

Environmental Management Plan (Generic)

Small-scale Mining 'Hotspot' on Farm: Otjimbojo Ost

Karibib District, Erongo Region



Prepared for:

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Small-scale Mining Division

No. Aviation Road

Windhoek

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ABBREVIATIONS AND ACRONYMS

List of Acronyms, Abbreviations and Terms

amsl	above mean sea level
AQG	Air Quality Guidelines
BAT	Best Available Technology
BID	Background Information Document
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
COVID-19	'CO' - Corona, 'VI' - Virus & 'D' - Disease of 2019
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EIF	Environmental Investment Fund
EMA	Environmental Management Act
EMP	Environmental Management Plan
ERSMA	Erongo Regional Small Miners Association
GPS	Global Positioning System
GRN	Government of the Republic of Namibia
ha	Hectare
HPP	The Harambee Prosperity Plan
IAPs	Interested and Affected Parties
KCC	Karibib Constituency Council
m ²	Square meters
m ³	Cubic meters
MC	Mining Claim
MCs	Mining Claims
MEFT	Ministry of Environment, Forestry and Tourism
MITSD	Ministry of Industrialization, Trade and SME Development
MME	Ministry of Mines and Energy
NAAQS	National Ambient Air Quality Standards
NCIS	Namibia Central Intelligence Services
NEPL	Non-Exclusive Prospecting License
NHC	National Heritage Council
NO ₂	Nitrogen Dioxide
NSI	Namibia Standards Institute
PM	Particulate Matter
PPE	Personal Protective Equipment
SABS	South African Bureau of Standards
SHE	Safety, Health & Environment
SME	Small and Medium Enterprises
SSM	Small-scale Miner (Mining)
SSMs	Small-scale Miners

Glossary of Terms and Definitions

Anthropogenic Impact:

Human impacts on the environment which include changes to the biophysical environments, ecosystems, biodiversity and natural resources caused directly or indirectly by human activities including global warming, environmental degradation, etc.

Biodiversity:

The variability among living organisms from all sources including terrestrial marine and other aquatic ecosystem and ecological complexes which they are part of.

Cumulative Impact:

In the context of mining, means the impacts of mining activities which in themselves may not be significant but may become significant when added to the existing and potential impacts resulting from similar or diverse activities or undertaking in the area.

Decommissioning:

The process which begins after termination or cessation of mining activities or mineral processing and ends with closure. It involves, amongst others, the removal of unwanted infrastructures, making safe of any dangerous excavations and surface restoration so as to minimise the adverse environmental impacts of mining activities remaining after cessation of operation.

Environment:

All physical, chemical and biological factors and conditions which influence an object and or organism. It is also defined as the surroundings within which human beings exist and is made up of the land, water, atmosphere, plants and animal life (micro and macro) including interrelationships between the factors and the physical or chemical conditions that influence human health and well-being.

Environmental Impact:

Environmental impact is any change to the environment whether adverse or beneficial, wholly or partially, resulting from an organization activities, products or services.

Environmental Management Plan (EMP):

A working document on environmental and socioeconomic mitigation measures which must be implemented by several responsible parties during all phases of a proposed development.

Landfill:

Onsite disposal of relatively small quantities of papers and plastics by burning in holes and pits.

Mineral Reserve:

The mineral is referred to as a reserve when the extent of the amount of that mineral which can be extracted has been quantitatively proven, through drilling and other acceptable sampling methods for which the level of confidence is high.

Mineral Resource:

The mineral is called a resource when the extent of extractable amount of that mineral is only estimated with a low level of confidence, i.e. the resource is only inferred or estimated from geological evidence and assumptions, but has not been verified via drilling and other acceptable sampling methods.

Mining:

Mining is the process which involves the extraction of mineral resources from their host sources, excluding fossil minerals.

Mining Claim:

A parcel of land with dimensions of 600 m by 300 m and not exceeding 18 ha, securing a mineral asset (deposit) pegged and registered as provided for in the Mineral (Prospecting & Mining) Act, which gives the holder exclusive rights to exploit the mineral asset secured by such a MC for his or her own benefit.

Overburden:

In the context of tourmaline mining, overburden are waste materials covering the tourmaline bearing pegmatites which must be removed to expose the pegmatites.

Sensitive Area

A sensitive area or environment is described as an area or environment where a unique ecosystem, habitat for plant and animal life, wetlands or conservation activity exists or where there is high potential for ecotourism.

Tailings:

Tailings are any waste materials, slimes or residue produced from mining or processing of minerals.

Topsoil:

The layer of soil covering the earth which provides a suitable environment for the germination of seed, allowing the penetration of water and a source of micro-organisms, plant nutrients, seeds and with depth not exceeding 0.5 m.

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1. GENERIC ENVIRONMENTAL MANAGEMENT PLAN

1.1 Introduction

This is a generic Environmental Management Plan (EMP) compiled to safeguard tourmaline mining operations conducted by Small-scale Miners (SSM) on Otjimbojo Ost, a privately owned game farm, situated in the magisterial district of Karibib, Erongo Region. This EMP should be read in conjunction with the EIA Scoping Report prepared under application number #APP-002228. The location of the farm is, as shown in Figures 1 & 2, while the number of Mining Clams (MCs) pegged on the farm, number of MC holders and status of the MCs are, as indicated in Table 1 below.

TABLE 1: Farm Size and Number of Mining Claims								
Farm Name	Size (ha)	Status of Mining Claims			MCs, Sizes, Footprint as % of Farmland & Holders			
		Active	Pending Renewal	New Applications	MCs	Size (ha)	%	MC Holders
Otjimbojo Ost	5 400	3	3	2	8	144	2.7%	3
Total	5 400	3	3	2	8	144	2.7%	3

1.2 Objectives

The objective of the EMP is to serve as a standalone tool to manage and safeguard the environmental impacts associated with mining activities conducted by SSMs on the said game farm. The underlying aim is to ensure that the environmental impacts associated with the mining operations are managed, mitigated and kept to a minimum.

In this EMP, recommendations and guidelines have been provided according to which, compliance monitoring can be performed during the mining operations and rehabilitation of such activities.

1.3 Purpose

It is the purpose of this EMP to provide clearly defined actions that should be implemented by SSMs during the lifespan of the mining operations. The EMP is a dynamic document, flexible and responsive to new and changing circumstances and should be updated as and when required. Any substantive changes to the current scope of mining activities, i.e. up scaling from labour based to a full scale mechanised mining operation, will require the amendment of the EMP. Copies of this document should be made available to the following:

- ✚ All SSMs with mineral rights on Otjimbojo Ost.
- ✚ The Farm Management – farm is owned by Otjimbojo Ost Farming CC.
- ✚ Any person hired to supervise the SSMs contracted by any MC holder.
- ✚ Any prospective person wishing to take transfer of any MC pegged on Otjimbojo Ost.

It is proposed that a training workshop on the environment be organized to all stakeholders listed above by the EIA proponent.

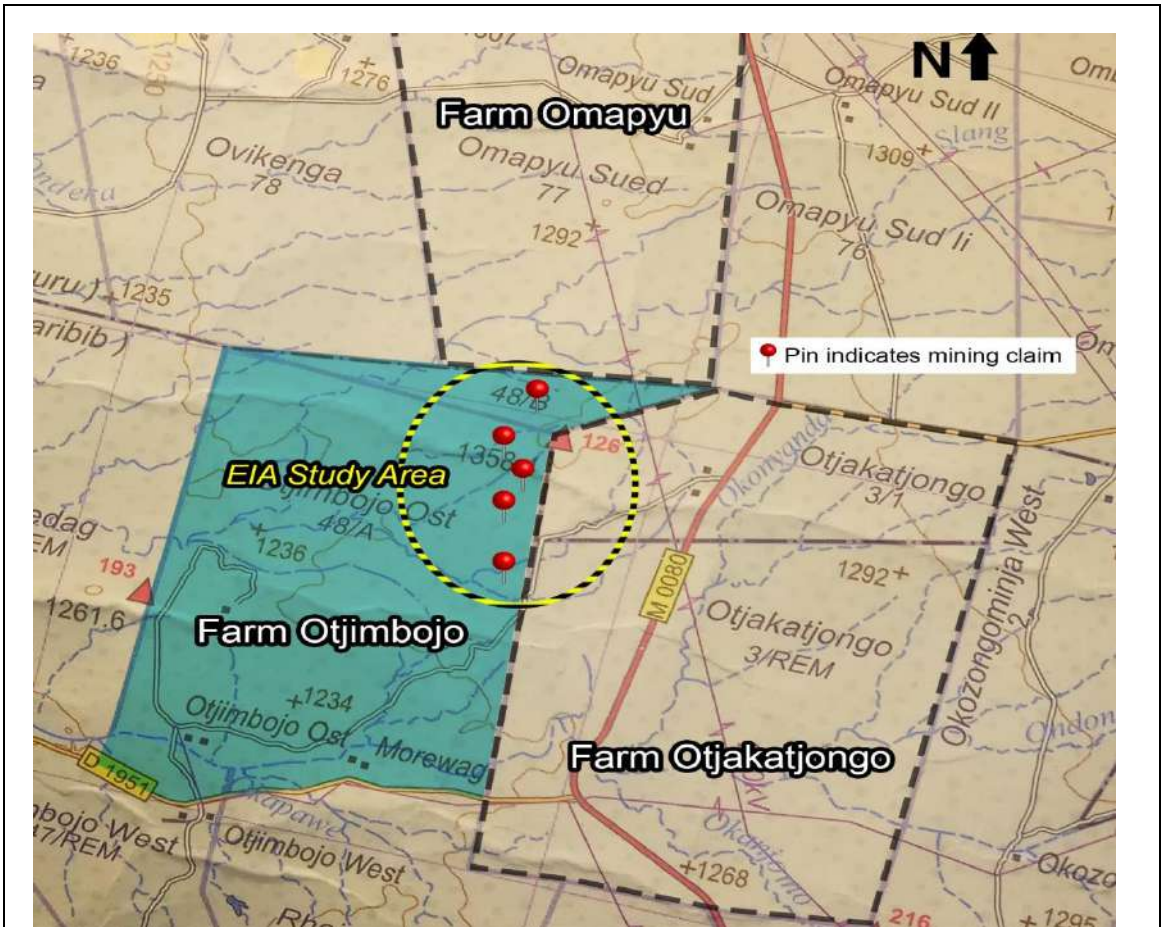


Figure 1: EIA Study Area – Otjimbojo Ost (Namibia Farm Maps)

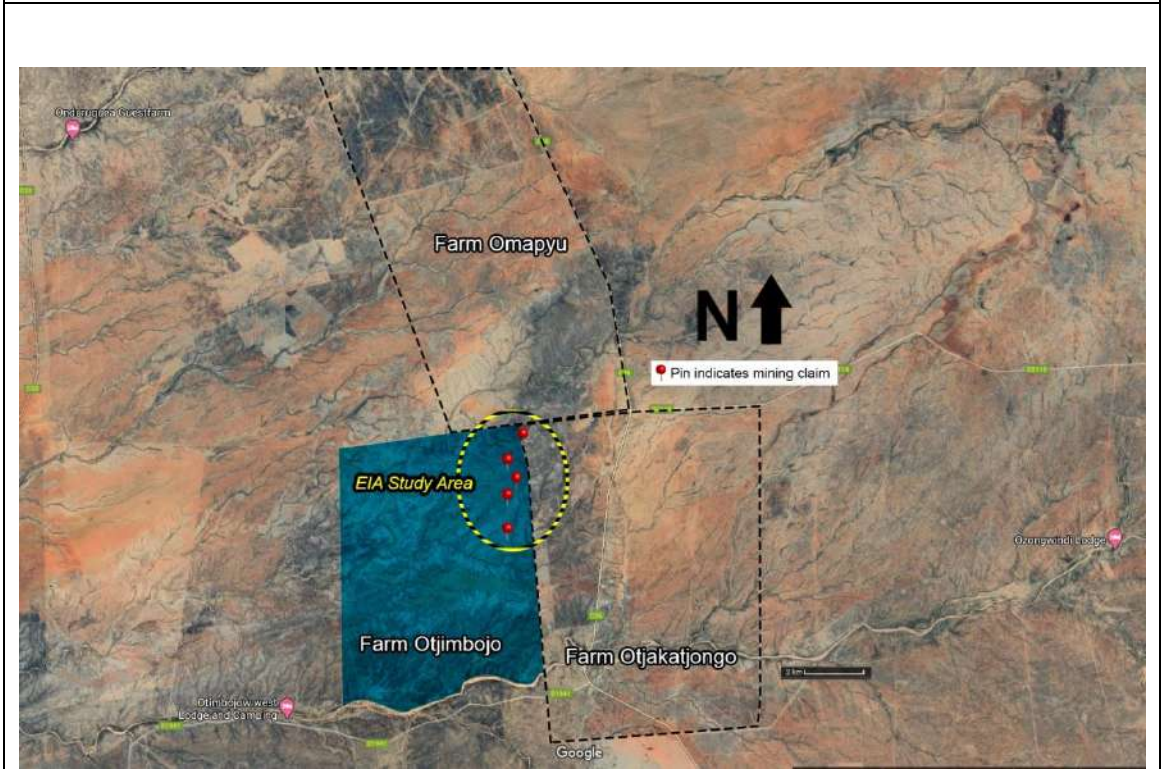


Figure 2: EIA Study Area – Otjimbojo Ost (Google Map)

1.4 Acceptance of the EMP

The acceptance of this EMP by the Environmental Commissioner will confer a legal obligation to the MC holder to comply with the recommendations of the EMP. Should the MC holder fail to comply with such requirements, it is deemed a contravention of EMA and as such is criminally prosecutable.

2. ENVIRONMENTAL MANAGEMENT OBJECTIVES

The implementation of this EMP will be a recurring process that converts mitigation measures into actions and through monitoring, review and corrective actions, ensures conformance with the overall aims and objectives. These objectives are:

- ✚ To ensure compliance with the conditions of the Environmental Clearance Certificate (ECC) once the same is granted to MC holder.
- ✚ To implement practical measures to prevent, minimize, mitigate or rehabilitate areas impacted by tourmaline mining operations.
- ✚ To conserve significant aspects of the biophysical and social environments.
- ✚ To protect human health and ensure safety of SSMs and the general public.
- ✚ To develop workable methods which ensure that the mining operations are carried out in a manner which is technically sound, socially acceptable and environmentally sustainable.

2.1 Roles and Responsibilities

Throughout the lifespan of the tourmaline mining operations, a number of individuals and stakeholders are expected to fulfill various roles and responsibilities to ensure the effective implementation of this EMP. In Table 2 below are the roles and responsibilities that various parties will play with respect to the implementation of this EMP:

Table 2: Roles and Responsibilities	
Roles	Responsible Party
EMA is the Act regulating environmental related matters. The line ministry is MEFT. Amongst the roles and responsibilities of MEFT are: <ul style="list-style-type: none">✚ Granting of ECCs (Environmental Clearance Certificates).✚ Enforcing compliance with the terms of the ECCs & EMPs.✚ Reviewing this EMP and any future revisions thereof.✚ Undertaking site audits and inspections at their discretion.✚ Reviewing Incident Reports.	Office of the Environmental Commissioner
The Minerals Act is the Act responsible for mineral related matters. The line ministry is MME and amongst its roles are: <ul style="list-style-type: none">✚ Granting of non-exclusive prospecting licenses.✚ Awarding & granting of MCs.✚ Inspection of MCs.	Office of the Mining Commissioner

Table 2: Roles and Responsibilities	
<ul style="list-style-type: none"> ✚ Renewal of MCs. ✚ Enforcing compliance of the provisions of the Minerals Act. 	
<p>Amongst the roles of a MC holder pegged on Otjimbojo Ost are the following:</p> <ul style="list-style-type: none"> ✚ Negotiate access terms and compensation with landowner. ✚ Agree with landowner on where to establish a Camp Site. ✚ Maintain general communication with all stakeholders. ✚ Provide landowner with the names of SSMs working on each MC. ✚ Provide name(s) of Supervisor or Foreman responsible for overseeing the day-to-day mining activities. ✚ Ensure that all SSMs working on his/her MCs are trained and inducted on the content of this EMP. ✚ Report any significant environmental incidents or accidents and emergencies to the relevant authority including the landowner. ✚ Perform internal audits of the EMP implementation annually. ✚ Obtain permission of landowner where to construct basic mining infrastructures: Camp Sites, site workshop/office, etc. ✚ Inform landowner when stopping mining activities as a result of tourmaline having been depleted or due to economic reasons. ✚ Rehabilitate all excavated sites before leaving site. ✚ Fence in any active abandoned sites to which work will be resumed in future and ensure that mineral rights over such sites are kept valid during the period of non-activities. This also applies to the ECC once granted. 	Holder of Mining Claim(s)

3.0 THE LEGAL FRAMEWORK

The Republic of Namibia has five tiers of law and a number of policies relevant to environmental assessment and protection which includes the following:

- ✚ The Namibia Constitution
- ✚ Statutory law
- ✚ Common law
- ✚ Customary law, and
- ✚ International law.

Relevant policies to the study are:

- ✚ The EIA Policy (1995)
- ✚ Namibia's Environmental Assessment Policy for Sustainable Development and Environmental Conservation (1994)
- ✚ The National Climate Change Policy of Namibia (September 2010)
- ✚ The Minerals Policy of Namibia (2004)
- ✚ Policy for the Conservation of Biotic Diversity and Habitat Protection (1994)
- ✚ The National Resettlement Programme

- ✚ The Affirmative Action Loan Scheme Policy
- ✚ The National Land Policy
- ✚ The National Land-Use Policy
- ✚ Land Tax Regulations
- ✚ Resettlement Land Act
- ✚ The Harambee Prosperity Plan of 2015.

As the main source of legislation, the Constitution of Namibia (1990) makes provision for the creation and enforcement of applicable legislations. In this context, and in accordance with its constitution, Namibia has passed numerous laws intended to protect the natural environment and to mitigate against adverse environmental impacts. The environmental regulations are guided and implemented by the Environmental Commissioner who heads the Department of Environmental Affairs (DEA) within MEFT.

Table 3: Laws, Policies & Regulations Applicable to the 'Listed Activities'											
Laws & Policies	A	B	C	D	E	F	G	H	I	J	K
The Constitution of Namibia	x	x	x	x	x	x	x	x	x	x	x
Minerals (Prospecting & Mining) Act, Act 33 of 1992	x									x	
Environmental Management Act , Act 7 of 2007	x	x	x	x	x	x	x	x	x	x	x
Regulations of the Environmental Management Act, Act 7 of 2007	x	x	x	x	x	x	x	x	x	x	x
Water Resource Management Act, Act 11 of 2013	x							x			
Explosives Act of 26 of 1956 of South Africa as Annotated Statutes	x	x		x		x					x
Nature Conservation Ordinance No. 14 of 1975								x			
Atmospheric Pollution Prevention Ordinance No. 11 of 1976		x	x					x			x
Namibia's Environmental Assessment Policy for Sustainable Development and Environmental Conservation	x	x	x	x	x	x	x	x	x	x	x
Pollution Control and Waste Management Bill (Draft of Sept 2003)		x	x	x				x			x
Hazardous Substance Ordinance No. 14 of 1974	x	x	x	x				x	x	x	x
Labour Act No. 6 of 1992 - Health and Safety Regulations		x	x	x	x	x	x	x		x	x
Public and Environmental Health Act No. 86 of 2015		x	x	x	x	x	x	x	x	x	x
Agricultural (Commercial) Land Reform Act, Act 6 of 1995	x						x			x	

Legend			
A	Use of natural Resources	H	Biodiversity
B	Emissions Impact (Air & Odour)	I	Archaeological, Cultural and Heritage Impacts
C	Emissions (to land & Hazard)	J	Social-economic Impacts
D	Noisy Impacts	K	Health and Safety Impacts
E	Visual Impacts		
F	Vibrations		
G	Land Use		

4. EMP PRESENTATION

4.1 Introduction

This EMP will become binding on the MC holder once an ECC has been granted by the Environmental Commissioner. It is therefore that this EMP is carefully studied, understood, implemented and adhered to. The mining activities conducted are relatively small with footprints not exceed 2 ha and have the following common parameters:

- ✚ No use of harmful chemicals.
- ✚ No use of water (other than for human use).
- ✚ No use of electricity.
- ✚ No downstream processing (crushing, milling, etc. often associated with mineral recovery).
- ✚ Work is predominantly labour based manual.
- ✚ Where machineries are used, it is often a JCB excavator or an air compressor.
- ✚ Occasionally, blasting to fragment the host rock, but the magnitude of such blast is small.
- ✚ No prior exploration work has been done by SSMs to define and quantify the target mineral (tourmaline) – which makes the operations exploratory in nature and speculative in character.

4.2 Arrangement of the EMP

The EMP has been arranged to cover environmental impacts related to these activities:

- ✚ Provision of Infrastructures
- ✚ Mining Activities/Operations
- ✚ Generic Environmental Mitigations Measures
- ✚ Final Rehabilitation
- ✚ Monitoring and Reporting

5. GENERIC ENVIRONMENTAL MANAGEMENT PLANS

5.1 Provision for Infrastructures

Once a MC holder has been allowed access to start tourmaline mining on Otjimbojo Ost, it is expected that such MC holder has to establish basic infrastructures, where such infrastructures have not already been established. With twenty six (26) new MC applications, it would be expected from such MC holders to establish the said infrastructures. Mitigation measures have been provided to establish, to maintain existing and to rehabilitate erected mining support infrastructures on cessation of mining activities:

- ✚ Construction and maintenance of access roads to Cape Sites and MCs.
- ✚ Development of Camp Sites where the personnel resides.
- ✚ Construction and maintenance of site workshops where machines and vehicles are parked serviced and repaired.

TABLE 4 : EMP for the Construction of Access Roads to Camp Sites and MCs**Description of Potential Impacts:**

NB: This EMP has been prepared to address impacts associated with greenfield mining operations. For those brownfield operations, where such infrastructures already exist, the SSMs are encouraged to have such infrastructures aligned with the provisions of this EMP.

- ✚ Soil surface disturbances will result in floral displacements and faunal disturbances including the possibilities of soil erosions.
- ✚ Road construction activities are likely to cause some noise and dust generation, but the duration is expected to be short and there are no sensitive receptors in close proximity.
- ✚ Excessive noise levels could cause irritation, agitation and stress, both in livestock and wildlife.

Mitigation Measures

- ✚ Permission of landowner must be obtained on where to construct access roads to MCs and Camp Sites.
- ✚ Where a new access road is to be established, select the route which allows for the minimum removal of bushes and trees.
- ✚ Where possible, access roads should be routed along existing fencing lines where some disturbances had already occurred in the past, i.e. along fences and farm service roads.
- ✚ Watercourses and steep gradients should be avoided as far as practically possible.
- ✚ The erection of gates in fencing lines and the opening and closing status of gates in new and existing positions must be clarified with the Farm Management.
- ✚ No other routes will be used for vehicles or personnel for gaining access to the mining site.
- ✚ Construction of MC internal routes should follow the same procedures (obtain consent from Farm Management; avoid sensitive areas and minimal removal of plants and trees).

Monitoring Frequency	Reporting Period	Responsible Party
Daily, during the construction period.	Annually	Farm Management and MC Holder or Supervisor.

TABLE 5 : EMP for the Maintenance of Access Roads**Description of Potential Impacts:**

- ✚ Neglect to maintain access roads could result in excess dust being generated during normal driving operations.
- ✚ Driving on heavily potholed and corrugated gravel roads could result in some vibrations being felt during driving.
- ✚ Dust and gaseous emissions will be generated by equipment (graders) used in the maintenance of access roads which further affect the general ambient air quality.
- ✚ Common impacts of dust are nose irritation, reduced visibility and health hazards.

Mitigation Measures

- ✚ All access roads leading and internal routes within each active MC, all gates and any fencing securing active mining areas must be regularly inspected and maintained throughout the duration of the mining operations.
- ✚ Off-road driving should be prohibited.
- ✚ In the case of dual or multiple use of the access roads by other SSMs, arrangements to share the maintenance cost should be made between such multiple users or SSMs.
- ✚ Newly constructed access roads should be adequately maintained so as to minimise dusts.
- ✚ Since watering down of access roads is not feasible given the limited water availability, the lowest possible speed limits should be implemented.
- ✚ Any machinery used for road maintenance must be well maintained and regularly serviced to avoid excessive gaseous emissions.

Monitoring Frequency	Reporting Period	Responsible Party
Quarterly, during the mining operations.	Annually	MC Holder or representative.

TABLE 6 : EMP for the Rehabilitation of Access Roads**Description of Potential Impacts:**

Same impacts as outlined in Table 5 and 6 above.

Mitigation Measures

- ✚ Where a MC is abandoned or expired and the MC holder does not wish to renew such MC, any access roads serving such MC must be removed and rehabilitated to the satisfaction of the landowner.
- ✚ The landowner should be consulted to indicate if some parts of the access roads should be retained for farming operations.
- ✚ Any fencing erected by the MC holder which the landowner does not require for farming purposes should be removed and the situation restored to, as far as practically possible, pre-mining conditions.
- ✚ Any gates installed by the MC holder which the landowner does not to keep for farming operation must be removed and the area rehabilitated.
- ✚ The access roads shall be removed by ripping and ploughing so as to stimulate regrowth.
- ✚ Areas rehabilitated should be monitored and the vegetation regrowth assessed and reported on. Where regrowth is poor, suitable fertiliser should be applied.

Monitoring Frequency	Reporting Period	Responsible Party
At the end of the mining operations.	Annually	Farm management & MC Holder or Supervisor

TABLE 7: EMP for the Development of Camp Sites**Description of Potential Impacts:**

NB: For existing mining operations with established Camp Sites, MC holders should ensure that where feasible, current conditions of such Camp Sites are brought in alignment with the guidelines as described in this EMP.

- ✚ Some floral displacements and faunal disturbances are likely to occur, but the impacts will be minimal and limited to the footprints of the Camp Sites.
- ✚ Accommodation structures in current Camp Sites are made out of shacks and old scrapped materials resulting in visual nuisances.
- ✚ Poor hygiene and sanitation will lead to health hazards, amenity nuisance and odour.

Mitigation Measures**Siting of Camp Sites**

- ✚ Camp Sites should be established in consultation and with the approval of the Farm Management.
- ✚ Camp Sites should be established away from any sensitive areas such as watercourses, slopes and or raised areas.
- ✚ Any area earmarked for the establishment of Camp Sites should be clearly demarcated and the minimum required piece of land selected which involves the least removal of vegetation.
- ✚ Potential for visual intrusion must be taken into account when selecting the location and all required site infrastructures.
- ✚ Where feasible, structures in the Camp Sites should be built with materials which blend in well with the environment.
- ✚ Ideally, one suitable area should be selected to serve as a single Camp Site where all SSMS are accommodated as opposed to having multiple Camp Sites dotted all over the farm.

Ablution Facilities

- ✚ As a minimum requirement, pit latrines must be provided (if chemical toilets are unaffordable).
- ✚ Provide washing facilities for the employees/workers/contractors.
- ✚ Pit latrines or chemical toilets are to be sited in such a way that they do not cause water pollution and associated problems.
- ✚ A high standard of hygiene and housekeeping must be maintained.
- ✚ Effluent water from washing facilities should be disposed of in a properly constructed drain.

Rehabilitation of Camp Sites

- ✚ On completion of mining activities, all structures must be removed from the Camp Site unless the Farm Management wants to keep any permanent structures.

TABLE 7: EMP for the Development of Camp Sites

- ✚ Area containing the drains should be compacted and covered with a final layer of topsoil.
- ✚ Any areas which have been rendered devoid of vegetation due to traffic movements, the surface must be ripped and, if possible re-vegetated.
- ✚ It is important to take photographs of the Camp Site at different time intervals, before establishing, during the operation phase and post mining operation and keep such photographs on file for records.

Monitoring Frequency	Reporting Period	Responsible Party
Daily during the construction and rehabilitation phases and quarterly during the operational period.	Annually	Farm Management and MC Holder or Supervisor .

TABLE 8 : EMP for the Construction of a Site Workshop**Description of Potential Impacts:**

Same impacts as outlined in Tables 4 & 5.

Mitigation Measures**Site Workshop**

- ✚ Obtain approval of landowner on where to locate the site workshop.
- ✚ Locate site workshop far away from any known watercourse in the area.
- ✚ Locate the workshop within the boundaries of a MC.
- ✚ The area selected for the workshop should be adequate to provide parking and safe storage for machinery, vehicles, equipment, tools and spare parts.
- ✚ Choose a site for the workshop that will result in the least removal of trees and plants.
- ✚ The site workshop should be securely fenced and all hazardous substances required for the mining operation (fuel, oil, grease, lubricants, etc) stored in there.
- ✚ Install drip pans or thin concrete slab or facility with PVC lining to prevent oil leaking into the ground
- ✚ All the repairs, servicing and maintenance of machinery must take place in the workshop.
- ✚ Access to workshop must be controlled by installing a gate which can be padlocked. This will help to avoid theft and vandalism.

Site Office

- ✚ Establish a small administrative office on the workshop premises.
- ✚ It is advisable to keep the following documents and contact numbers handy:
 - ❖ Mining Claim Certificate/ Licence or a copy thereof;
 - ❖ ECC or copy thereof;
 - ❖ Agreement with the landowner;
 - ❖ Complaint books;
 - ❖ Names and contact numbers of all SSMs working on the MC;
 - ❖ Contact number of the Farm Manager;
 - ❖ Contact number of the nearest NamPol Charge Office;
 - ❖ Contact number of nearest Ambulance, Hospital/Clinic and Fire Brigade.

Rehabilitation of Workshop

- ✚ On completion of mining operations the workshop must be dismantled and the area rehabilitated by clearing all contaminated soil.
- ✚ All buildings, structures and objects must be removed unless where the landowner wants to retain such structures.
- ✚ The surface area should be ripped or ploughed to a reasonable depth in order to stimulate vegetation regrowth.
- ✚ The site shall then be seeded with a vegetation seed mix adapted to reflect the local indigenous flora

Monitoring Frequency	Reporting Period	Responsible Party
At the end of mining operations.	Annually	Farm Manager & MC Holder

5.2 Mining Activities/Operations

Mitigation measures have been provided with respect to impacts emanating from these operational activities:

- ✚ Demarcations of Mining Areas;
- ✚ Physical Mining;
- ✚ Blasting,
- ✚ Dry processing areas and Waste Piles, and
- ✚ Rehabilitations.

TABLE 9 : EMP for Mining Activities / Operations

Description of Potential Impacts:

By its very nature, mining is inherently a destructive activity and its impacts can have severe consequences to the environment.

- ✚ Destruction and disruption to the floral diversity of the area including reduced grazing capacity.
- ✚ Loss of habitats to the faunal diversity, but the impact is limited to MC footprint.
- ✚ Open unrehabilitated trenches are safety hazards to farming personnel, hunting patrons and the wildlife of the farm.
- ✚ Potential source for noise, dust and vibrations which could lead to irritation and health problems.

Mitigation Measures

Demarcation of Mining Areas

- ✚ Each MC must be correctly pegged in accordance with the provisions of the Minerals Act by erecting middle and corner beacons that are correctly marked and clearly visible.
- ✚ Pegging of MCs must be made in consultation with the landowners.
- ✚ Mining areas within each MC must be clearly identified and properly demarcated.
- ✚ All mining activities must take place within a mining area which is clearly demarcated. Under no circumstances should mining activities be conducted outside the confines of a MC.
- ✚ It is advisable to have a mining layout displaying sections to be mined, volumes of materials to be moved and the mining method.

Physical Mining

- ✚ Where overburden has to be mined (stripped) in order to exposure the pegmatites, the first 300 mm should be treated as topsoil.
- ✚ Topsoil must be removed and stockpiled away from all areas where physical disturbances of soil surface will occur.
- ✚ Topsoil should be stockpiled away from watercourses and any raised areas where it is likely to be exposed to soil erosion.
- ✚ Topsoil should be kept separate and not mixed with subsoil and any waste rock. Topsoil must be preserved for future rehabilitation and should be used for maintenance of access roads.
- ✚ Where feasible, use the opencast mining method, which allows for overburden and waste rock excavated from one trench to be used to backfill the next trench.

Blasting

NB: Where blasting is required to fragment pegmatite rocks to release contained tourmalines, the following recommendations are made:

- ✚ By law, blasting is exclusively performed by a person in possession of a valid open surface blasting certificate.
- ✚ Blasting must be conducted only between 09h00 and 16h00
- ✚ Adequate blasting notifications must be given to all stakeholders as prescribed in applicable regulations.
- ✚ All explosives must be stored in an approved tamper-proof explosive storage magazine, constructed as prescribed in applicable regulations.
- ✚ Explosives are to be transported in a fit-for purpose vehicle approved and licensed as such.
- ✚ Blasting must be conducted in a manner which prevents injury to persons and wildlife as well as damage to properties and assets.

TABLE 9 : EMP for Mining Activities / Operations

- ✚ Proper records of blasting should be kept by the MC holder at all times.
 - ✚ No blasting should be conducted under adverse weather conditions such as high winds or when it is raining.
 - ✚ All explosive remnants and detonators must be collected from the blasted site and stored in approved containers for disposal at designated site.
- (It is a criminal offence to handle, transport, store and use explosives without proper authorisation).

Processing Areas and Waste Piles (Dumps)

NB: Where alluvial based tourmaline is mined and dry processed on site, the following guidelines are recommended:

- ✚ Processing area and waste stockpiles should not be established within 100 m of a watercourse.
- ✚ Processing area should be established, as far as practicable, near the edge of excavations to allow the screened waste to be conveyed back into such excavations.
- ✚ The area chosen to establish a processing facility shall be the minimum reasonably required and involve the least disturbance to vegetation and bushes.
- ✚ Prior to the development of a processing area, the topsoil must be removed and stockpiled as described above.
- ✚ Tailings from the processing should be stored in such a way that it does not delay or prevent the rehabilitation process.
- ✚ Select the processing area with the consent of the landowner and secure approval if permanent structures will be established.

Rehabilitation

- ✚ Backfill excavated trenches starting with waste rock from the processing area and profiled with acceptable contours and erosion control measures.
 - ✚ The topsoil stored elsewhere should be backfilled last over the same area to facilitate vegetation regrowth.
 - ✚ Gauge the quality of vegetation on the topsoil and assess if fertilizer has to be applied to enhance rapid vegetation regrowth.
 - ✚ If reasonable assessment indicates that re-establishment of vegetation is relatively poor, the soil can be analysed and any deleterious effect on the soil arising from mining activities corrected and the area seeded with a vegetation seed mix
 - ✚ Any access roads not required by the landowner should be ripped and ploughed, and if necessary fertilized in order to ensure vegetation regrowth
 - ✚ Any excavated trenches made must be backfilled immediately and not left idling and unrehabilitated.
- (The key to achieving environmental goals and objectives is to have all SSMs given workshop on the importance required to protect and safeguard the environment.)

Monitoring Frequency	Reporting Period	Responsible Party
Daily during the implementation phase and monthly during the operational phase.	Annually	Farm Manager & MC Holder or representative..

5.3 Generic Environmental Mitigation Measures

The following activities are considered as generic and not site specific and should be involved in the digging of tourmalines conducted by the small miners at varying degrees of sophistication – ranging from artisanal where only basic hand tools are used to operations that are semi-mechanized where some machineries (backhoe-actors, compressors, excavators, wheeled loaders, dry screening plants, etc.) are used.

Mitigation measures have been provided with respect to the following activities:

- ✚ Working hours
- ✚ Poaching of Wildlife
- ✚ Fire Hazards

- ✚ Archaeological and Cultural Heritage Aspects
- ✚ Health and Safety
- ✚ Environmental Awareness Training
- ✚ Social-economic Impacts

Where some mitigation measures are already in place, the MC holder is encouraged to ensure that such measures are in alignment with this EMP.

TABLE 10 : EMP for Working Hours		
Description of Potential Impacts:		
The mining operations are located on a game farm which has a lodge for its hunting patrons. It is therefore important that working hours are discussed and agreed upon with the farm management.		
Potential impact is mostly noise disturbances generated by mining machinery, vehicles and equipment.		
Mitigation Measures		
<ul style="list-style-type: none"> ✚ A game lodge is operated on the farm and noise levels at the mining areas should be kept at the minimum. ✚ Work must be confined to normal day light hours, i.e. between 07h00 and 17h00. ✚ Any work on Sundays or public holidays should be agreed with the landowners. ✚ No sound amplification equipment are allowed on the Camp Sites. ✚ Where blasting is conducted, ample notification should be given to the landowner and the neighbouring landowners. ✚ Any complaints received regarding noise disturbances should be recorded, investigated and corrective action taken. 		
Monitoring Frequency	Reporting Period	Responsible Party
Not applicable	Not applicable	MC Holder or Supervisor .

TABLE 11 : EMP for Waste Handling and Management		
Description of Potential Impacts:		
Poor waste management could result in these negative impacts:		
<ul style="list-style-type: none"> ✚ Odour and stench smell around the Camp Sites and working area if waste is not collected and allowed to rot. ✚ Poor handling of hazardous waste could lead to contamination of underground water and or watercourses. ✚ Visual intrusion if plastics and papers are blown away by wind. ✚ Health hazard, if plastics are consumed by livestock and wildlife. 		
Mitigation Measures		
Solid Waste		
<ul style="list-style-type: none"> ✚ Keep various types of waste separate and liaise with Farm Management on safe disposal ✚ Non-biodegradable and recyclable waste (plastics, cans, bottles, packaging materials, metal scraps, etc.) should be stored in containers and disposed of on a regular basis to a designated waste facility, i.e. Karibib Municipality. ✚ Organic waste (food items, etc.) should be stored in bins with secure lids and not fed to wild animals. ✚ Small volumes of dry waste (papers, plastics, etc) may be landfilled on site and burned down in small pits. ✚ Avoid wind dispersal of papers and plastics as it results in visual nuisance. Plastics can be fatal to animals when confused. ✚ Maintain a high standard of housekeeping at the Camp Sites. ✚ Train SSMs on all aspects related to waste management. 		
Hazard Waste		
<ul style="list-style-type: none"> ✚ Refueling must be made on a hard impermeable surface or over drip pans to ensure that any spilled fuel is captured and cleaned up. ✚ Refueling of machines outside the workshop premises should be done from a suitable jerry can or other safe 		

<p>containers, e.g. mobile diesel bowser. Defective hoses and or valves should be promptly repaired.</p> <ul style="list-style-type: none"> ✚ Suitable covered containers must be available at the site workshops all times for the disposal of hazardous wastes. ✚ Used oil filters, used oil and lubricants must be placed in leak-proof containers and disposed of at a licensed facility. ✚ Any oil spills which occur should be cleaned up by scooping out the soil-soaked oil and placing it into containers for disposal at an approved waste landfill site. ✚ Under no circumstances should hazardous wastes be disposed of on the farm. 		
Monitoring Frequency	Reporting Period	Responsible Party
Daily during operations	Annually	MC Holder or Supervisor.

TABLE 12 : EMP for Health and Safety Aspects

<p>Potential Impacts: The MC holder must endeavor to develop a health and safety plan for the mining operation. Poor health and safety practice could result in:</p> <ul style="list-style-type: none"> ✚ Incidents and accidents; ✚ Injuries which could lead to loss of life or loss of assets; ✚ Unhygienic conditions could lead to diseases and sickness.
<p>Mitigation Measures</p> <p>Road Safety:</p> <ul style="list-style-type: none"> ✚ Within the mining area, access roads should be properly demarcated and well maintained. ✚ All vehicles should be operated on such roads and no off-road driving should be allowed. ✚ Vehicles used in the operation and on public roads must be licensed and roadworthy. ✚ All drivers who operate vehicles on and off the mining operations must have valid driver's license and comply with traffic rules & regulations. ✚ Speed limits should be respected and complied with. <p>Safety within the Mining Areas:</p> <ul style="list-style-type: none"> ✚ Demarcate open excavations with danger tapes ✚ Provide adequate signage around blasting area ✚ Provide PPE to SSMs working in dusty and noisy areas ✚ Demarcate all blasting areas with danger tape ✚ No use of alcohol should be allowed ✚ No weapons (knives, guns, etc.) must be allowed in the work place. ✚ Provide a portable toilet if mining area is far from the Workshop and Camp Sites. <p>Good Housekeeping Practice:</p> <ul style="list-style-type: none"> ✚ Maintain good housekeeping of the mining area and Camp Sites. ✚ No littering should be allowed. ✚ Apply good waste management with waste storage containers available at sites where people are working: workshops, mining areas and Camp Sites. ✚ Discourage the use of 'bush' as toilet ✚ No use of drugs should be allowed at the Camp Sites. ✚ No alcohol should be allowed on Camp Sites. ✚ Discourage foul language amongst the SSMs. <p>COVID-19 Protocols:</p> <ul style="list-style-type: none"> ✚ Wash hands frequently with soap and clean water. ✚ Avoiding touching eyes, nose and mouth with unwashed hands. ✚ Practice social distancing by staying at least 2 meters from the next person when queuing in shops, banks or in bars. ✚ Wear a face mask which covers the mouth and nose. ✚ Avoid indoor gatherings. ✚ Obey and respect regulations as announced by the authority from time to time.

TABLE 12 : EMP for Health and Safety Aspects		
Monitoring Frequency	Reporting Period	Responsible Party
Daily during operations	Annually	MC Holder or representative.

TABLE 13 : EMP for Archaeological, Heritage and Cultural Remains		
Potential Impacts: Likely impacts are potential damage to archaeological remains during mining excavations including any unknown and unmarked graves.		
Mitigation Measures		
Heritage & Archaeological Sites: Should a Cultural Heritage site or an Archaeological site of interest be uncovered during the mining operations, e.g. a "chance find" proceed as follows: <ul style="list-style-type: none"> ✚ If operating a machine, stop work immediately. ✚ Demarcate the site with plastic warning tape. ✚ Cease any works in the immediate vicinity. ✚ Determine GPS position if possible. ✚ Report findings, site location and actions taken to MC holder or Supervisor. ✚ No items must be removed from the site until directive is received from the authority. ✚ Notify the office of NHC and request written permission to remove findings from work area. ✚ Recover, pack and label findings for transfer to the National Museum as guided by NHC. 		
Human Remains: Should human remains be found, follow these guidelines: <ul style="list-style-type: none"> ✚ Apply the 'chance find' procedure as described above by securing the site. ✚ Notify the nearest Namibia Police Charge Office. ✚ Schedule a field inspection with an archaeologist to confirm that remains are human. ✚ Advise and liaise with the NHC and the NamPol. ✚ Remains to be exhumed and transported by the Police either to the National Museum or the National Forensic Laboratory in Windhoek ✚ Work must only resume, once the remains have been successfully retrieved. 		
Monitoring Frequency	Reporting Period	Responsible Party
Not applicable	Not applicable	MC Holder or representative

TABLE 14 : EMP for Fire Hazards		
Potential Impacts: Fire can result in loss of grazing and habitats, destruction of assets and properties, and in severe cases to even loss of human life.		
Mitigation Measures		
<ul style="list-style-type: none"> ✚ Open fire may be made at designated areas only. ✚ Fire-fighting equipment should be readily accessible and kept in a good working order. ✚ No smoking should be allowed in areas where there is a fire hazard, i.e. near fuel storage area. ✚ Fire emergence procedures should be established, communicated to and well understood by all SSMs. ✚ Where firewood is used for purposes of preparing food, a fire-break should be cleared around the perimeter of the Camp Sites. ✚ No trees or shrubs should be cut down or wilfully damaged for purposes of obtaining firewood. ✚ Dead trees may be harvested for firewood but with the permission of the landowner. Such harvested firewood should be consumed on the Camp Site only and must not be transported outside the farm for sale to third parties. ✚ Dead wood to be harvested for firewood should be carefully inspected and any such dead wood used by birds for breeding purposes must be avoided. Any birds laying eggs should not be disturbed. ✚ Maintain a high standard of housekeeping. 		

TABLE 14 : EMP for Fire Hazards		
Monitoring Frequency	Reporting Period	Responsible Party
Not applicable	Not applicable	MC Holder or representative

TABLE 15 : EMP for Illegal Hunting of Livestock and Game		
<p>Potential Impacts: The mining operations are on a game farm hence wildlife is the lifeblood of the farming operation. Likely impacts from illegal hunting of game are:</p> <ul style="list-style-type: none"> ✚ Economic sabotage of the landowner. ✚ Inhuman killing of animals especially those caught in snares and trap wires. ✚ Potential game extinction due to the non-selective killing nature of wildlife. <p>(Poaching is a criminal activity and anyone arrested and convicted for poaching could go to jail for up to five years)</p>		
<p>Mitigation Measures</p> <ul style="list-style-type: none"> ✚ Dogs and cats are prohibited on the Camp Sites. ✚ No handguns are permitted on the Camp Sites. ✚ No snares or trap wire devices may be used to catch wildlife. ✚ MC holder must provide the landowner with a list of names of all SSMs working on their MCs. ✚ SSMs should report their visitors to their Mining Supervisor before such visitors arrive at the farm. ✚ SSMs going away from the mining area must notify the Mining Supervisor/Foreman well in advance. ✚ For ease of security control, it is proposed for each SSM to have badges with his names and MC number where the SSM works. ✚ SSMs should also wear safety shoes with branded soles. ✚ Any suspicious movements observed by SSMs around must be reported to the landowner. 		
Monitoring Frequency	Reporting Period	Responsible Party
Not applicable	Not applicable	MC Holder or Supervisor

TABLE 16 : EMP for Environmental Awareness Training		
<p>An Environmental Awareness Training to SSMs will have positive impacts. Training will help to:</p> <ul style="list-style-type: none"> ✚ Enhance appreciation and understanding of the environment by SSMs. ✚ Improve knowledge and skills of SSMs. ✚ Boost morale and increase productivity. 		
<p>Mitigation Measures</p> <p>The training should cover the following:</p> <ul style="list-style-type: none"> ✚ Basic understanding and appreciation of the fragile environment and the consequences of neglecting to protect it. ✚ The role and responsibilities of MC holders with respect to complying with the EMP. ✚ The role and responsibilities of all parties, landowner and SSMs with respect to complying with the EMP. ✚ An overview of the specific environmental impacts of tourmaline mining especially when huge trenches are left open and un-rehabilitated presenting safety hazards to the farming personnel, wildlife and hunting patrons. ✚ The significance of the mitigation measures proposed in this EMP. ✚ The significance why reptiles including snakes may not be killed. ✚ The training should highlight that poaching has a negative impact on the profitability and ultimately sustainability of the game farming operation. ✚ During training the problems associated with poor waste management and handling should be explained to the SSMs. <p>In order to enhance comprehension, where at all possible, the training should be provided in a language understood by the participants (Afrikaans, Oshiwambo, Damara>Nama, OtjiHerero, etc):</p>		
Monitoring Frequency	Reporting Period	Responsible Party
Maybe once a year	Not applicable	MC Holder or Supervisor

TABLE 17 : EMP for the Socio-economic Environment

Socio-economic impacts could both be positive and negative:

- ✚ When tourmalines are successfully recovered and sold, the impact is positive as it leads to poverty eradication, support to the family and improved standard of living for the SSMs.
- ✚ When working conditions are of substandard level with no decent sanitation, no washing facilities, poor waste management, poor safety and hygiene, the impacts could be negative resulting in compromised health with possibilities for incidents and accidents.

Mitigation Measures

Labour Legislations:

SSMs must be hired by MC holders in a formal manner with employment contracts as provided for the Labour Act.

Employees' wellbeing:

SSMs must be provided with decent sanitation at Camp Sites, suitable PPEs and adequate potable water including a working environment free of incidents, accidents and waste.

Monitoring Frequency	Reporting Period	Responsible Party
Not applicable	Annually	MC Holder or representative

5.4 Monitoring and Reporting

To ensure compliance with the provisions of the EMP and to assess the continued appropriateness and adequacy of the said EMP, the MC holder shall be expected to conduct performance assessment and monitoring on a continuous basis in accordance with the period specified for each identified impacts.

TABLE 18 : EMP for Monitoring and Reporting

MC holders should develop risk and monitoring assessments for their mining operations and to report on such assessments to MEFT on annual basis. It is also important that mining layout plans (where available) are updated regularly and submitted to MME.

Mitigation Measures

Monitoring and assessment

- ✚ Regular monitoring of all the environmental management measures and components should be carried out in order to ensure that the provisions of the EMP are complied with.
- ✚ An assessment of environmental impact that were not properly addressed or were unknown during the time when the EMP was compiled should be carried out and added as correction action.
- ✚ Various points of compliance have been identified in this EMP, regarding a number of impacts that the operation would have on the environment. Such points of compliance should be monitored on an ongoing basis throughout the lifespan of the operation.
- ✚ Areas prone to soil erosion should be inspected and the necessary repairs done before the onset of the rainy season.
- ✚ Mined out areas which have been rehabilitated must be inspected to assess vegetation regrowth and take corrective action is regrowth does not occur.
- ✚ Fire fighting equipment should be inspected regularly for functionality and effectiveness.

Reporting

- ✚ Each MC holder or duly appointed representative is expected to submit reports confirming compliance with various points as identified in the EMP.
- ✚ Reports should be submitted annually.
- ✚ Any emergency or unforeseen circumstances must be reported as soon as possible.
- ✚ All complains received regarding issues or impacts resulting from mining operations must be addressed and

TABLE 18 : EMP for Monitoring and Reporting		
feedback reported on annually.		
Monitoring Frequency	Reporting Period	Responsible Party
Quarterly or on a need to need basis	Annually	MC Holder or duly appointed Supervisor

5.5 Final Rehabilitation

The goal of the final rehabilitation with respect to the area where mining operations have taken place is to leave the area level and even, and in a natural state containing no foreign debris or other materials which could harm the environment.

TABLE 19 : EMP for Final Rehabilitation		
When the MC holder intends to close down operations for reasons that, the tourmalines have been depleted or due to unfavourable economic circumstances, the mining operation has to receive a final rehabilitation treatment to the satisfaction of the landowner, MEFT and MME.		
Mitigation Measures		
<ul style="list-style-type: none"> ✚ Inform landowner, MEFT and MME of final rehabilitation of the mining operations. ✚ Establish from landowner in case there are infrastructures which he wants to retain for farming operations. ✚ A list of all items to be removed should be drawn up: <ul style="list-style-type: none"> ❖ Infrastructure - access roads, workshop MC pegs maintenance yard, camp site, stockpiles, etc. ❖ Equipment – scrap metals, tyres, rubble, conveyor belts, etc. ❖ Hazard Waste – old batteries, oil filters, fuel filters, etc. ✚ Waste materials of any description must be removed from the site and disposed of at a recognised landfill facility, i.e. Karibib Municipality landfill ✚ No items may be buried or burned on site with the exception of small volumes of papers and plastics. ✚ Access roads and workshop areas must be ripped and ploughed to facilitate vegetation regrowth. ✚ Final completion must be inspected by MME, MEFT officials and landowner 		
Monitoring Frequency	Reporting Period	Responsible Party
On cessation of mining operations.	Once on cessation of mining operations.	MC Holder or duly appointed Supervisor

6. CONCLUSIONS

Although all possible actions and potential mitigation or management actions are contained in this document, the EMP should be considered as a day-to-day management tool. The EMP is therefore intended to set out minimum environmental and social standards that are required to minimise the negative impacts and maximize the positive benefits of the mining operations conducted on Otjimbojo Ost by SSMs.

The EMP should be reviewed on an on-going basis and any changes or amendments made communicated to MEFT. Based on the observations made during the site inspections and issues raised during the public meeting held at Karibib, it is incumbent upon the MC holders to assess whether any modifications to the mitigation measures as proposed in this EMP may be required so as to improve the overall efficiency and applicability of the EMP to his/her unique operational circumstances.