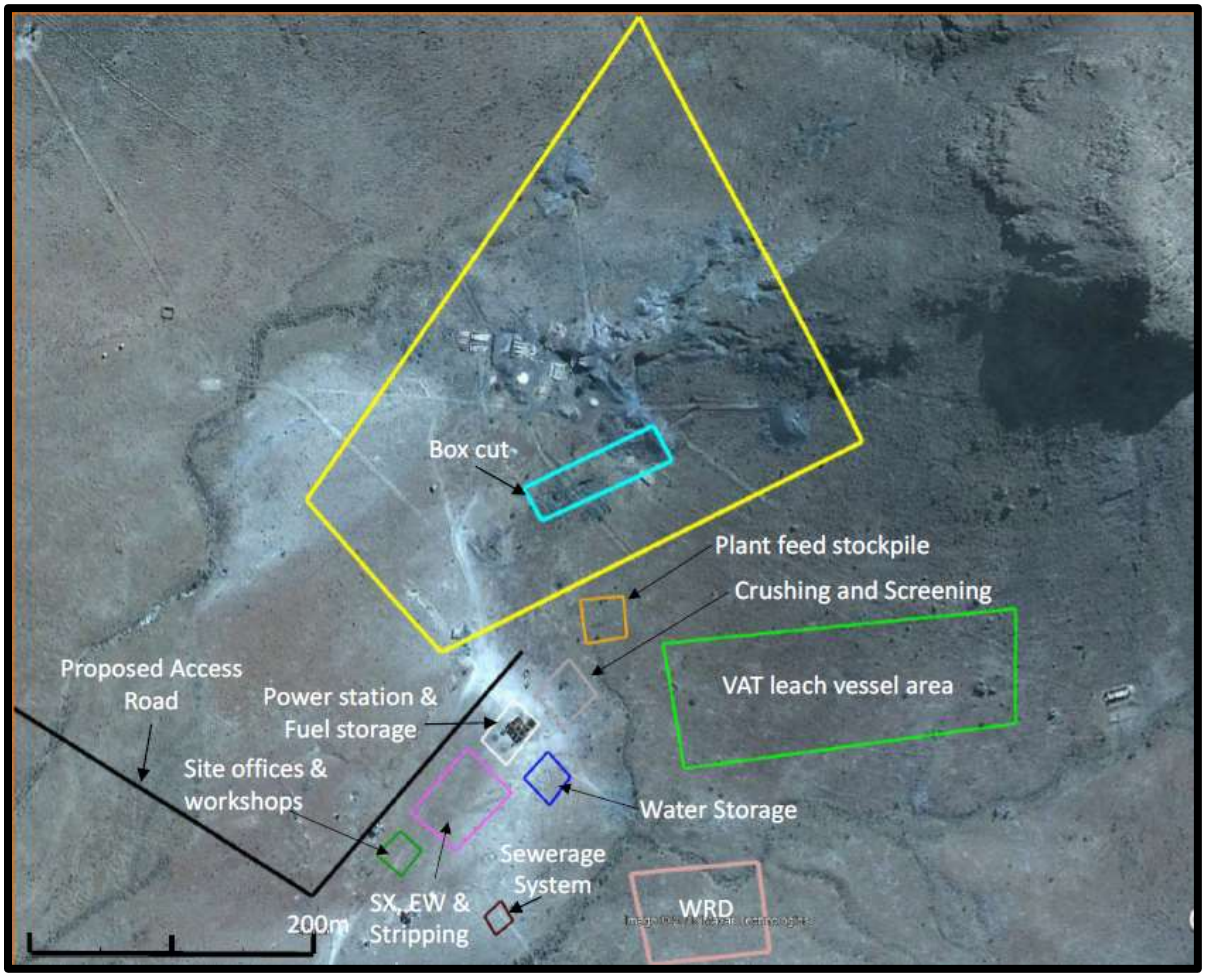
Environmental Management Plan (EMP)

(Updated)

Small-Scale Mining of Copper at Sinclair Mine, Maltahöhe District, Hardap Region, Namibia. Mining Claims: 70469, 70470, 70471, 70472, 70473, 70474, 70475, 70476, 70477 and 70478



November 2021

DOCUMENT DESCRIPTION

Title:	Environmental Management Plan for the small-scale mining and ongoing exploration activities on ten mining claims (70469-70478).
Location:	Sinclair Mine, Maltahöhe District, Hardap region
Prepared for:	Mr. Morne Du Plessis P.O. Box 32199 Pioneerspark Windhoek Namibia
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Status:	Updated EMP
Date:	November 2021
Application No:	APP003227

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LIST OF ACRONYMS

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
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
SSMs:	Small-scale miners
SWMU:	Solid Waste Management Unit
TLB:	Tractor-Loader-Backhoe
ToR:	Terms of Reference

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

Mr. Morne Du Plessis hereinafter referred to as the proponent was granted an ECC for small-scale mining activities on ten mining claims (70469-70478), located in the Maltahohe district in Hardap region. These mining claims are located adjacent to each other and encompass the historic Sinclair mine and the Sinclair farm.

The general altitude of the project area ranges from 1400m to 1450m. The project area is part of the Sinclair Formation which is made up of basalts and rhyolites that have been interbedded with andesites. These have in turn been intruded by Quartz pegmatites and granites as well as the mineralization of interest is copper chalcocite and malachite. There have been recorded sightings and analyses of silver mineralization and to a minor degree gold mineralization. Rose quartz and granite deposit have not been studied enough to determine deposit size and economic potential.

The project area is having a number of endemic invertebrates, amphibians, reptiles, mammals, and birds including the Black Rhinoceros and African Elephant and the mountain zebra. Other large mammal species found within the eco-region are kudu, springbok, gemsbok, Damara dik-diks, and black-faced impala. Predators include lion, leopard, cheetah, bat-eared fox, and Cape fox. There are desert lizards and geckos as well as scorpions that favour the desert climate, the slender mongoose, the rock mouse, bats, rodents, and other small carnivores (the-eis.com).

Environmental management is concerned with a planned, integrated program aimed at ensuring that identified and unidentified impacts of a proposed project are contained and brought to an acceptable minimum. It provides confidence on the part of project planners that a reliable scheme will be put in place to deal with any contingency that may arise during all phases of development, from preliminary study to abandonment.

The EMP proposes mitigation measures in respect to the different aspects of identified Environmental issues during the exploration phase, operation and finally the decommissioning phase (if any) for the associated identified potential impacts. These mitigation measures are actions that are intended to avoid, alleviate, or reduce environmental impacts on the environment, and they form a basis on which an Environmental Management Plan has been formulated. The mitigation measures are set forth to maximize positive impacts and minimize negative impacts as a result of the proposed development.

1.2 Objectives of the 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 THE

2.1 Locality of the study area

Sinclair Mine is located within the Maltahöhe district, Hardap Region approximately 50 kilometres northwest of Helmeringhausen (Figure 1). It also situated on the Sinclair private commercial farm. Access to the project can be made through well maintained secondary road between Helmeringhausen and Sesriem

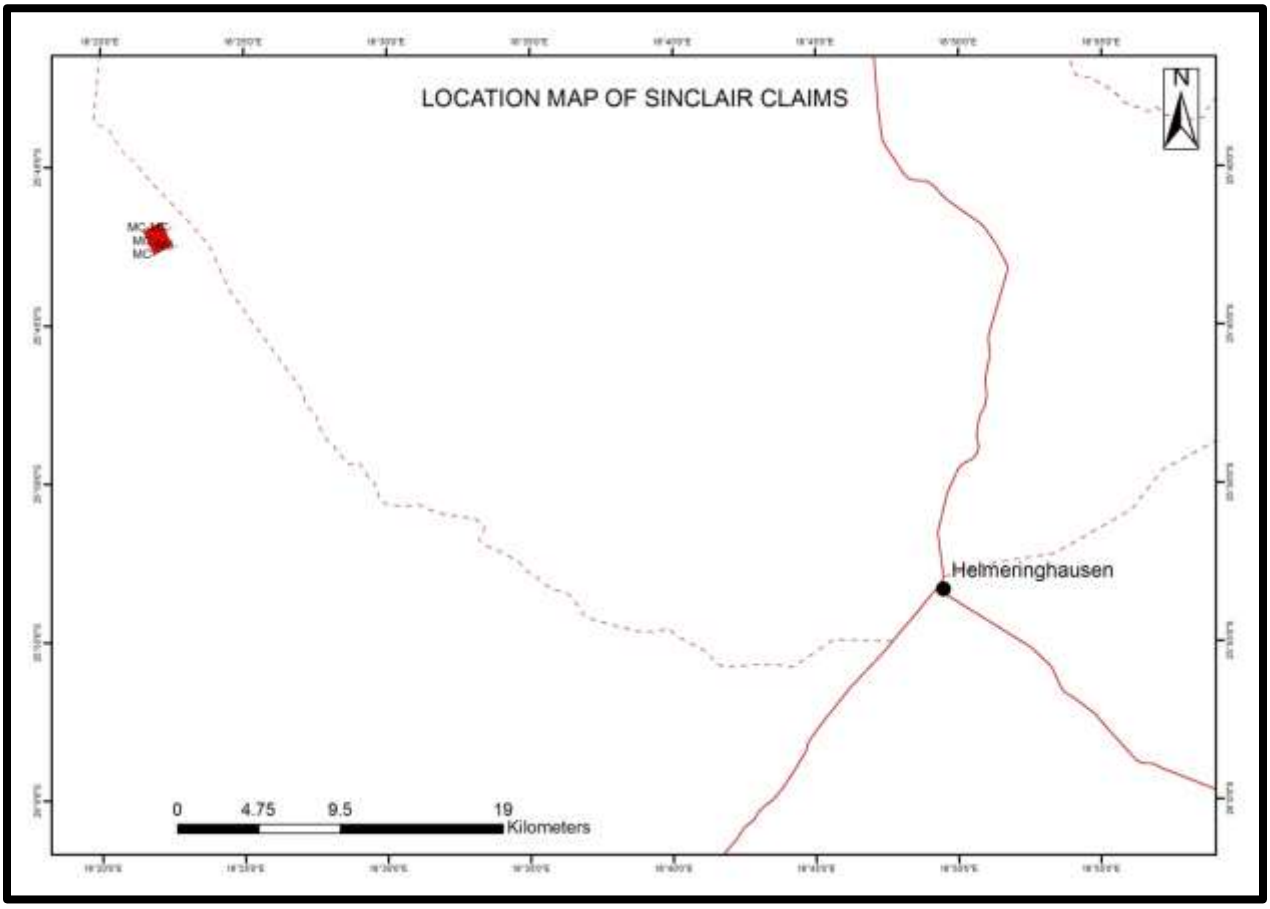

Figure 1: The study area

2.2 Mineral rights

The mining area which encompasses the Sinclair mine is covered by ten (10) Mining Claims (MC) 70469, 70470, 70471, 70472, 70473, 70474, 70475, 70476, 70477 and 70478 adjacent to each other as well as by an Exclusive Prospecting Licence (EPL) 6545 (Figure 2).

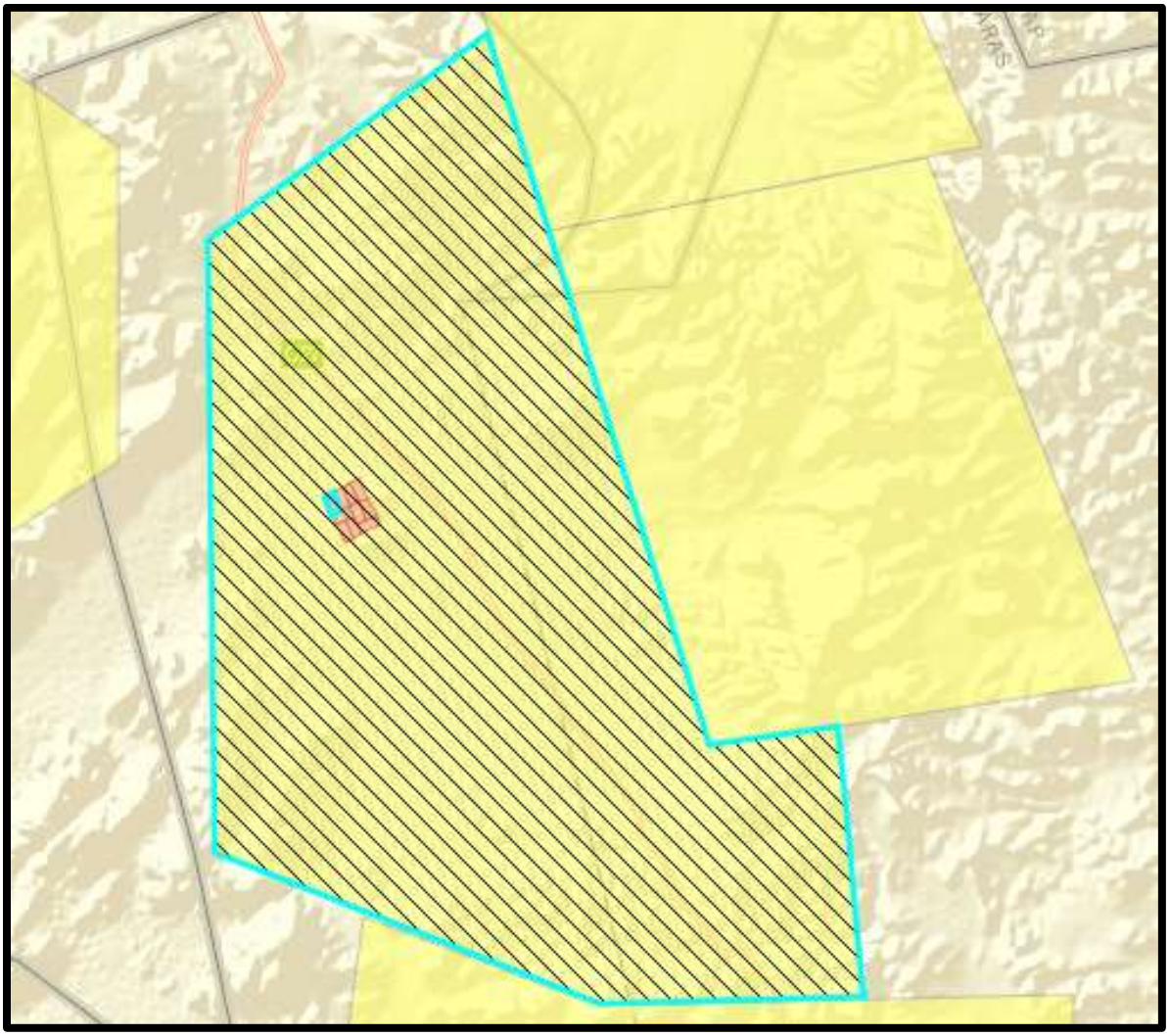

Figure 2: Mineral rights overview

2.3 Project activities

The possible open cast mine pit footprint is illustrated in yellow in Figure 3 and could extend over an area of ±7.8 ha. The open cast mining would be undertaken to depths ranging between ± 5 and 30 m depending on the exploration results.

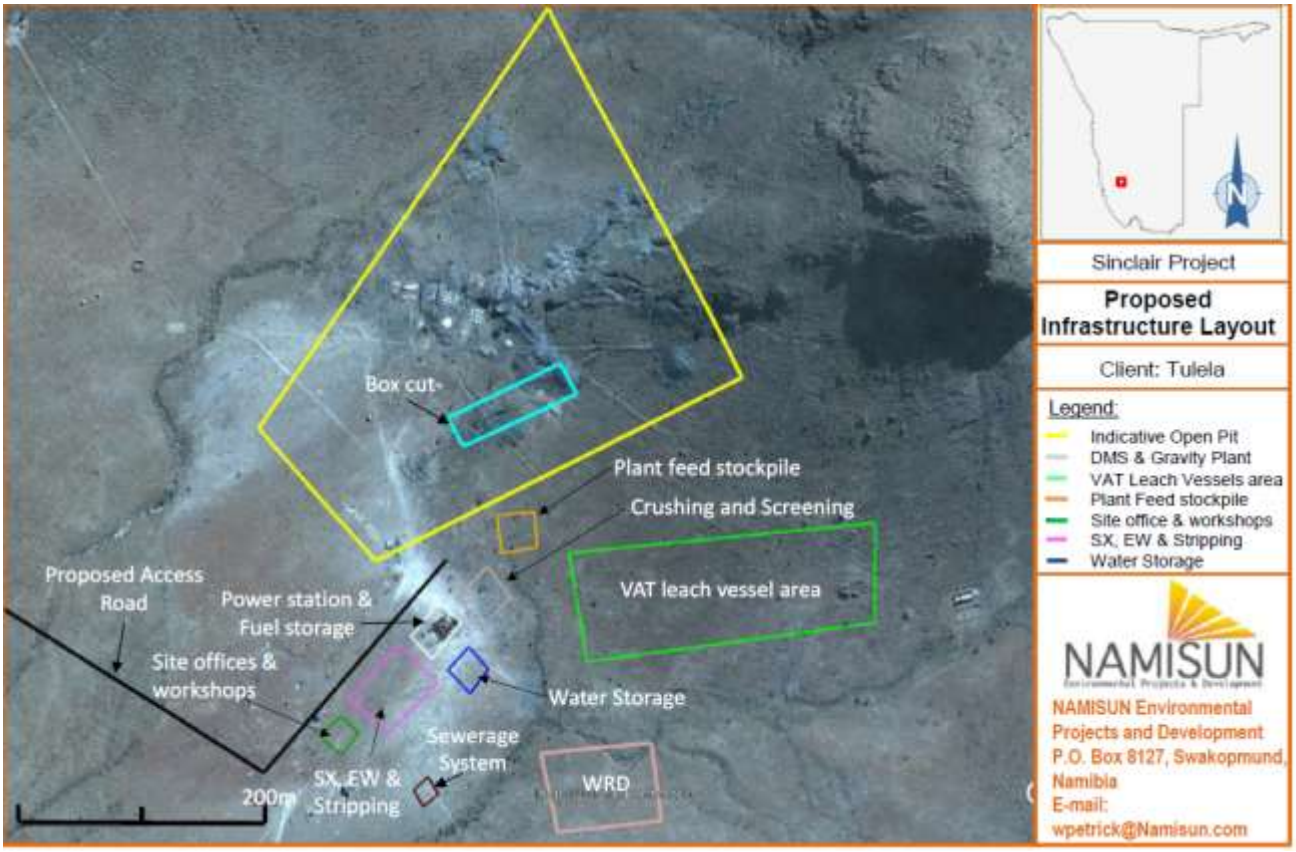

Figure 3: Sinclair mine footprint

The mining process to be followed is explained below

a). Extraction

The proposed small-scale mining activities include the extraction of mineral ore from the area of interest in the mining claim areas, processing of the existing surface stockpiles and, further exploration of ore deposits at the existing Sinclair mine. Extraction of ore will be done through an open pit mining method will with a pit depth ranging from ± 5 to 30m.

The mined ore (from the open pits and potentially from the box cut) will be hauled to the 'Plant feed stockpile' and similarly crushed and screened and then processed in the proposed (multiple) VAT/Heap leach facility and SX, EW & Stripping plant. The estimated feed rate of ore to the crusher would be ± 50 t/hr. and similarly to the VAT leach vessels.

b). Crushing and screening

From the plant feed stockpile, the ore will first be crushed via a mobile crushing plant; and thereafter screened for heap leach treatment. This activity will present the opportunity to do thorough sampling to quantify the gold content and the results to feed into the gold extraction feasibility model. Hauling of ore grade material, as well as crushing and screening activities will be limited to daytime hours.

c). Leaching

Multiple "Hybrid VAT/Heap leach vessels" ('pans) will be constructed. Each of the VAT/Heap leach vessels will be constructed on the ground surface and will have a footprint in the order of 2 500 m^2 and would be ± 6 m in height. A total of 9 VAT/Heap leach vessels are likely to be implemented to process the existing material stockpiles.

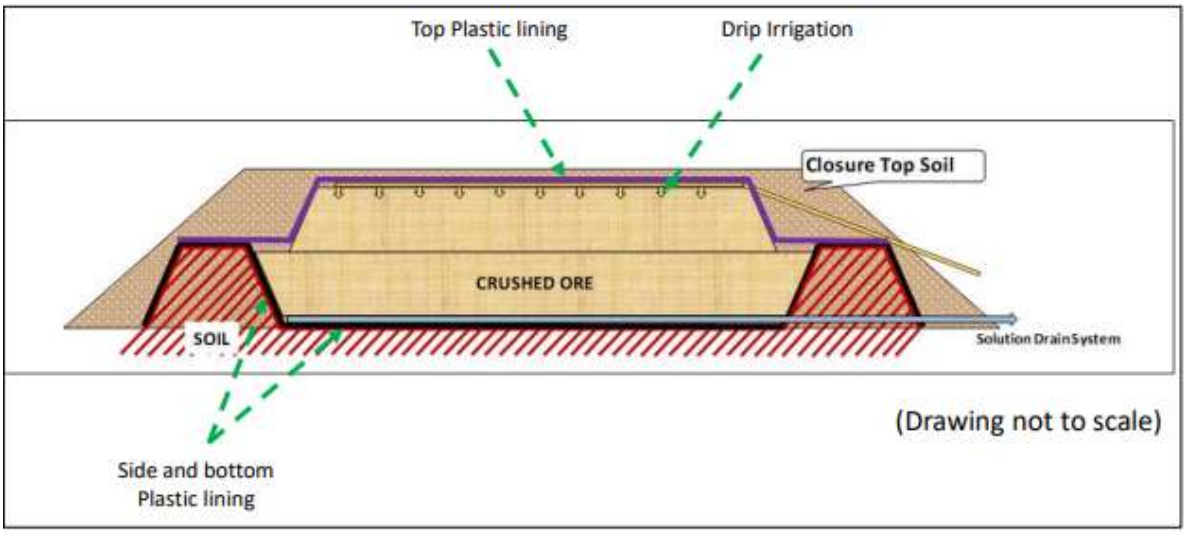

Figure 4: Schematic View of the proposed Vat / Heap Leach Vessel

The bottom and sides of the VAT/Heap leach vessels will be lined with an impermeable plastic lining and once the ore has been crushed and screened, it will be introduced into the leach area and covered (on top) with another plastic lining to reduce evaporation.

Once the ore is 'encapsulated' inside the plastic lining it will be ready to be treated chemically. HDPE Sheeting will be used for both the bottom and the top layer. The base will be levelled and rolled to smooth out any material that could damage the bottom plastic lining. A Bidim layer will be placed under the bottom plastic layer to add to the plastic lining protection. Before the ore can be introduced a top bidim layer will be laid to protect the plastic from the top side. The plastic liner will be 2mm thick made from flexible HDPE membrane

d). Solvent extraction and stripping (SX) and Electro Winning (EW)

The leached copper-bearing solution ("PLS") will be pumped, to the proposed solvent extraction and stripping (SX) section and electro winning (EW) processing plant where copper plates will be produced. The Raffinate solution will be recycled and pumped back unto the VAT / Heap leach material. An 'Inter-stage Leach Pond' (i.e., ILS pond, which will be a ±100 m3 lined facility) will be utilized to sustain the Cu tenor in solution between the various VAT/Heap leach vessels. The process will make provision to possibly recover small quantities of gold and silver post the extraction of the copper. A cyanide solution will be added to the encapsulated material. The gold / silver-bearing solution will be extracted; filtered and precipitated.

e). Neutralizing the VAT/Leach Vessels

The VAT will be neutralized post the extraction process. Two options exist for heap treatment: Washing of the material with diluted process solution and thereby reducing the acid or alkaline content in the material.

f). Processing of the mined ore

The future mined ore (from the open pits and potentially from the box cut) will be hauled to the 'Plant feed stockpile' and similarly crushed and screened and then processed in the proposed (multiple) VAT/Heap leach facility and SX, EW & Stripping Plant, as described above. The estimated feed rate of ore to the crusher would be ± 50 t/hr. and similarly to the VAT leach vessels. The total estimated material to be processed during phase 2 is to be determined as part of the exploration process and estimations indicate 125,000 t material to be treated.

g). Storm water management

Below is a schematic diagram of Storm water Management Plan for the proposed mining area (i.e., facilities), which is presented in the EIA Scoping and Assessment Report. The current planned waste stockpile is located within a natural drainage which is not accepted under the environmental design standards, it is recommended to move the planned waste stockpile south to fall outside of the natural drainage as indicated in Figure 3. Once the final infrastructure drawings and plans have been completed, the conceptual storm water plan can be updated to consider the final layouts.

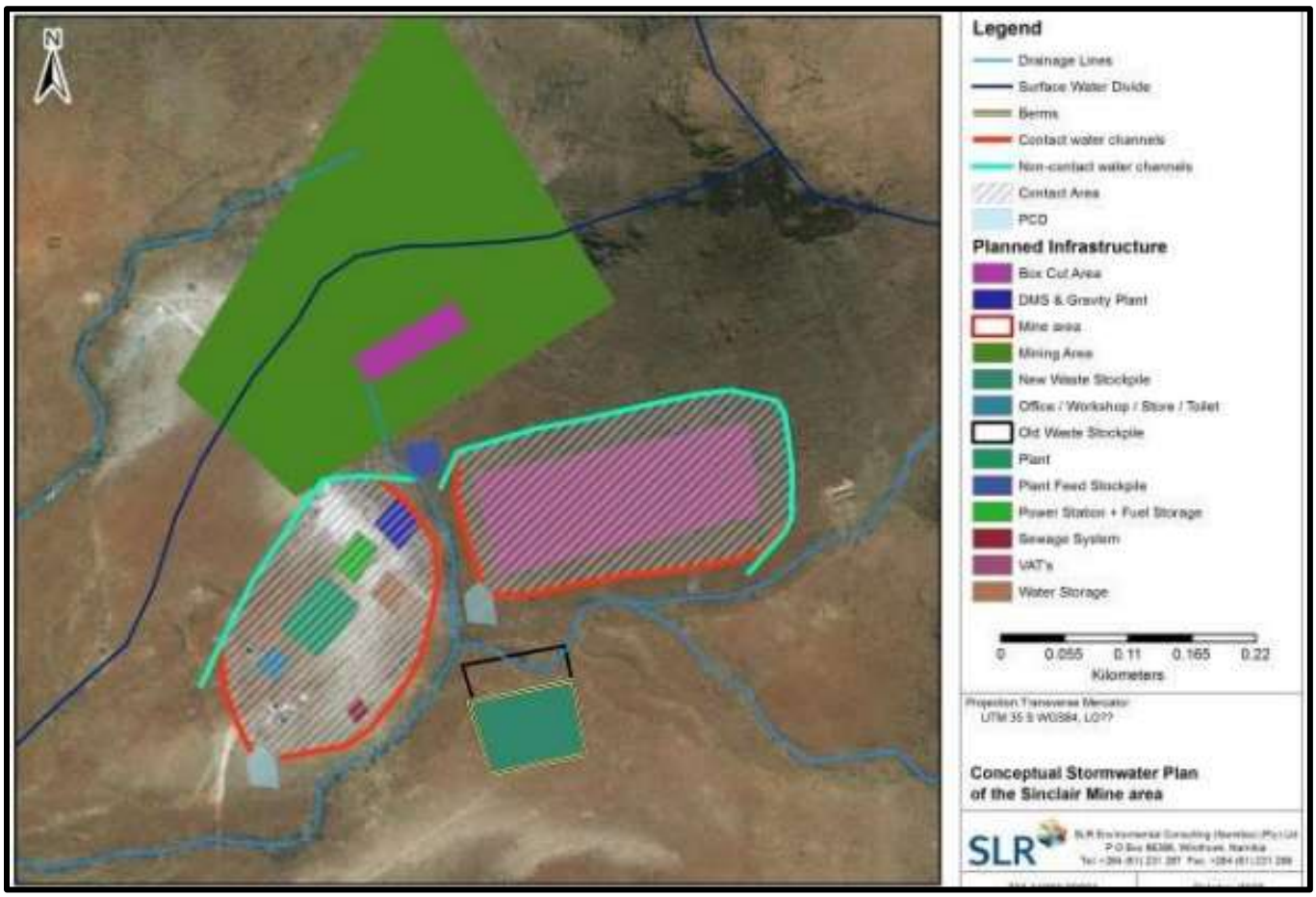

Figure 5: Proposed Stormwater Management

2.4 Resource requirement and management

a). Water requirements and management

The project area has a few boreholes that will supply any water that may be needed for the project. It is not predicted that the project will put a heavy strain on the water supply as the project will mostly require domestic utilization of the water source for the employees.

Approximately 50 m^3 per annum of water will be used for exploration and 40 000 m^3 per annum (i.e., 90 to 120 m^3/day) (excluding for human consumption) for the mining and processing activities. Water will be sourced from nearby borehole(s) on the farm within the area of interest

b). Employment

Approximately 20 people will be required for the operational phase (Phase 1 and 2) of the project, of which 80% to be skilled. It is estimated that about 70% will be fix term contractors and 30% permanent. A 4-shift cycle team of 4 people per shift will be required, including the supervisor. Three options were initially evaluated to accommodate the work crew:

- Utilizing a site base camp on the mining lease.
- Accommodation (accommodation camp) on the adjacent farm; or
- Accommodation (accommodation camp) in Helmeringhausen.

d). Waste management

All general waste will be collected and disposed of at the Malthohe waste disposal site. Employees will be sensitized not to liter and waste collection bins will be provided at the project site.

Specialized waste such as scrap metals, old plant and equipment will be collected and taken to scrap salvage.

All liquid waste will be contained in a septic tank and will be disposed at the Maltahohe waste treatment plant and no liquid waste will be disposed of in the open environment.

Hazardous waste such as oil, chemicals waste including contaminated equipment or parts will be collected and sent to Walvis Bay or Windhoek landfill site. Hazardous waste will be transported in the specialized containers and in accordance with the Hazardous waste Regulations of the MoHSS.

3. IMPLEMENTING THE ENVIRONMENTAL MANAGEMENT PLAN

3.1 Role players and responsibilities

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

Table 1: Roles and Responsibilities

Role Player	Responsibilities
1. Institutions	
1.1. MME Competent Authority	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. • 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). • Department of Mines o Registration of Non-Exclusive Prospective Licence and Mining Claims to authorize mining activities. o Issuing of transport permits o Small-scale Mining Division should conduct regular inspections. o Provide training to SSMs on the content of this EMP and other legal requirements as per item 3.2 of this report. • The Department of Controlled Minerals and Minerals Development shall assist SSMs to compile quarterly and annual reports on the mining activities. • Mineral Ancillary Rights Commission should oversee the consultative process between SSMs and affected landowners and resolve conflicts when they arise. • 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.

1.2. MEFT Regulatory Authority	The Ministry of Environment, Forestry and Tourism is the Regulatory Authority in terms of the Environmental Impact Assessment Regulations and has the following responsibilities: • Department of Environmental Affairs and Forestry (DEAF) is responsible to oversee the implementation of the EMP. • Moreover, DEAF is also responsible for conducting compliance monitoring, reviewing of environmental and incidental reports and approval of renewal, transfers, and amendments of ECCs. • 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. • The Directorate of Wildlife and National Parks should assist farm owner in resolving human-wildlife related conflicts.
1.3. MAWLR	• 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.
1.4. MLIREC	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)**.** The Division of Labour should carry out specific activities as follows. • Conducting labour inspections. • Investigating workplaces complaints. • Conducting workplace accident investigations; and • Conducting stakeholders' meetings when
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 07 of 1996 and the Explosives Act of 1996.

2. Proponent	• Be fully conversant with this Environmental Management Plan, and all relevant environmental legislation. • Ensure that all stipulations within the EMP are communicated and adhered to by all employees or sub-contractors where applicable. • Implement various applicable mitigation measures outlined on Table 3-4 of this EMP. • Conduct monitoring of identified environmental receptors as per Table 6 of this EMP. • Signing of Environmental Contracts with MEFT-DEAF • Obtain necessary permits, licenses, consents etc. as outlined on Table 3 of this report. • 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. • MC holders should ensure the renewal of ECCs every three years and Mining Claims every after three years and thereafter, every after two years.

3.2 Awareness and training

It is important to ensure that the mining operator 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 operator and 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.

Environmental training for all mine employees 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 2: Legal compliance requirements

Aspect	SSM Activities	Legal Requirement/s	Reporting Frequency	Regulatory Authority
Mining	-Mining and exploration, transportation, and marketing of minerals.	-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
Land tenure	-Mining, accommodation and supporting infrastructures	-Consent letter from the traditional authority. -Leasehold agreement	-None	MAWLR
Environment	Listed Activities mining, quarrying, blasting and waste management	-EMP -ECC	-Annual reports -Renewal of ECC after three years	MEFT
Vegetation	-Forest permit, -Wood collection	-Forest permit	-None	MEFT-DoF
Water	Water abstraction	-Water abstraction permit	-None	MAWLR-DWSSC
Waste Management	-Effluent discharge -Solid waste generation, disposal	-ECC -Effluent discharge permit	-None	MEFT, MAWLR-DWSSC
Energy	-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
Health and Safety	-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 commercial area must notify the farm owner, prior to the making of any application as contemplated in the Minerals (Prospecting and Mining) Act 33 of 1992.
- All MCs should be pegged and registered in accordance with Section 16-45 of the Minerals (Prospecting and Mining) Act 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 are noted and such sites must be avoided and considered as no-go zone areas.

4.2.2 Access roads

- Existing roads shall be used as far as practicable.
- 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 Toilet facilities and wastewater handling

- As a minimum requirement, the holder of a mining claim shall provide ablution facilities by means of a ventilated improved pit (VIP) latrine for all sites without sewer lines, as recommended by the DWSSC. Alternatively, a portable toilet connected to a septic is recommended.
- All wastewater from domestic activities shall be channeled into the pit or septic tank which should be emptied regularly. Wastewater should be collected and disposed of, at the nearest wastewater oxidation ponds or treatment plant.
- According to the general Health Regulations (GN 121 of 1969), at least one VIP latrine for each group of 15 people (adult) and separate toilets for male and female is recommended.
- All ablution facilities should not be less than 200 meters, from any stream, or borehole.

- 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.

4.2.4 General and hazardous waste handling

- The miner shall always make suitable covered containers available for the disposal of waste.
- General wastes should be collected and disposed of at the Malthahoe waste 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 Maltahohe waste disposal site).
- All spills should be cleaned up immediately to the satisfaction of the Mining Inspector.
- No manufacturing, storage, or use explosives without a valid license as per the Arms and Ammunition Act 7 of 1996.

5. MANAGEMENT AND MITIGATION MEASURES

5.1 Table 3: 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
• **Vegetation loss or destruction**	-Potential impacts on vegetation through; trampling, clearance, dust generation, soil disturbance and veld fire.	• Minimize vegetation clearance and avoid damage to sensitive areas. • Use existing access roads as far as possible. • Only vegetation that are directly affected by the mining activities should be removed. • Areas with abundance of protected species should be excluded from mining. • Rehabilitate the area by backfilling excavations. • Fireplaces should be well secured to prevent fire outbreaks.	Proponent	Inspection around the mining area by MME.
• **Loss or reduction of local Fauna**	-Mining operations in sensitive areas could cause large habitat fragmentation and drive away wildlife from their natural habitats. -Mining and other anthropogenic activities in	• All "No-go-zone areas" as identified in the scoping report must be avoided. • Mining should be done strictly during daytime and no operations during nighttime.	Proponent	MEFT-Wildlife and Nature Conservation Division.

	wildlife zones may cause conflicts with wildlife. -Settlement in wildlife areas may also lead to illegal poaching.	• Campsites must not be placed in wildlife zones. • Trapping, chasing, or killing of wildlife (both large and small) is prohibited. • The movement of pet animals such as dogs, and cats must be under control.		
• **Destruction of Topography, Landscape and Drainage**	Open pit mining cause disturbance on larger areas and decrease the sense of place and aesthetical value. Changes in the topography caused by the mining activities could alter wind direction, flow of surface water and aesthetic appearance of the area.	• Waste rocks should properly and carefully be disposed of and where possible, excavations from mining activities should be rehabilitated. • Waste rocks and overburden should not be placed in riverbeds or main drainage. • Important topographic views should be preserved.	Proponent	Inspections by MME
• **Ecological degradation and habitat fragmentation**	Small-scale mining activities, especially those using semi-mechanized method have potential to cause large scale habitats fragmentations. The intensification of small-scale mining operations will degrade the ecological functions and ecosystem connectedness.	• Minimize vegetation clearance and disturbances. • Only designated access roads should be used. • Sensitive habitats i.e., riverbeds, valleys, caves should be avoided.	Proponent	Inspections by MME
• **Soil erosion and contamination**	-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.	• The topsoil should be properly and securely stockpiled and should not be mixed with overburden and should be backfilled after mining. • Soil conservation measures such as berms and gabions should be used	Proponent	Inspections by MME

	-Contamination from spillage, leakages, and direct discharge of pollutant in the soil.	on-site to help reduce erosion. Any cases of erosion should be contained. • Vehicles and equipment with oil leaks should be inspected and properly maintained. • Spillage or leakage should be contained, and contaminated soil should be carefully removed and disposed of at the Uis waste disposal site.		
• **Disturbance of geology**	-Unintended disturbance of geotechnical of the soil during mining and exploration.	• Obtain geo-technical data from the GSN to make informed decisions on mining and explorations.	Proponent	Inspections by MME
• **Water Resources pollution and increased demand**	<u>Pollution</u> -Pollution of fresh water sources from mining activities and poor handling of waste. <u>Increased demand</u> -Water is a very scarce commodity in the area, hence, using water in mining operations will increase the local demand significantly.	• 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. • 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. • Water should be primarily used for domestic purposes.	Proponent	Record keeping for monthly water used.
• **Groundwater contamination and over-abstraction**	<u>Contamination</u> -Groundwater sources could be easily contaminated from poor waste handling. <u>Over-abstraction</u> -Groundwater of the area is of poor quality and limited quantity, hence, over-	• Mining camps should be equipped with VIP latrines. • All borehole drilling should be approved by the DWSSC under the MAWLR. • Un-productive boreholes should be rehabilitated or decommissioned.	Proponent	

	abstraction will deteriorate the quality further.			
• **Air pollution**	-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.	• Minimize dust generation and where possible provide dust suppression i.e., sprinkle with water. • Avoid excavation during windy days/times.	Proponent	Inventory of all dust generating activities and ensure regular inspections. Inspections by MME
• **Land Degradation**	-Land degradation could occur because of surface disturbance, vegetation clearance, reduced/disturbance of grazing areas, water, and wood over utilization and resources over-extraction.	• Cutting down of trees for wood collection should be prohibited. Vegetation that are already damaged should be used for firewood. • All spillage and contaminated soil should be carefully removed and disposed of at the Uis disposal site. • Mined out areas should be rehabilitated after mining.	Proponent	-Inspections by MME

5.2 Table 4: 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
Non-compliance	Lack of awareness Employees 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.	• All employees 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.	Proponent	Proponent should have proof that all employees attended training before start mining.
Public Health and Safety	Blasting and Drilling -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 contain toxic materials (e.g., lead paint, silica) that are hazardous to workers and residents. Excavations:	• Only use blasting abrasive and explosive listed under Group I and II of the Explosive Act No. 26 of 1956. • *gunpowder, nitro-glycerine, dynamite, guncotton, blasting powders, fulminate of mercury or of other 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*	Proponent Proponent	Inspections by MME and NAMPOL Inspections by MME

	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 un-rehabilitated pits and trenches. <u>Nuisance</u> According to the Labour Act 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.	*explosion or a pyrotechnic effect.* • Use abrasives that can be delivered with water (slurry) to reduce dust. • Blasting should ONLY be carried out by a registered company/person. • Police Clearance should be obtained from the local NAMPOL offices. • No major blasting should take place within 1km from residential areas. • Keep people away from the blasting area. • Provide a Blasting Notice by means of a sign board onsite. • Excavated areas must be backfilled and properly rehabilitated. • Identified wildlife corridors and sensitive habitats in the area must be avoided. • Noise level at semi-mechanized sites should not exceed 85db (Health and Safety Regulations No.156). • Provide regular maintenance of all equipment/machines to reduce noise generation. • Employees should always wear PPE.	Proponent	Inspections by the MLIREC

		• Apply soundproof to operational machineries/equipment. • Operations should be limited to daylight hours (8:00-19:00). Avoid operating during odd hours and nighttime.		
Explosions and fire outbreaks	<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. <u>Wood collection</u> Uncontrolled firewood collection could lead to deforestation and cause land use conflicts with the farm owner.	• The proponent is advised to keep less than 200L of fuel at the site as per the Petroleum Products Regulations of 2000. • Petrol should be stored in underground sources while diesel should be kept at properly secured site. • 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. • The proponent is advised not to engage in wood selling businesses without a Permit from MEFT-DoF.	Proponent	MME MEFT-DoF
Visual appeal and aesthetics	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.	• Temporary structures should be made of local materials available and should be comparable to the local landscapes. • Control of fugitive dust by	Proponent	Inspections by MME

		suppression or reduce dust generating activities		
Visibility	Mining activities generate excessive dust which causes visual intrusion in the area.	• 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.	Proponent	Inspections by Farm owner
Waste Generation	Mining 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.	• Topsoil and waste rocks should be backfilled in the trenches where possible. • General waste generated on site should be gathered, collected regularly and properly disposed at the nearest Municipal or approved disposal site (Uis). • 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. • Unwanted and old temporary structures not in use must be removed from the site and disposed of by the owner.	Proponent	Inspections by Farm owner
Land use conflicts and competition	-Mining activities are likely to compete with other land users for resources such as land, water etc. Expansion of mining activities may encroach on community lands.	• Employees should demonstrate respect to local cultural, heritage or political status of the local people.	Proponent	Issuing of Ancillary Rights by MME

	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.			
Temporal Housing for Employees	The absence of basic services will lead to pollution of the environment because of poor sanitation or lack of waste management. Uncontrolled fire could result in fire outbreak. Placing Temporary housing structures in remote areas or wildlife habitats might result in HWC.	• All employees are required to have access to a pit latrines and proper hygiene measures shall be established. • Fireplaces should be at secure sites and the fire should be put off after use. • The housing areas should be at secured sites and movement of people during night hours should be limited.	Proponent	Inspections by Farm owner
Archeological impacts	Potential impacts on artefacts may arise from excavation and other mining activities.	• No mining Activities should be allowed in places of nomadic pastoral importance. • 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.	Proponent	Inspections by NHC
Diseases, theft, poaching and increasing demand of	Transmission of HIV and AIDS	• Educational awareness sessions should be	Proponent	

natural resources as an influx of People in the Area	-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. <u>Theft and Poaching</u> -Uncontrolled movement of people in search for opportunities could also contribute to criminal activities such as poaching or theft. <u>Increase demand of natural resources.</u> -Uncontrolled movement of people in the area could also put pressure on local available resources such as land, water, energy etc.	implemented on HIV/AIDS for all the miners. • Education is key to prevention. Miners must be informed & of the value of the fauna in the area. Rules and regulations regarding the illegal harvesting of the fauna must be made clear. • Proponent should keep records of water and energy usage.		Health awareness campaigns by Regional Councilor in collaboration with MoHSS,
Increased traffic volumes	-Uncontrolled movement of vehicles will result in deterioration and trampling of vegetation and drive away wildlife in their habitats or grazing/browsing sites.	• Drive a speed limit of 40km/hr. • Only use existing access roads. • New roads should be created in consultation with the Roads Authority.	Proponent	Inspection by NAMPOL-Traffic Section

Occupational Safety and Health impacts	-Miners 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. - 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.	• Training should be given to employees to encourage them to be committed toward maintaining Safety and Health as well as protection of the environment. • Introduce appropriate technologies which will reduce the workload. • Working time should be limited to 8hrs as prescribed in the Labor Act. SSMs are also encouraged to. o Equip themselves with Personal Protective Equipment (PPE), o Keep First Aid Kits onsite and receive regular health check-ups.	Proponent	Inspections by MME

5.3 Table 5: 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
Employment Creation	The project will provide employment to many people.	• 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.	**MLIREC**
Secondary Opportunities (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.	• Export of unprocessed minerals should be discouraged.	**MIT**
Economic Contribution	Despite the support that the sector continues to receive from the government and non-governmental 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.	• The proponent should be supported with the latest technologies to allow them to operate efficiently and effectively.	**MME**
Source of Livelihood	The proposed activities will provide a source of livelihood for more than 20 families through employment creation and income generation.	• Collaborative efforts from all government sectors to formalize, expand and sustain this sector.	**National Planning Commission**
Gender Issues	Small-scale mining industry also project jobs for women.	• More women should be trained and encouraged to participate in this sector.	**MME**

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 6: Compliance Monitoring

Issue to be monitored	Monitoring Objectives	What need to be monitored	Frequency and means of Monitoring	Responsibility
Water	-Sustainable utilization of water resources	-Water quality -Aquifer potential	Biannual reports	MAWLR
Pollution	-Prevent contamination and pollution	-Waste management	Quarterly reports	Proponent
Soil	-Ensure soil conservation	-Soil exposure, pollution, contamination, and soil erosion by windy conditions and water	Monthly	Proponent
Vegetation	-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., *prosopis*	Annually (after rainy season)	Proponent
Air quality	-Ensure air quality	-Dust emission	Daily	Proponent
Noise level	-Ensure noise level is at the required standard (85dB)	-Ambient noise level at mining site	Daily	Proponent
Occupational Health Diseases	-Ensure safety of SSMs and their families.	-Occupational related diseases i.e., silicosis, lung diseases etc.	Annual health check-up	MoHSS
Implementation of the EMP	-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 the proponent to rehabilitate the disturbed area to its natural or nearly its natural state.

According to the Environmental Management Act 07 of 2007 and the Minerals (Prospecting and Mining) Act 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 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 Farm owner shall be removed and/or rehabilitated to the satisfaction of the farm owner or MME.
- The areas shall be cleared of any contaminated soil, which must be disposed of properly.

- As outlined in the Monitoring Section, the proponent is 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, the most suitable post-mining land use will be open grazing and browsing area mainly by the domestic and wildlife alike. 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 as farm infrastructure. Finally, the area should be returned close to the natural state as far as possible.