

# ENVIRONMENTAL MANAGEMENT PLAN

*Environmental  
Management  
Plan*



## TITLE OF PROJECT:

PROPOSED MINERAL EXPLORATION ACTIVITIES ON EPL 7719 , KAMANJAB CONSTITUENCY, KUNENE REGION-NAMIBIA ENVIRONMENTAL SCOPING REPORT AND ENVIRONMENTAL MANAGEMENT PLAN

## REPORT PREPARED FOR

*Office of the Environmental Commissioner  
Ministry of Environment and Tourism  
Namibia*

**APPLICATION NO:**  
003746

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REPORT TITLE	<b>ENVIRONMENTAL MANAGEMENT PLAN (EMP)</b>
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## 3 ACRONYMS

**Table 1 Acronyms**

TERMS	DEFINITION
BID	Background Information Document
CPC	Cuvepalm Consulting cc
EAP	Environmental Assessment Practitioners
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA (R)	Environmental Impact Assessment (Report)
ESIA	Environmental and Social Impact Assessment
EMP	Environmental Management Plan
EMPr	Environmental Management Plan Report
GHGs	Greenhouse Gasses
ISO	International Organization for Standardization
I&Aps	Interested and Affected Parties
MAWLR	Ministry of Agriculture Water and Land Reform
JGM	JG Mining (PTY) LTD also referred to as the Proponent.

MEFT: DEA	Ministry of Environment Forestry and Tourism's Directorate of Environmental Affairs
NHC	National Heritage Council
ToR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change

## 4 DEFINITION OF TERMS

The **'Consultant'** – this refers to the team that is conducting the ESIA and the preparation of the EMP for the development

The **'Proponent'** – this refers to the institution that is directly involved in the implementation of the project, i.e. NHIG/Global Smelters.

The **'Stakeholders'** – this refers to the people, organisations, NGOs that are directly or indirectly affected and interested by the project.

The **'Environment'** – this refers to the ecology, economy, society and politics.

## 5 Purpose of this Environmental Management Plan (EMP)

This document has been compiled in line with Regulation 8 of the Environmental Management Act (EMA) No. 7 of 2007 and its Environmental Assessment Regulations (2012) that requires that an Environmental Management Plan (EMP) be included as part of the Scoping Assessment process. A 'management plan' is defined as:

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

An EMP is one of the most important outputs of the Environmental Assessment (EA) process. The EMP sets out in detail the approach which JGM will adopt in dealing with the potential environmental impacts from various activities relating to project. It synthesises all of the proposed mitigation and monitoring actions, set to a timeline and clarify responsibilities of various parties involved. It provides a link between the impacts identified in the EIA Process and the required environmental management performance standards and requirements during project implementation. It is important to note that an EMP is a legally binding document and a person who contravenes the provisions of this EMP may face imprisonment and/or a fine.

The purpose of this document is therefore to guide environmental management throughout the different phases of the proposed exploration activities, namely; construction phase (site preparation) operational and decommissioning phases. This EMP will have to be effectively implemented by the Proponent, project managers and contractors, to ensure that adverse environmental impacts are properly mitigated. The management of these impacts will be done by effective implementation of the management measures and EMP compliance monitoring.

***NB: This document has been developed in conjunction with the environmental scoping report (ESR). Therefore, it is highly recommended that this EMP is studied or used together with the project ESR for further information that may be required to fully understand the EMP, if needed.***

**Declaration of Commitment and Legal Compliance**

Exploration activities will potentially result in environmental impacts as identified in the Environmental Assessment (Scoping) Report. This Environmental Management Plan, ensures that all the identified impacts are minimised and or avoided, as such, it becomes the sole responsibility of JGM and its contractors to comply with the provisions of the EMP set herewith. The declaration of Commitment for the implementation of this EMP is as follows:

JGM hereby declares its full commitment to the full implementation of this EMP and to ensure that its management components are fully abided to. JGM also commits to the appointment of an independent Environmental Control Officer to ensure that compliance is sufficiently dealt with.

Signed:



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Mr. Ben Biwa (Director)

JG Mining (PTY) LTD

## 6 CHAPTER ONE: INTRODUCTION AND BACKGROUND

### 6.1 Project Background

The proponent, JG Mining (PTY) LTD is an indigenous Namibian enterprise that is involved in the mining sector since 2010. The company has identified potential mineral deposits in the Kamanjab area. JG Mining PTY LTD in ownership of Exclusive Prospecting License No. 7719, intends to conduct mineral exploration activities on EPL 7719. The proponent intends to establish the economic development potential of Base and Rare Metals, Dimension Stones, Industrial Minerals, Non-Nuclear Fuel Minerals and Precious Metals. If the exploration results prove that economic development potential of ore bodies are significant, the proponent will prepare a feasibility study report and subsequently lodge an application for a mining license with the Ministry of Mines and Energy (Namibia).

However, it is standard procedure and a pre-requisite under the Environmental Management Act No.7 of 2007 and the Environmental Impact Assessment Regulations (GN 30 in GG 4878 of 6 February 2012) that the proponent (in this case JGM) first undertake an Environmental Impact Assessment. Furthermore, as per the requirements of the Environmental Management Act No. 7 of 2007, CPC) was appointed by JGM to conduct an Environmental and Social Impact Assessment (ESIA) and develop an Environmental Management Plan (EMP) for the proposed project. This has been followed by an application for Environmental Clearance Certificate (ECC) to the Ministry of Environment and Tourism (MET): Directorate of Environmental Affairs (DEA). Subsequently, this document forms part of the application to be made to the DEA's office for an Environmental Clearance certificate for the proposed construction and operation of a copper smelting plant, in accordance with the guidelines and statutes of the Environmental Management Act No.7 of 2007 and the environmental impacts assessment regulations (GN 30 in GG 4878 of 6 February 2012).

### 6.2 Project Location

EPL 7719 is located approximately 35 km (horizontal distance) North-East of Kamanjab Town, Kamanjab Constituency, Kunene Region-Namibia. EPL 7719 covers farm(s) and portion(s): Kopermyn, Uitspruit, Gagarus, BabelBerg, Vaalwater, Bergtoppe, Urumube. The area is easily accessible via a C40 tared road (Kamanjab-Outjo) and then a D2671 well maintained gravel road (when coming from Outjo) or the D3248 (when coming from Kamanjab).



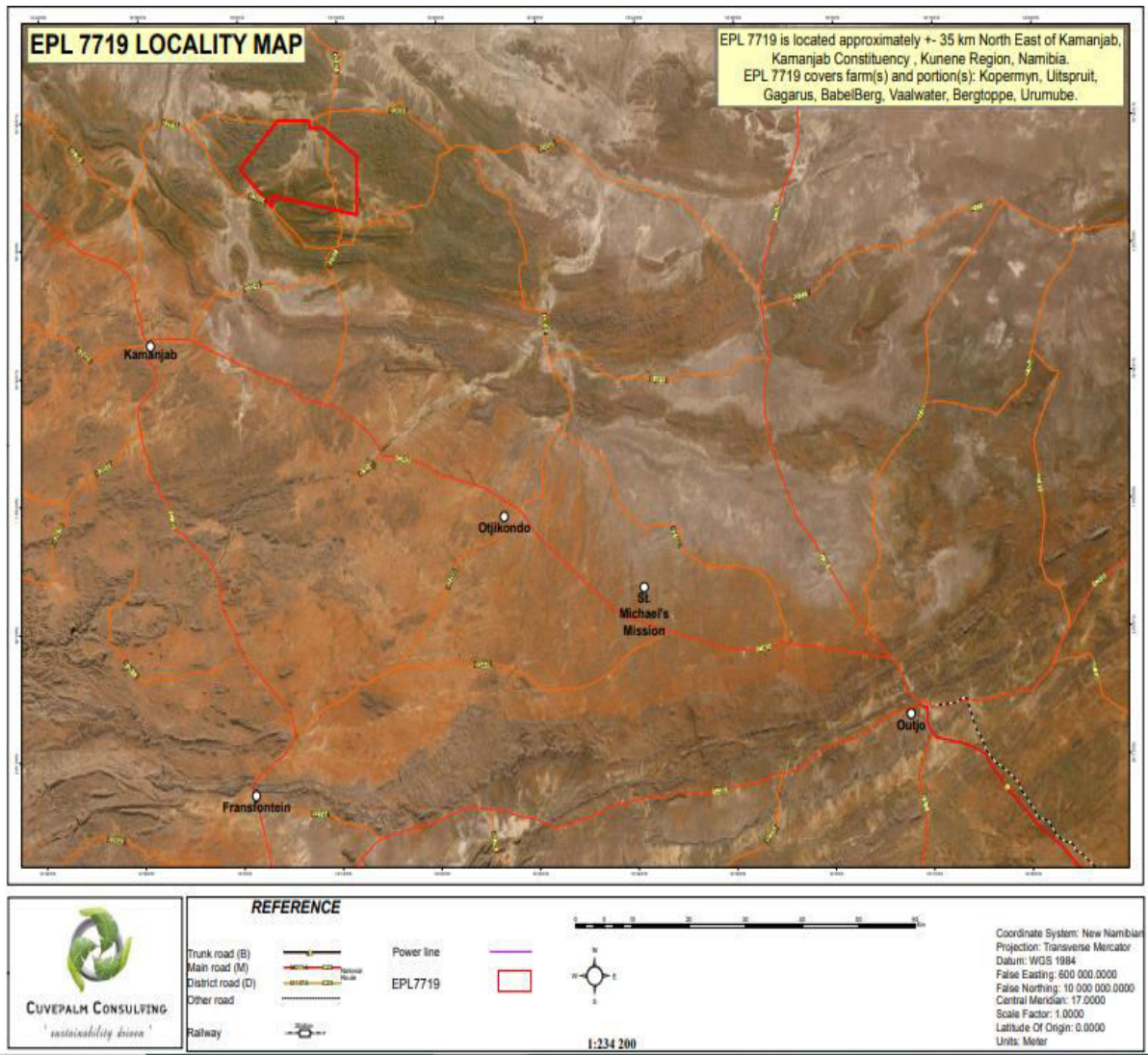


Figure 1: Overview of project area - EPL 7719

## 7 Project Components

### 7.1 Overview

The proposed development will comprise of the following components:

#### Desktop review of past exploration activities

This component will serve to comprehensively establish information on mineral occurrence based on past exploration and mining activities in order identify potential mineral deposits.

Access agreements: Agreement will guide the working relationship between affected landowners and exploration teams. The exploration planning team will undertake initial site visits to identify appropriate sites for the establishment of field camps. Exploration will only commence once ecological sensitive areas are known and agreed jointly with landowners.

Site Offices: The formal housing structures found at farm Kopermyn 291 will be converted into office space for the exploration teams. Additional prefabricated offices may possibly be erected to ensure sufficient office space.

Land clearing: Small land parcels will be cleared for the establishment of base or field camps and staging areas. Field camps will be used for the safe keeping of exploration equipment and vehicles before use.

Access routes and haul tracks: Apart from the existing farm road network, additional tracks (extensions from farm roads) may be created in order to access target areas.

Trenching and Bulk Sampling: Stripping will involve the removal of overburden material overlaying the ore deposits. Trenches will be excavated to trace mineralization along predetermined areas. Backhoe excavators will be used for excavations. Waste rock will be stockpiled adjacent to trenches. Where deemed necessary, waste stockpiles connected to historic or abandoned mining site such those found at farm Kopermyn could be investigated. The latter will serve to establish the commercial viability of reclaiming minerals from stockpiles and to determine the type of processing plant that would be required for test mining.

Drilling (Reverse Circulation Drilling Technology): Drilling will serve to extract complete core samples from surface downwards to seek and locate mineral deposits and to establish geological structure. This will be achieved by means of reverse circulation drilling method .Equipment uses compressed air. Upon completion drilled holes will be collared and sealed. Drill core samples will be taken for laboratory analysis.

Erection of Primary Crushing Unit (grinding and sizing): At the exploration site (staging areas), a primary crusher unit and an ore screen will be erected. Primary crushed ore will be crushed further to obtain a product of -150 mm and + 50mm. The crushed ore will be required for performing probable process trials as part of metallurgical testing programme.

Water abstraction: Water will be sourced from existing boreholes. Water use will be aimed at suppressing dust around tipping areas and vehicle tracks. Approximately 500 liters of water will be needed daily for domestic use.

Waste management: Waste generated will be in the form of rock material (non-mineral) as derived from trenching activities. Insignificant amounts of domestic or general waste will be generated by exploration team. Domestic or general waste will be transported out of the EPL area and disposed at an approved land fill site. There are no licenced waste disposal sites in the project area.

Sanitation services: Sufficient portable chemical toilets will be provided for workers and appropriately emptied according to their manufacturer's operational standards and legislated occupational sanitary provisions. Licenced waste contractors will provide sewage removal services.

Reclamation & Rehabilitation: Dug out trenches will be back filled with waste rock (gangue). Stockpiled top soil will be returned to the backfilled areas. Rehabilitation will be done concurrent with exploration. Drilling holes will be decommissioned in accordance with best practice standards.

## 7.2 *Project Phases Covered in the EMP*

The following phases are addressed in this EMP:

- **Construction Phase (Site Preparation):** This phase is preceded by detailed exploration planning whereby preliminary legislative reviews and due diligence is conducted by proponent, service contracts are finalized, exploration schedules are refined and administrative arrangements are carried out. This phase largely comprise site preparation work to be carried out at key exploration targets, assembly of equipment and the construction of service infrastructure required for exploration or operational phase.
- **Operational:** The project phase during which the main exploration activities will be undertaken, and managed by the JMG appointed contractors and project manager.
- **Decommissioning:** The project phase during which JGM and contractors decide to demobilize field camps and equipment. Signify the cessation exploration (field based activities).

## 7.3 *Environmental Assessment Practitioner (EAP)*

In order to comply with the EMA and its 2012 EIA Regulations, JGM appointed Cuvepalm Consulting cc (hereinafter referred to as the *Environmental Consultant*) to undertake the required EA process and submit the Environmental Clearance Certificate (ECC) application to the Competent Authority on their behalf. Different components of the proposed project activities are subjected to different legal requirements. The legal implications or applicability to these activities and details, in terms of permitting and licensing are presented under the following chapter.

## 8 CHAPTER TWO: ENVIRONMENTAL LEGAL REQUIREMENT (PERMITS AND LICENSES)

This chapter presents detailed information on the legal obligations that governs certain project activities that could require permitting and/or licensing from relevant regulatory authorities. **The detailed list of all legislations, policies and guidelines are presented in the environmental scoping document (report).**

**Table 2: Licenses and Permits relating to project**

LEGISLATION/POLICY	RELEVANT PROVISION/ PROJECT APPLICABILITY	REQUIRED PERMIT/CLEARANCE OR LICENSE
<p>Environmental Management Act No. 07 of 2007</p> <p>Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878)</p>	<p>Requires that projects with significant environmental impacts are subject to an environmental assessment process (Section 27).</p> <p>Details principles which are to guide all EAs. The EMA and its Regulations should inform and guide this EA process.</p>	<p>Should the ECC be issued to the Proponent, it should be renewed every 3 years.</p> <p>Bi-Annual reports should be informed by monthly compliance inspections and submitted for review to MEFT</p> <p>Contact details at the Department of Environmental Affairs (DEA):</p> <p>Tel.: <b>+264 61 284 2701</b> OR Environmental Assessment Unit Mr. Damian Nchindo, Tel: <b>+264 61 284 2717</b>, Email: <a href="mailto:damian.nchindo@met.gov.na">damian.nchindo@met.gov.na</a></p>
<p>The Water Act 54 of 1956</p> <p>Water Resources Management Act No. 11 of 2013</p>	<p>The project will potentially use significant amount of water. The activities directly affect water conservation, management and use therefore, requires the implementation of water conservation techniques and securing relevant operational permits. The protection (both quality and quantity/abstraction) of water resources should be a priority throughout the project life cycle.</p>	<p>Given the fact that the project will fall under commercial type of industry, a water abstraction and use permit (WAUP) should be applied for and obtained from the Department of Water Affairs &amp; Forestry (DWA): Directorate of Water Resources Management: Water Policy and Water Law Administration</p> <p>Contact: <b>Mr. F. Witbooi (Deputy Director)</b> Tel: +264 208 7158 Email: <a href="mailto:Franciskus.Witbooi@mawf.gov.na">Franciskus.Witbooi@mawf.gov.na</a></p> <p>It is likely that effluent/wastewater will be produced on site, hence an application for a waste water discharge permit should be filed with</p>

LEGISLATION/POLICY	RELEVANT PROVISION/ PROJECT APPLICABILITY	REQUIRED PERMIT/CLEARANCE OR LICENSE
		the Department of Water Affairs & Forestry (Water Environment Division at the Ministry of Agriculture and Forestry)  Contact: <b>Ms. Elise Mbandeka</b> Tel: +264 61 208 7167 Email: <a href="mailto:Elise.Mbandeka@mawf.gov.na">Elise.Mbandeka@mawf.gov.na</a>
Road Traffic and Transport Act, No. 22 of 1999	The Act provides for the establishment of the Transportation Commission of Namibia; for the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, the control and regulation of road transport across Namibia's borders; and for matters incidental thereto.	Should the Proponent wish to undertake activities involving road transportation or access onto existing roads, the relevant permits will be required from the Ministry of Works and Transport's Roads Authority.  Contact: <b>Mr. Eugene de Paauw (Specialist Road Legislation, Advice &amp; Compliance)</b> Tel: +264 61 284 7027 Email: <a href="mailto:dePaauwe@ra.org.na">dePaauwe@ra.org.na</a>
National Heritage Act (No. 27 of 2004)	Discovered heritage resources should be reported to the National Heritage Council.  Consent should be obtained from NHC prior to the commencement of exploration work.	<b>Contact: Erica Ndalikokule (Director Heritage Council)</b>  National Heritage Council: Archaeology Unit  Tel: +264 61 301 903, Email: <a href="mailto:erica@nhc-nam.org">erica@nhc-nam.org</a>
Minerals Prospecting and Mining Act (Act no 33 of 1992)	A notice of intention to drill shall be submitted to the MME prior to the commencement of any drilling work	Ministry of Mines & Energy  Private Bag 13297, Windhoek, Namibia  6 Aviation Road , Windhoek Namibia  Tel: +264 61-238643/220386  Email: <a href="mailto:info@mme.gov.na">info@mme.gov.na</a>

LEGISLATION/POLICY	RELEVANT PROVISION/ PROJECT APPLICABILITY	REQUIRED PERMIT/CLEARANCE OR LICENSE
<p>Petroleum Products and Energy Act (no 13 of 1990), Petroleum Products Regulations</p>	<p>The Act governs petroleum products and consumer installations. Should the proponent wish to install an above ground fuel storage tank a certificate should be obtained from MME.</p>	<p><b>Mr Andreas Sheehama</b>  <b>Chief Inspector: Petroleum Affairs</b>                      Ministry of Mines and Energy                      6 Aviation Road , Windhoek Namibia                      Mobile + 264 811250602                      Email: <a href="mailto:Andreas_Sheehama@mme.gov.na">Andreas_Sheehama@mme.gov.na</a> or <a href="mailto:Andreasheehama772@gmail.com">Andreasheehama772@gmail.com</a></p>

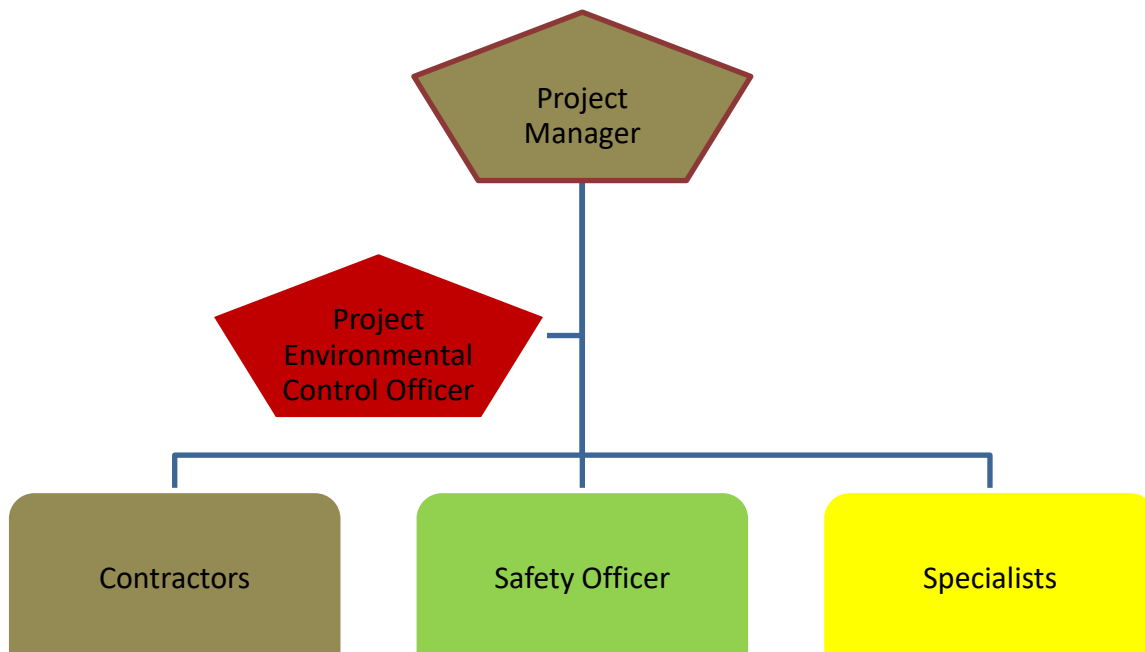
## 9 CHAPTER THREE: EMP ROLES AND RESPONSIBILITIES

The chapter gives a presentation of the roles of different parties involved in the project cycle (all project phases) and their respective responsibilities towards the implementation of the EMP.

This EMP informs all relevant parties listed below and other staff employed at the site as to their duties in the fulfilment of the legal environmental management requirements. Also, this is done with particular reference to the prevention and mitigation of anticipated potential negative environmental impacts. All parties should note that obligations imposed by the EMP are legally binding in terms of the Environmental Clearance granted by the approving authority, in order to:

- Ensure compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and/or international;
- Verify environmental performance through information on impacts as they occur;
- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- Create management structures that addresses the concerns and complaints of I&APs with regards to the development;
- Establish a method of monitoring and auditing of activity

### 9.1 Organizational Structure



**Figure 2** Site Organization Diagram

#### 9.1.1 Proponent (JGM) or Project Manager (PM)

The Proponent is ultimately responsible for the overall implementation of the EMP. Alternatively, if the Proponent does not plan to manage all environmental aspects and activities relating to construction, operation and decommissioning phases, they should assign this responsibility to a suitably qualified individual referred to in this plan as the Proponent’s Representative (PR) or his designated representative which is the Project Manager (PM). The latter shall assume the following specific roles:



- Ensures that the relevant commitments contained in the EMP Action Plans are adhered to;
- Compile relevant procedures and method statements for approval by the applicable phase site manager prior to initiation of activities;
- Ensure relevant staff are trained in procedures; and
- Maintain records of all relevant environmental documentation.
- Ensure that there are sufficient allocation of financial resources in project budget so that EMP activities are carried out.
- Managing the implementation of this EMP and updating and maintaining it when necessary.
- Management and monitoring of individuals and/or equipment on-site in terms of compliance with this EMP.
- Issuing fines for contravening EMP provisions.
- Alternatively, the Proponent may delegate an external ECO to ensure EMP compliance throughout the project life cycle.

### 9.1.2 Environmental Control Officer (ECO)

The Proponent should assign the responsibility of overseeing the implementation of the whole EMP on the ground from the construction to decommissioning to a designated member of staff or external qualified and experienced person, referred to in this EMP as the Environmental Control Officer (ECO.) The ECO will have the following responsibilities:

- Continually ascertain that the provisions of the EMP as well as the environmental authorization are complied with during mineral exploration. The ECO must be fully conversant with the Environmental Impact Assessment Process, Environmental Management Plan.
- Provide instructions to contractors where environmental considerations call for action to be taken.
- Establish procedures to test, identify environmental hazards.
- Submit monthly written reports, ensuring that activities conform to the relevant environmental legislation and that monitoring requirements are met.
- Ensures that adverse environmental impacts are kept to a minimum.
- Management and facilitation of communication between the Proponent/Project Manager and Interested and Affected Parties (I&APs) with regard to this EMP.
- Conduct regular site inspections (recommended frequency is fortnight during the construction phase and monthly for the operation and decommissioning phase) and EMP compliance audits.
- Provide advice to the Project Manager (PM) on the removal of person(s) and/or equipment not complying with the provisions of this EMP.
- Making recommendations to the PM on the issuance of fines for EMP contraventions.
- Maintain the safe keep of all EMP related records.
- Undertaking an annual review of the EMP and recommending additions and/or changes to this document.
- Keep constant updated records of all concerns and issues logged during the course of operations
- Monitor the speed and effectiveness of remedial actions taken upon concerns and issues raised by the public

### 9.1.3 Contractor(s)

Contractor shall ensure full compliance with the environmental management measures proposed in this document. Other responsibilities shall include

- Ensure statutory compliance with relevant environmental laws relating to activity, related authorizations and license conditions.
- Appointment of appropriately qualified experts to undertake specialist investigations relating to environmental management in a timeous manner and in accordance with prescribed standards.
- Record and report environmental incidents as per ECO prescribed templates.

#### 9.1.4 Safety, Health and Environmental (SHE) Officer

The SHE Officer shall ensure that workplace occupational health and safety requirements are met. The Environmental Control officer may equally assume the role of SHE Officer when required provided that he/she has the required skill set. The SHE Officer shall compile/update the Occupational health and Safety Plans for subsequent review by Project Manager.

The SHE officer shall regularly arrange and conduct safety drills targeting employees and contractors as part of accident prevention program.

#### 9.1.5 Specialists

Specialized skills may be required on an ad-hoc need basis. Services to be sourced may include independent compliance audits. Where necessary, proponent deemed may enlist the services of specialists. Specialists may include:

- Occupational Hygienist(Occupational Hygiene Surveys/Air Quality Assessments)
- Environmental Specialist (Environmental Auditor)

#### 9.1.6 Other (General Workers/Visitors)

Visitors and general workers will be obliged to:

- Familiarize with the requirements of the EMP,
- Comply with the environmental specifications and enforce adherence,
- Communicate all environment related incidents with the ECO
- Enforcement compliance requirements on a day-to-day basis. Any violation of the environmental specifications shall be recorded and the agreed on disciplinary

## 10 CHAPTER FOUR: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

### 10.1 *Identified Potential Environmental Impacts*

The following potential negative impact were identified and the mitigation measures or management action plans covered under this chapter are aimed at addressing these impacts. The impacts to be managed are as follows:

- Potential impact on water resources(quantity and quality) and soil contamination (mainly during operational phase)
- Waste generation and management (All phases)
- Dust generation and pollution(Operational Phase)
- Noise (All phases)
- Health and safety (All phases)
- Vehicular traffic safety (All phases)
- Visual and archaeological impact (All Phases)
- Social nuisance: Influx of people into the area (All Phases).

### 10.2 *Environmental and Social Management Actions (Measures)*

The aim of the management actions of the EMP is to avoid potential negative impacts where ever possible. Where impacts cannot be avoided, measures are provided to reduce the significance of these impacts. It should be noted some impacts are expected to occur in both construction and operational phases. In order to avoid repetition of points on such impacts, once-off management measures will be provided under the construction phase and reference made to it in the operational or decommissioning phases.

The management action measures are clearly set out with the responsible implementation parties assigned to these as well as the timeframes for each action. This is done to ensure that the EMP implementation responsibilities are clearly given and each implementation party involved in the project is aware of their respective responsibilities from the beginning and remain accountable.

Table 3 Construction (Site Preparation) Phase Management Action Plans

Environmental Aspect	Impact	Management Actions	Responsible person(s) / Implementation responsibility	When?
EMP Compliance	<ul style="list-style-type: none"> <li>• Statutory compliance</li> <li>• Employee Awareness</li> </ul>	<ul style="list-style-type: none"> <li>• Contractors appointed for exploration work must ensure that all personnel are aware of applicable environmental requirements should include as a minimum the following:</li> <li>• Explanation of the importance of complying with the EMP</li> <li>• Employees' roles and responsibilities, including emergency preparedness</li> <li>• Description of mitigation measures that must be implemented when carrying out respective activities</li> <li>• Description of specific mitigation measures within this EMP</li> <li>• Training shall be provided by ECO or someone who is competent to provide it and has theoretical and practical knowledge that relate to all aspects of EMP</li> </ul>	Proponent(Project Manager & ECO)	All Phases

Environmental Aspect	Impact	Management Actions	Responsible person(s) / Implementation responsibility	When?
		<ul style="list-style-type: none"> <li>• Introduce visitor environmental management induction sessions</li> <li>• Conduct detailed review of the current EMP to familiarize personnel with requirements</li> </ul>		
Site Offices, Field Camps	Site kept off-limits from natural dangers	<ul style="list-style-type: none"> <li>• Appropriate storm water routing and attenuation must be implemented to avoid onsite erosion and downstream sedimentation.</li> <li>• The project layout must be planned to ensure that a buffer zone of 50 m is maintained and that no development activities occur within 50 m of key public amenities and surrounding properties .</li> </ul>	Project Manager/ ECO	Construction

Environmental Aspect	Impact	Management Actions	Responsible person(s) / Implementation responsibility	When?
		<ul style="list-style-type: none"> <li>• If any construction footprint takes place inside or within 50 meters of any water body, authorization must be obtained.</li> <li>• Sensitive ecological areas should be avoided</li> <li>• Siting of field camps should avoid areas prone to flooding or natural fires.</li> </ul>		
	Waste Management	<ul style="list-style-type: none"> <li>• The siting and design of temporal hazardous waste storage areas should be incorporate the use impervious geotextiles.</li> <li>• Prepare and implement a waste management plan</li> </ul>		
Water	Water Use	<ul style="list-style-type: none"> <li>• A water abstraction and use permit should be applied for from the DWA at MAWLD</li> </ul>	Proponent	Operational phase
	Wastewater / Effluent discharge	<ul style="list-style-type: none"> <li>• An effluent/wastewater permit should be applied for and obtained from the Department Water Affairs (Water Environment Division).</li> </ul>		

Environmental Aspect	Impact	Management Actions	Responsible person(s) / Implementation responsibility	When?
	Water pollution control	<ul style="list-style-type: none"> <li>The project layout must be planned to ensure that a buffer zone is maintained and that no development activities occur within 200 meters of watercourses.</li> </ul>	Planning / Design Engineer	Construction
Vegetation	Compliance with forestry related laws	<ul style="list-style-type: none"> <li>Should the Proponent need to remove certain protected tree species on and/or around the site, a relevant permit should be applied for and obtained from the Directorate of Forestry.</li> <li>Discourage the use of fuelwood. Encourage use of alternative energy sources (gas or solar).</li> <li>Encourage use of alternative energy sources such as gas and solar for lighting and cooking</li> </ul>	Proponent: ECO	All phases
Labour recruitment	Local employment/ Community Support	<ul style="list-style-type: none"> <li>Priority for casual work to be done during the construction and operational phases should be given to locals provided they have the required skills to undertake work.</li> </ul>	Contractor & Project Manager	All phases

Environmental Aspect	Impact	Management Actions	Responsible person(s) / Implementation responsibility	When?
		<ul style="list-style-type: none"> <li>• Employment of out-of-area people should only be considered if the local community does not have the required skills or they are less in number to take up the work.</li> <li>• Employment of women, marginalised people and people with disability in the area should be encouraged.</li> <li>• Equal opportunities should be provided for both men and women.</li> </ul>		
Community relations	Schedule	<ul style="list-style-type: none"> <li>• A convenient construction work/schedule should be prepared and shared inhabitants and surrounding communities, so that project expectations are understood uniformly.</li> <li>• Construction signs containing expected duration of construction should be designed and prepared for the site.</li> </ul>	Project Manager	Construction

Environmental Aspect	Impact	Management Actions	Responsible person(s) / Implementation responsibility	When?
	Vehicular traffic safety	<ul style="list-style-type: none"> <li>If required by Roads Authority, a site road access should be applied for and obtained.</li> <li>Base camps should include parking bays as well as offloading and loading zones.</li> </ul>	Proponent	Construction
Aesthetics	Visual	<ul style="list-style-type: none"> <li>Rock Waste dumps and trenches should be designed in such a way that visual intrusion is minimized.</li> <li>Trenches should be excavated and reburied quickly.</li> </ul>	ECO/Contractor	Construction/Decommissioning

Table 4 Operational Phase Management Action Plans

Environmental Feature	Impact	Management Actions	Responsible person(s) / Implementation responsibility	Timeframe (When?)
Monitoring	EMP non-compliance	<ul style="list-style-type: none"> <li>The ECO should monitor the implementation of this EMP.</li> <li>The ECO should inspect the work areas throughout the exploration period on a <b>Fortnight basis (2 times a month)</b>.</li> <li>An EMP non-compliance penalty system should be implemented on site.</li> </ul>	Proponent: ECO	Ongoing



Site Preparation	Site Earmarking	<ul style="list-style-type: none"> <li>The drilling contractor should mark out (e.g. on the ground or with danger tape) the working areas buildings before any workers, equipment or building materials are brought on site. A 2-metre buffer can be allowed around the perimeter of field camp or work areas.</li> <li>The marked-out area should be inspected and approved by the Site Manager. Thereafter, all site staff should be clearly informed that they may not move or disturb any areas beyond those limits.</li> <li>The only land area that may be cleared on site is the roads, the areas where field camps and critical infrastructure will be erected.</li> <li>As far as possible, project materials should not be stockpiled in surrounding areas beyond the actual final footprint of staging or work areas.</li> </ul>	Proponent: ECO  Construction Contractor	Construction
	Site establishment	<ul style="list-style-type: none"> <li>The construction area must have all the necessary ablution facilities with chemical toilets at commencement of construction activities, ablution facilities shall be within 100m from workplaces but not closer than 100m from any natural water bodies or boreholes. There should be enough toilets available to accommodate the workforce.</li> <li>The Contractor must supply waste collection bins where such is not available and all solid waste collected must be disposed of at the nearest approved landfill site. Under no circumstances may solid waste be burnt or buried onsite.</li> </ul>	Construction Contractor	
Biodiversity	Loss of fauna and flora	<ul style="list-style-type: none"> <li>Exploration teams should refrain from disturbing or killing wildlife</li> <li>Environmental awareness sessions on the importance of biodiversity preservation should be arranged for contractors and workers.</li> </ul>	<ul style="list-style-type: none"> <li>Proponent(ECO)</li> <li>Contractors &amp; their Employees</li> </ul>	Ongoing
Soils	Physical disturbance	<ul style="list-style-type: none"> <li>Re-vegetation of disturbed surfaces must occur immediately after the construction activities are completed.</li> </ul>	Contractor	

	Pollution	<ul style="list-style-type: none"> <li>• Spill control preventative measures should be put in place to control soil contamination, no matter how small the amount of pollution (spill) is.</li> <li>• Spill clean-up kits should be made available on site at all times.</li> <li>• Potential contaminants such as hydrocarbons, and wastewater should be contained on site and disposed of in accordance with national wastewater discharge standards so that they do not contaminate surrounding soils.</li> <li>• An emergency plan should be available for both major and minor spills on site in both project phases.</li> <li>• Where hydrocarbons and other chemicals are used, impermeable liners should be laid on such sites to capture possible spills, and prevent these substances from reaching the site soils.</li> <li>• Drip trays should be made available for project vehicles, especially heavy trucks to contain possible fuel leaks and spills while parked on site.</li> <li>• In an event that any of the substances mentioned above, spill on the soil, the contaminated soil should be cleaned up immediately and dispose of in a designated hazardous waste bin and transported to the nearest approved landfill site. The contaminated and removed soil should be replaced with clean soil.</li> </ul>	Proponent: ECO	Ongoing
Air Quality	Atmospheric pollution	<ul style="list-style-type: none"> <li>• The Proponent should ensure that the construction schedule is limited to the given number of days of the week, but not every day. This will keep the vehicle-related dust level minimal in the area, especially when it is windy.</li> <li>• In extremely windy days, a reasonable amount of water should be used to suppress the dust that may be emanating from work areas Avoid unpaved roads that are likely to generate a significant amounts of dust.</li> </ul>	<ul style="list-style-type: none"> <li>• Project Manager</li> <li>• ECO</li> <li>• Contractor</li> </ul>	Ongoing

		<ul style="list-style-type: none"> <li>• Excavations and other clearing activities must only be conducted during agreed working times and permitting weather conditions to avoid drifting of excessive dust into neighbouring areas.</li> <li>• The Contractor must be responsible for dust control onsite to ensure no nuisance is caused to the resident farming communities.</li> <li>• Project vehicles and heavy machines should not be left idling when not in use, such that they emit air polluting gases.</li> <li>• Change in ambient air quality must be recorded at regular interval i.e., on quarterly or half yearly basis.</li> </ul>		
Water Resources	Pollution	<ul style="list-style-type: none"> <li>• Potential contaminants such as hydrocarbons (diesel) should be contained on site and disposed of in accordance to the nearest municipal wastewater discharge standards so that they do not contaminate surrounding soils and eventually groundwater.</li> <li>• All run off materials such as hydrocarbons, wastewater and other potential contaminants should be contained on site in designated containers and disposed of in accordance waste water discharge standards.</li> <li>• Stormwater management plans (discharge points) should be constructed on site to prevent the potentially contaminated run-off from reaching water resources, especially during rainy seasons.</li> <li>• The effluent / wastewater containers or ponds should be lined in order to prevent dissolving waste from leaching into the ground, and potentially into groundwater.</li> <li>• Contaminated wastewater must be managed by the Contractor to ensure existing water resources on the site are not contaminated.</li> </ul>	<ul style="list-style-type: none"> <li>• Project Manager</li> <li>• ECO</li> <li>• Workers involved in this phases and subsequent phases</li> <li>• Contractors</li> </ul>	Ongoing and as when required

		<ul style="list-style-type: none"> <li>All wastewater from general activities must be collected and removed from the site for appropriate disposal at a licensed commercial facility.</li> <li>Employees must not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction related activities.</li> </ul>		
	Aquifer safe yield/sustainable water sources	<ul style="list-style-type: none"> <li>Although water is needed for many aspects of exploration, it should be used sparingly at all times.</li> <li>The requirements of the applicable water and wastewater legislations should be adhere to any licence/permit.</li> <li>The amount of water supplied from the existing boreholes should be used to inform the abstraction rate and water consumption practices.</li> <li>As per the preceding point, water conservation practices will aid in ensuring that exploration works are not affecting other water users from accessing the same subterranean water sources.</li> </ul>	Project Manager	Ongoing
Health and Safety	Health and safety of the workers	<ul style="list-style-type: none"> <li>As part of their induction, the workers should be provided with awareness training on how to use site equipment as well as the risks of mishandling equipment and materials.</li> <li>When working on site, employees (for both phases) should be properly equipped with appropriate personal protective equipment (PPE) such as coveralls, gloves, safety boots, earplugs, safety glasses, etc. depending on the type of work being done.</li> <li>When operating excavation machinery onsite, workers should be equipped with personal protective equipment (PPE) such as earplugs to reduce noise exposure.</li> </ul>	Proponent: ECO  Workers involved in this phases and subsequent phases	Ongoing

		<ul style="list-style-type: none"> <li>• No employee should be allowed to drink alcohol prior to and during working hours as this may lead to mishandling of equipment which results into injuries and other health and safety risks.</li> <li>• Employees should not be allowed on site if under the influence of alcohol.</li> <li>• Contractors should ensure that work areas are equipped with "danger" or "cautionary" signs for any potential danger or risk area identified on site.</li> <li>• Temporary enclosed fence should be constructed around designated working areas. This is done to control access to the site, in such a way that the public, especially children do not access the site and play with equipment and machinery on days when no work is done.</li> <li>• Working sites should be equipped with security controls. This is to limit restrict access to authorized personnel only.</li> <li>• Demarcate general work area with a suitable and visible marker. Demarcate the following areas with danger tape:             <ul style="list-style-type: none"> <li>- excavation areas</li> <li>- temporary breakdown areas</li> </ul> </li> <li>• Provide additional warning signage in areas of movement and in “no personnel” areas where workers are not active</li> <li>• No person should mount or enter any loader being operated and capable of movement without first attracting the operator's attention.</li> <li>• Introduce visitor health and safety induction sessions</li> </ul>		
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Noise	Nuisance Control	<ul style="list-style-type: none"> <li>• The construction times should be set such that, no work is carried out during the night or very early in the mornings.</li> <li>• Construction hours should be restricted to between 08h00 and 17h00 to avoid noise generated by construction equipment and the movement of vehicles before or after hours.</li> <li>• A noise zone shall be clearly demarcated and identified by notice indicating that relevant area is a noise zone</li> <li>• Where the movement of heavy vehicles is within 500 m of sensitive receptors (such as residential areas), the affected community need to be consulted well in advance to agree on a mutually acceptable working schedule.</li> <li>• No worker in any part of the site should be exposed to a daily noise dose or peak noise level in excess of the standard laid down by the competent authority unless wearing an approved hearing protection device.</li> <li>• Heavy vehicle traffic must be routed away from noise sensitive areas, where possible.</li> </ul>	Proponent: ECO	Ongoing
Vehicular Traffic	Traffic Control	<ul style="list-style-type: none"> <li>• Drivers of the construction and operational vehicles should be in possession of valid and appropriate driving licenses.</li> <li>• Vehicle drivers should adhere to the road safety rules.</li> <li>• Vehicles should be in a road worthy condition and serviced regularly in order to avoid accidents as a result of mechanical faults of vehicles.</li> <li>• Vehicle drivers should only make use of designated site access roads provided.</li> <li>• Provide sufficient road signs to guide traffic</li> <li>• Avoid operation heavy equipment during times of poor weather conditions and visibility</li> </ul>	<ul style="list-style-type: none"> <li>• Proponent(ECO)</li> <li>• Contractor</li> </ul>	Ongoing

		<ul style="list-style-type: none"> <li>• Vehicles drivers should not be allowed to operate vehicles while under the influence of alcohol.</li> <li>• Sufficient parking bays for all project vehicles and safe offloading and loading zones should be constructed on site.</li> <li>• No heavy trucks or project related vehicles should be parked outside the project site boundary.</li> <li>• In order to control traffic movement on site, deliveries from and to site should be carefully scheduled. This should optimally be during weekdays and between the hours of 08h00 and 17h00.</li> </ul>		
Waste	Environmental Pollution (General waste)	<ul style="list-style-type: none"> <li>• Exploration teams should be sensitized to dispose of waste in a responsible manner and not to litter.</li> <li>• After each daily works, no waste should be left scattered on site, but rather be disposed of in allocated site waste bins.</li> <li>• No waste may be buried or burned on site or anywhere else throughout the project lifecycle.</li> <li>• All domestic and general construction waste produced on a daily basis should be contained until such that time it will be transported to designated waste disposal sites on a bi-weekly basis during construction and on a weekly basis during operations.</li> <li>• The working sites should be equipped with separate waste bins for hazardous and general waste/domestic.</li> <li>• A penalty system for irresponsible disposal of waste on site and anywhere in the area should be implemented.</li> <li>• No waste should be disposed inappropriately</li> <li>• A waste management plan for handling waste must be developed and implemented.</li> <li>• Waste should be stored at the appropriate areas designated for this type of waste.</li> </ul>	Proponent(ECO) Contractors	Ongoing

	Sanitary waste	<ul style="list-style-type: none"> <li>Sanitary waste(sludge) must be stored in roofed and bunded area with no external drainage</li> <li>Sanitation facilities must be included in the project design.</li> <li>All sanitary waste should be disposed-off in accordance with the provisions of the National Sanitation Policy</li> </ul>	Project Manager	
	Human Health	<ul style="list-style-type: none"> <li>Sufficient portable toilets should be provided on site for workers and appropriately emptied according to their manufacturer's operational standards recommendations.</li> <li>Operational ablution facilities including toilets and washrooms should be erected in preparation for the operational phase.</li> <li>Hazardous waste, including emptied chemical containers used during this phase should be safely stored on site where they cannot be reached and used by the unsuspecting locals for personal use. No waste should be improperly disposed of on site or its surroundings, i.e. unapproved waste sites.</li> <li>As an emphasis on the preceding point, empty hazardous substance containers should not be disposed of anywhere on the project site or its surrounding, but instead they should be kept at a designated storing place on site until such time that they can be safely taken and disposed of at the nearest approved hazardous waste sites.</li> </ul>	Proponent: ECO	
	Hazardous Waste Generation	<ul style="list-style-type: none"> <li>All hazardous substances such as paints, diesel and cement must be stored in a bunded area with an impermeable surface beneath them.</li> <li>Proponent must designate appropriate areas for the storage of hazardous substances.</li> <li>Hazardous waste and other chemicals should be safely stored on site and later (as required) transported to the proximate and licenced hazardous waste disposal sites.</li> <li>Hazardous waste shall be transported by licenced hazardous waste contractors and vehicles.</li> </ul>		



		<ul style="list-style-type: none"> <li>Empty hazardous substance containers should not be disposed of anywhere on the project site or it's surrounding, but should be stored on site and safely taken to the nearest approved hazardous waste sites.</li> </ul>		
Archaeology	Impact on unknown cultural or heritage sites/objects	<ul style="list-style-type: none"> <li>The Proponent should consider having a qualified and experienced archaeologist/ECO on standby during the exploration phase. This measure will serve to verify that no important archaeological, historical or cultural sites will be adversely affected by project. A qualified archaeologist can assist on the possible of uncovering of sub-surface graves or other cultural/heritage objects during site preparation (earthworks) and advice the Proponent accordingly.</li> <li>Identified of any archaeological significant objects on the site should not be disturbed, but are to be reported to the project Environmental officer or National Heritage Council offices for further instructions and actions.</li> <li>Workers should be educated to not destroy or throw away but report (to the environmental officer) of any unknown object found/discovered on site during earthworks during the construction or even during operations.</li> </ul>	Project Manager & ECO	As and when required
Demographic change/Social Pathology	Influx of outsiders into the area	<ul style="list-style-type: none"> <li>The Proponent and its project contractors should prioritize the employment of local people, and only if necessary and due to lack of skills in the area, out-of-area people can be given some of the work. This is to avoid the influx of outsiders into the area.</li> <li>Locals employed should be provided with the necessary training of skills required for the project to minimize the number of out-of-area employees.</li> <li>The workers should be engaged in health talks and training about the dangers of engaging in unprotected sexual relations which results in contracting HIV/AIDS and other sexual related infections.</li> <li>Leisure activities in the form of shebeens, sale of liquor and local brews within the exploration zone should be avoided.</li> </ul>	Project Manager	Pre-construction and/or Operational Phase

		<ul style="list-style-type: none"> <li>• Out-of-area workers that may be employed (due to their unique work skills) on site should be sensitized on the importance of respecting the local values and norms, so that they can co-live in harmony with the local community.</li> <li>• Contractors or any project related worker should be prohibited from getting involved in sexual relations and/or engage in sexual activities with under-age girl children.</li> <li>• Any construction worker who will be found or seen engaging in sexual relations with a school learner shall be reported to the site manager and necessary actions taken against that worker according to the Contractor’s code of conduct.</li> <li>• Project Manager shall maintain access agreements and continually engage land owners on the scheduling of planned activities.</li> </ul>		
	Potential damage or disturbance to private properties	<ul style="list-style-type: none"> <li>• The Proponent and its project contractors should inform their workers on the importance of respecting the locals' properties by not intruding or damage their homes, fences or killing their livestock or wildlife.</li> <li>• Any workers or site employees that will be found guilty of intruding peoples 'privately owned properties should be called in for disciplinary hearing and/or dealt with as per their employer's code of employment conduct</li> <li>• Site workers should be advised to respect local cultures, values and norms.</li> <li>• No contractor /worker should be allowed to wander into private land without the permission of land owners.</li> <li>• Site workers are not allowed to kill or in any way disturb local livestock.</li> <li>• No worker should be allowed to, without permission cut down or damage trees.</li> </ul>		
Housing	Employee Wellness	<ul style="list-style-type: none"> <li>• All construction related structures, including mobile camps must be removed timeously after the cessation of exploration work.</li> </ul>	Contractor	Ongoing

		<ul style="list-style-type: none"> <li>• The area that previously used for the construction camp must be checked for spills of substances such as oil, paint, etc., and these shall be cleaned up and contaminants disposed of appropriately.</li> <li>• The Contractor must repair any damage that the construction works may have caused to neighbouring properties, specifically, but not limited to damage caused by poor storm water management.</li> <li>• All hardened surfaces within the construction area must be ripped, all imported materials removed, and the area shall be top soiled and regressed.</li> <li>• All building rubbles (materials) must be removed from the site.</li> <li>• Final inspection must be undertaken in order to ensure adherence to EMP guidelines, completion of localized/ remaining areas of impact, monitoring of rehabilitation success, etc.</li> </ul>	<p>Proponent: ECO</p>	
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Table 5: Operational Management Action Plans

Environmental Feature	Impact	Management Actions	Responsible person(s) / Implementation responsibility	Timeframe (When?)
EMP training	Lack of EMP awareness and the implications thereof	All personnel and visiting groups to undergo EMP induction (training) <ul style="list-style-type: none"> <li>• <b>Management action plans provided under the Construction Phase apply to this phase</b></li> </ul>	Proponent: ECO	Ongoing
Monitoring	EMP non-compliance	<ul style="list-style-type: none"> <li>• The ECO or the Proponent should monitor the implementation of this EMP.</li> <li>• The ECO should inspect the site operation on a monthly basis.</li> </ul>	Proponent: ECO	Ongoing
Employee Health and Safety	Employee OHS	Establish an Occupational Health and Safety programme that should address at a minimum occupational hygiene and the mitigation measures included below: <ul style="list-style-type: none"> <li>• <u>Hazard Analysis</u> of Rock Waste Dumps. Prior to the commencement of drilling work on old tailings and waste rock dumps, a risk assessment should be conducted to identify occupational safety hazards that may comprise the following components(hazard radiation, geotechnical stability)</li> <li>• <u>Medical surveillance</u> of employees should be conducted for the protection of the health of employees prior and post-employment</li> <li>• <u>Lighting systems</u>: A lighting survey in respect of site offices should be conducted prior to commencement of operations.</li> <li>• <u>Ventilation Systems</u>: Ensure that work areas(make shift offices) are sufficiently ventilated. Conduct ventilation study prior commencement of operations.</li> <li>• Conduct regular occupational exposure surveys in accordance with statutory standards</li> <li>• Correct Personal Protective Equipment (PPE) must be worn at all times by the personnel on site. Personnel must be trained on the use of PPE.</li> </ul>	Proponent: ECO	Ongoing

Environmental Feature	Impact	Management Actions	Responsible person(s) / Implementation responsibility	Timeframe (When?)
		<ul style="list-style-type: none"> <li>• No unauthorised ignition sources will be permitted on site and debris/waste shall not be burnt under any circumstances.</li> <li>• Erect suitable warning and information signage near any hazardous storage facility.</li> <li>• Handling of hazardous chemicals must only be done by trained personnel.</li> <li>• All provisions of the Labour Act Nr 11 of 2007 read in conjunction with Regulation 156, 'Regulations Relating to the Health and Safety of Employees at work' must be complied with.</li> <li>• Safety Data Sheets (SDSs) must be readily available on site for hazardous substances.</li> <li>• In the event of an emergency relating to hazardous substances, procedures detailed in the SDS shall be implemented.</li> <li>• Comply with occupational exposure limits set by law</li> </ul>		
Soil	Sterilisation of soils as a result of hydrocarbon / chemical / waste contamination.	<ul style="list-style-type: none"> <li>• No foreign matter such as rubble, waste or hazardous material will be mixed with the topsoil or used to backfill excavation.</li> <li>• Spills will be cleaned up immediately after the incident. Contaminated soil will be disposed of as hazardous waste at a licensed hazardous landfill facility.</li> <li>• Drip trays or a Polyvinyl chloride (PVC) lining shall be provided for equipment utilising hydrocarbons.</li> <li>• No waste will be buried or burned on site.</li> <li>• Dust fallout contamination monitoring (soil) should be conducted every month</li> </ul>	Proponent: ECO	Ongoing

Environmental Feature	Impact	Management Actions	Responsible person(s) / Implementation responsibility	Timeframe (When?)
Air Quality	Dust generation	<p><b>In addition to some relevant management measures given under the Construction Phase, the following are further recommended for the operational phase:</b></p> <ul style="list-style-type: none"> <li>• Fallout dust monitoring will also be conducted every month on a 28-day monitoring cycle.</li> <li>• Ambient air quality will also be conducted prior to project operation, to allow for baseline comparison.</li> <li>• At times of high winds, periodic dust suppression techniques will be employed on cleared areas generating dust.</li> <li>• During tertiary crushing, all dust suppression measures should be employed for dust fallout likely to affect neighbours.</li> </ul>	Proponent: ECO	Ongoing
Odour/Gases	Smell from the dugout waste dumps	<ul style="list-style-type: none"> <li>• The first step in solving any odour problem is identifying the source. Since this could be caused by a number of different things, it is best to pinpoint the source of odours with the help of a professional/specialist in occupational hygiene.</li> <li>• If offensive odours arise, the source must be investigated immediately and appropriate corrective measures must be taken.</li> </ul>	Proponent: ECO	Ongoing
Biodiversity	Loss of fauna and flora	<b>Management action plans provided under the Construction Phase apply to this phase</b>	Proponent: ECO  Workers involved this phase	Ongoing
Soils	Physical disturbance and Pollution	<b>Management action plans provided under the Construction Phase apply to this phase</b>	Proponent: ECO	Ongoing

Environmental Feature	Impact	Management Actions	Responsible person(s) / Implementation responsibility	Timeframe (When?)
Water Resources	Pollution abatement	<ul style="list-style-type: none"> <li>• Potential contaminants such as hydrocarbons (diesel) should be contained on site and disposed of in accordance to the national wastewater discharge standards so that they do not contaminate surrounding soils and eventually groundwater.</li> <li>• An emergency plan should be available for major / minor hydrocarbon spills during construction activities and during the transportation of the product(s) to the site.</li> <li>• The Storm water Management Plan must be implemented.</li> <li>• Storm water from the plant must be channelled to an onsite holding pond.</li> <li>• The site must be managed in a manner that prevents pollution of drains, downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants.</li> <li>• The proposed smelter wastewater ponds should be lined and adequately maintained to prevent surface and groundwater contamination of any form.</li> <li>• Provide shade around bunded waste storage areas to prevent accumulation of water</li> <li>• No alterations to banks or beds of watercourses is allowed (a dry gully is also recognized as a water course);</li> <li>• An inventory of all chemicals on site must be kept together with the respective SDS.</li> <li>• Cleaning/repair of equipment/vehicles should be done in a designated area to prevent soil and water pollution and the workshop area should be bunded and fitted with an oil separation system.</li> </ul>	<p>Proponent: ECO</p> <p>Workers involved this phase</p>	Ongoing

Environmental Feature	Impact	Management Actions	Responsible person(s) / Implementation responsibility	Timeframe (When?)
		<ul style="list-style-type: none"> <li>• Storage areas containing hazardous substances/materials are to be clearly demarcated and labelled.</li> <li>• Remediation of spillages must be conducted as far as practically reasonable.</li> <li>• Stockpile will be shaped to divert storm water around the site to minimise soil erosion of the site as well as to prevent the contaminated water runoff.</li> <li>• The storm water drainage system must be adequately designed based on site conditions in order to ensure the free flow of surface run-off.</li> <li>• Sewage facilities will be maintained and kept in a good order to prevent any sewage spills.</li> </ul> <p>-The septic tanks will always be maintained and emptied when required. All sewerage waste is under the Management of the Village Council.</p>		
	Water Security	<ul style="list-style-type: none"> <li>• <b>Management action plans provided under the Construction Phase apply to this phase</b></li> </ul>	Project Manager	Ongoing
Vehicular Traffic	Traffic Safety	<ul style="list-style-type: none"> <li>• Drivers of the construction and operational vehicles should be in possession of valid and appropriate driving licenses.</li> <li>• Vehicle drivers should adhere to the road safety rules.</li> </ul>	ECO , Contractor	Ongoing



Environmental Feature	Impact	Management Actions	Responsible person(s) / Implementation responsibility	Timeframe (When?)
		<ul style="list-style-type: none"> <li>Project vehicles and machinery should be serviced regularly in order to avoid accidents as a result of mechanical faults of vehicles and machines.</li> </ul>		
Noise	Nuisance	<ul style="list-style-type: none"> <li>Any site activities that may potentially create noise should be conducted between 08h00 and 17h00 on weekdays. These activities include ore off-loading, crushing.</li> <li>A noise assessment should be conducted during operation, to ensure that noise generation thresholds are not exceeded.</li> </ul> <p><b>For the rest of the management action plans, please refer to management action plans provided under the Construction Phase</b></p>	Proponent: ECO	Ongoing
Waste management	Pollution Control	<ul style="list-style-type: none"> <li>A designated waste storage site will be identified on site,</li> <li>All hazardous waste will be disposed of by an accredited hazardous waste handling contractor/carrier.</li> <li>Waste will not be stored for a period exceeding 90 days Or volumes exceeding 100 cubic metres.</li> <li>Hazardous Waste to be stored on bunded and hard standing floors</li> <li>Waste generated on the proposed site should be collected by authorised waste contractors and frequently disposed of at a licensed landfill site as the last resort. Recycling/reuse of waste should be enforced where feasible.</li> <li>Non-mineral waste site should be identified separately from the hazardous waste disposal area.</li> </ul>	Proponent: ECO	Ongoing

Environmental Feature	Impact	Management Actions	Responsible person(s) / Implementation responsibility	Timeframe (When?)
	Environmental Pollution	<b>Management action plans provided under the Construction Phase apply to this phase</b>	Proponent: ECO	Ongoing
	Human health	<ul style="list-style-type: none"> <li>• Radiation, Carcinogenic emissions and fumes from historic waste stockpiles can be dangerous to human health, as such employee medical examination before working on those should be conducted.</li> <li>• In order to discourage the unsuspecting and uniformed local community from eyeing the empty hazardous containers, if possible, holes should be drilled in these containers while kept on site (before transporting the containers to the waste site). This is also where the fencing of the site is vital throughout the two project phases to restrict unauthorized public/local site access.</li> <li>• Avoid the discharge of any type of waste into the general environment or private properties or into the surface water bodies or ground (and eventual infiltration into groundwater)</li> </ul>	Proponent: ECO	
Archaeological	Impact on unknown cultural or heritage sites/objects	<b>Management action plans provided under the Construction Phase apply to this phase</b>	Proponent: ECO	As required
Community relations	Social Cohesion	<ul style="list-style-type: none"> <li>• Communication Plan, which should outline as a minimum the following:                             <ul style="list-style-type: none"> <li>- How stakeholders(landowners), who require on-going communication for the duration of the exploration program will be identified and recorded and who will manage and update these records (i.e. use the stakeholders list for this study as a basis)</li> <li>- How these stakeholders will be consulted on an on-going basis</li> <li>- Make provision for grievance mechanisms – i.e. how concerns can/ will be lodged/ recorded and how feedback</li> </ul> </li> </ul>	Proponent	On-going

Environmental Feature	Impact	Management Actions	Responsible person(s) / Implementation responsibility	Timeframe (When?)
		<p>will be delivered as well as further steps of arbitration in the even feedback is deemed unsatisfactory.</p> <ul style="list-style-type: none"> <li>• Information regarding activities to be communicated through community communication channels</li> <li>• Develop a communication strategy and establishment of a community complaints and resolution committee</li> <li>• Establish guidelines for communicating pertinent OH&amp;S, Emergency Preparedness and Response information to community representatives and social services providers(Police , Medical providers, Local fire department, Ambulance Service)</li> <li>• Emergency response procedures should be documented for all anticipated hazards associated with smelting operations</li> <li>• Affected community (Neighbours) should be given a list containing names and photographs of exploration teams for identification purposes</li> <li>• Each member of the team needs to wear an ID tag (with a photo on) at all times when on site as well as a team uniform</li> <li>• Bright, reflective jackets need to be worn by each person on sites</li> <li>• Exploration vehicles must be marked for easy identification</li> <li>• Install a Camera Surveillance System at key entrance to the exploration area and key road intersections in order to combat livestock theft</li> </ul>		

Table 6 Decommissioning management action plans

Environment Feature	Impact	Management Action	Responsible person(s) Implementation responsibility	Timeframe (When ?)
Landscape	Ecological Sustainability	<p>Implement Actions stipulated under the rehabilitation framework (Annexed). This Rehabilitation Plan be amended to reflect an integrated approach to the management of activities. These measures are therefore proposed as a minimum to be conducted over the duration of exploration activities. Key actions relating to rehabilitation shall include:</p> <ul style="list-style-type: none"> <li>• Remove all waste, and any other remains from the site</li> <li>• Slope reduction of the steep pit sides, spreading of stockpile topsoil back in these graded sides,</li> <li>• Revegetation along drainage lines to prevent gulley formation.</li> <li>• Only indigenous and highly drought tolerant plant species shall be considered for restoration purposes.</li> <li>• Site inspection to be conducted regularly to check progressive rehabilitation efforts</li> </ul> <p>The proponent shall consult the local office of the Ministry of Agriculture Water and Forestry for advice in respected of reforestation plan</p>	Project Manager	Ongoing
Community relations & Social Cohesion	Stakeholder Relations	<b><i>Management actions stipulated under the Construction &amp; Operational Phase apply to this phase</i></b>		
Abandoned drill holes	Physical Hazard Elimination	<ul style="list-style-type: none"> <li>• Remove all equipment from drill hole before sealing</li> <li>• Remove surface equipment</li> <li>• Seal drill hole with cement if required to prevent leaks to surface or sub-surface movement of formation fluid</li> <li>• Upon decommissioning, the collars of drill holes and wells should have no open annulus to the surface</li> </ul>		

		<ul style="list-style-type: none"> <li>• Where casing is to temporarily remain; have a marker plate installed</li> <li>• where casing is to be removed; ensure PVC collar casing, steel hole casing, and sub-surface infrastructure is cut below the surface at an adequate distance to minimize potential impact on future land use</li> </ul>		
Drilling	Bush fire preventions	<ul style="list-style-type: none"> <li>• Where practically feasible and consistent with environmental best practice, the drill site should be located in an area with at least 50 metres of open ground between the work area and nearby trees and dense grass patches</li> <li>• Firefighting equipment that is consistent with the level of bushfire risk should be available for all drilling activities. This may include firefighting pumps (with adequate water supply), extinguishers and equipment should be located on site to mitigate the risk of a fire at the site escaping and starting a bushfire.</li> </ul>		

### 10.3 *Promoting Environmental Awareness*

Contractors shall ensure that its employees and any third party who carries out all or part of the Contractor's obligations are adequately trained with regard to the implementation of the EMP, as well as regarding environmental legal requirements and obligations. Training shall be conducted by the ECO where necessary.

Environment and health awareness training programmes should be targeted at three distinct levels of employment, i.e. the executive, middle management and workers. Environmental awareness training programmes shall contain the following information:

- The names, positions and responsibilities of personnel to be trained.
- The framework for appropriate training plans.
- The summarized content of each training course.
- A schedule for the presentation of the training courses.
- The ECO shall ensure that records of all training interventions are kept in accordance with record keeping and documentation control requirements as set out in this EMP. The training records shall verify each of the targeted personnel's training experience.

## 11 CHAPTER FIVE: ENVIRONMENTAL MONITORING ACTION

In order to reduce the "medium" and maintain the "low" significance ratings of impacts identified and assessed in the EA report, some monitoring activities are recommended for proposed exploration works. **CPC hereby recommends robust a monitoring programme that should necessitate the following:**

### 11.1 *Monitoring of Selected Environmental Components*

- **During construction or site preparation phase :** Weekly monitoring during the first months where after Monthly audits will be conducted by the Environmental Control Officer for the remainder of the construction phase to ensure compliance to the EMP conditions, and where necessary make recommendations for corrective action.
- **Audit reporting (during the Construction, Operational and Decommissioning period)** Compilation of an audit report with a rating of compliance with the EMP. The ECO shall keep a photographic record of any damage to areas outside the demarcated working sites. The Contractor shall be held liable for all unnecessary damage to the environment. A register shall be kept of all complaints from the Landowner or community. All complaints/claims shall be handled immediately to ensure timeous rectification /payment by the responsible party.
- **Environmental (during the validity period of the ECC):** Monthly Environmental inspections and EMP implementation and compliance monitoring should be undertaken throughout the project cycle. The monthly inspection reports will also be used for the compilation of the first bi-annual report, to be conducted 6 months from the date of ECC issuance. Environmental monitoring reports are to be compiled and submitted to the Department of Environmental Affairs (DEA). This practice will make the ECC renewal easy when it is about to expire. Therefore, the Proponent should effectively monitor and submit the reports to the DEA. The submission is not only done for record keeping purposes, but also in compliance with the environmental legislation.
- **Environmental (Checklist):** In order to make impact monitoring and EMP compliance easy, the Proponent will implement an Impact-Indicator Checklist that can be used by the ECO every month.
- **Groundwater:** The risk of groundwater contamination from the proposed project is deemed to be relatively high. The EAP recommends that the Proponent consider establishing a baseline and monitoring points for the duration of project. This can be done by sampling water from monitoring boreholes before the commencement of drilling activities. As a minimum four (4) boreholes (x2 upstream and x2 downstream) and within a 3 km radius of main exploration target should be monitored.

Water level monitoring will be done every month, whilst water quality monitoring **will** then be done on a quarterly basis. The following parameters would be monitored:

- pH, electrical conductivity (EC), total dissolved solids (TDS), Biological oxygen demand (BOD), sulphates, total organic nitrogen, calcium phosphorus, magnesium, potassium, sodium, ammonium nitrogen, chloride, nitrate-nitrogen, nitrite-nitrogen, potassium, total dissolved phosphorus, bicarbonate, dissolved organic carbon, an ion balance
- Screening (presence/absence) for *E. Coli*,

## 11.2 Monitoring standards & Methods

The section below provide for general monitoring requirements for various parameters.

**Table 7** Sampling Methodology

	Particulars	Monitoring Frequency	Method of Sampling	Parameters
A	<b>Industrial Water Quality</b>			
	Industrial Waste Water	Daily	SANS 5667-10	Parameters specified under Water Act 54 of 1954 -Guidelines
B	<b>Ambient Air Quality (off-site)</b>			
	All sensitive receptors	Quarterly	manual procedure	PM10, PM2.5, SO2
	Sensitive receptors ( monitoring points)	Quarterly	manual procedure	PM10, PM2.5, SO2
C	<b>Industrial Noise</b>			
	Drilling Unit	Quarterly	8 hr continuous with 1 hr interval, SANS10083	Noise levels in dB(A)
	Office Unit	Quarterly	8 hr continuous with 1 hr interval, SANS10083	Noise levels in dB(A)
D	<b>Ambient Noise</b>			
	Property(farm houses) boundary	Monthly	8 hr continuous with 1 hr interval, SANS10083	Noise levels in dB(A)
E	<b>Ambient Water Quality</b>			
	Monitoring Boreholes – (Adjacent- 1km radius) Monitoring Boreholes – (Distant- 3 km radius upstream )	Monthly	SANS 5667-11	Parameters specified under Water Act 54 of 1954
F	<b>Ambient Air Quality (on-site)</b>			
	Monitoring dust associated with tailings, drilling and trenching	Quarterly	Collect samples using low volume portable (TSP) samplers (LVPs, type). A flow indicator (model No.1355, Kubik) can be used for calibration of air flow (1.7 l min <sup>-1</sup> ).	SO2,PM10, PM2.5,
	Offloading , Screening and Crushing Area	Quarterly	ISO-Kinetic or manual procedure	SO2,PM10, PM2.5, CO

**Fallout Dust:** Air quality is monitored to measure the amount of dust fall out. This is to see how air quality is affected by activities exploration activities, and the possible impact on neighbouring sensitive receptors. Dust monitoring should conform to the ASTM International standard (ASTM D1739-98), designed primarily to study long-term trends and obtain particulate matter for chemical analysis from sampling points to be established during the baseline audit inspection. Due to a lack of guidelines on ambient air quality standards in Namibia, the consultant recommends depositional dust monitoring results will be compared to the dust fallout limits as provided by the South African National Standard (SANS) limit of 600 mg/m<sup>2</sup>/day as an average value over a 28 – 32-day period being the limit value for residential and human habited areas within a 2km radius area.



Table 8 SANS (1929:2011) AMBIENT AIR QUALITY EVALUATION CRITERIA FOR DUST DEPOSITION

LEVEL	DUST FALL RATE (mg/m <sup>2</sup> /day)	AVERAGING PERIOD	PERMITTED FREQUENCY OF EXCEEDING DUST FALL RATE
<b>Action Residential</b>	D < 600	30 days	Three within any year, no two sequential months
<b>Action Industrial</b>	D < 1200	30 days	Three within any year, not sequential months
<b>Alert Threshold</b>	D < 2400	30 days	None. First incidence of dust fall rate exceeded requires remediation and compulsory report to relevant authorities

Table 9 THE TARGET, ACTION AND ALERT THRESHOLD VALUES FROM THE SANS 1929: 2011 AMBIENT AIR QUALITY MONITORING STANDARD

Band Number	Band Description	Dust rate(D) mg/m <sup>2</sup> /day	Comment
1	<b>Residential</b>	D < 600	Permissible for residential and light commercial.
2	<b>Industrial</b>	600 < D < 2400	Permissible for heavy commercial and industrial.
3	<b>Action</b>	600 < D < 2400	Requires investigation and remediation if two sequential months lie in this band, or more than three occur in a year.
4	<b>Alert</b>	1200 < D < 2400	Immediate action and remediation required following the first incidence of dust fallout rate being exceeded. Incident report to be submitted to the relevant authority.

## 12 CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

CPC is of opinion that the potential negative impacts associated with the proposed exploration activities, can be adequately mitigated by the effective implementation of recommended management action plans contained in this document. Therefore, it is recommended that:

- All mitigations provided in this EMP should be implemented as stipulated;
- All required permits, licenses and approvals are obtained as required (please refer to the Permitting and Licensing in Table 1 of this EMP);
- The Proponent and all their contractors comply with the legal requirements governing this type of project and its associated activities;
- A Monthly Environmental Compliance inspection should be conducted;
- Water quality monitoring should be conducted to prevent pollution.
- Environmental monitoring requirements recommended are adhered to; and
- All the necessary environmental and social (occupational health and safety) precautions provided are adhered to.
- That the proponent adopt a workable Rehabilitation Plan

## 13 CHAPTER SEVEN: APPENDIX – REHABILITATION PLAN

### REHABILITATION PLAN

(RP)

## 1. Introduction

A major concern with mineral exploration is that most companies and individuals conducting exploration work fail to formulate practical and cost effective rehabilitation plans. It is the responsibility of the proponent to make sure that this PRP is adopted and implemented on site. Prior to the promulgation of the EMA (Act no 7 of 2007, reclamation/rehabilitation of exploration areas has not been a major environmental concern to the public in Namibia. In Namibia, abandoned mining and exploration sites are posing a lot of problems to host communities, wildlife and the environment. Among the problems are:

- Threat to public safety due to dangerous vertical pit walls
- Livestock injuries /losses
- Wildlife injuries
- Land degradation
- Scenic dilapidation

The benefits of salvaging the old mining site can be widely recognized if the PRP has been adopted. When work areas are progressively reclaimed, problems like those mentioned above can be minimized and prevented. Rehabilitation by definition is the act of restoring something to its similar original state. This is important aspect in Environmental Management. Rehabilitation involves the management of all of the property's natural resources during the extraction process. Planning for the rehabilitation the phases of exploration activities will make the restoration process easier. Restoration is the developer's responsibility. The amount of 'rehabilitation' to an area disturbed by past and proposed exploration work can range from restoration, where an area is brought to as near as possible to pre-exploration condition, to re-contouring and re-vegetating to a state that is non-polluting and compatible with environmental regeneration and community expectations (Hancock 1993). Three levels of land repair are available:

1. Reclamation (a process whereby unusable land is returned to a state of usefulness).
2. Rehabilitation (where continual management encourages plant growth).
3. Restoration (return to the original natural ecological functioning of the land).

The proponent may submit a rehabilitation plan to MEFT prior to the commencement of closure operations.

In short rehabilitation involves the following steps:

- For dug out trenches, slope reduction is usually the first step in pit rehabilitation. Overburden or rock waste dumps often end up with very unstable and steep, almost vertical work faces. To lessen the risk of landslides and injuries, and to minimize erosion from surface runoff, these faces are to be reduced to gentle grades.
- Flatter inclines also permit the seeding and growth of plants and are more suitable to other forms of land use. The maximum acceptable slope in the restoration of waste dumps is a ratio of one vertical to three horizontal (33 percent grade). This means that for every metre of height there should be three metres of distance from the bottom of the working face.
- All garbage, supplies and equipment are taken from the site. Dug out trenches should not be used for the disposal of domestic, industrial or toxic waste because of the thin soil layers and the potential for contaminating ground water.
- Re-filling/spread over of the trenches with stockpiled topsoil and overburden to encourage revegetation.

## 2. Objective

The objective of this reclamation / rehabilitation is to restore the exploration sites to ensure human, livestock and wild animal safety to an acceptable satisfactory condition by;

- i.* Eliminating unacceptable health hazards and ensuring public safety
- ii.* Restoring sites to a condition that is visually acceptable to the community

- iii. Reclaiming the areas impacted for future use (solar park or tourist amenity)
- iv. Preparing the site to be amenable to support vegetation
- v. Removing any contaminated soils
- vi. Ensuring physical stabilization of the soils (a combination of smoothing and contouring slopes, replacing overburden and topsoil and re-vegetating).
- vii. Ensuring that final drainage of work areas do not adversely affect ecological integrity of local riverine systems.

Reclamation operations should where possible be carried out concurrently with exploration and as such a practical after use of the site should be considered during pre-excavation planning.

### 3. Proposed Rehabilitation Plan

"Rehabilitation plan" means the JGM written proposal as required and approved by the Department of Environmental Affairs for reclamation of the affected land, which shall include but not be limited to:

- i. Proposed practices to protect surface and subterranean water resources;
- ii. Specifications for surface gradient restoration to a surface suitable for the proposed subsequent use of the land after reclamation is completed. In the absence of suitable remedial action, a disturbed landscape can undergo further degradation. End-use goals and the degree of disturbance at a site determine the type and level of landscape repair to be implemented
- iii. Manner and type of revegetation or other surface treatment of the affected areas;
- iv. Method of prevention or elimination of conditions that will be hazardous to wildlife in or adjacent to the area;
- v. Method of compliance with air and water pollution prevention laws where applicable;
- vi. Sketch maps and other supporting documents as may be reasonably required by MEFT(Office of the Environmental Commissioner);
- vii. A time schedule delineating events to meet the requirements.

### 4. Closure & Post-exploration

This phase contains elements that should be considered when exploration activities are conducted and concluded by the proponent. These management requirements are important to ensure that rehabilitation of the environment is optimized. It is important to note that ongoing rehabilitation initiatives have been captured and detailed in the various themes (as set out above). Proponent must implement the elements of a rehabilitation plan that has been tried and tested and signify industry best practice. A comprehensive rehabilitation plan shall be submitted to the Ministry of Environment and Tourism prior to the commencement of decommissioning. The first step before decommissioning is to select the after use management activity followed by a drafting of the work plan for dug out trenches. The after-use management must be compatible with consideration of the surrounding land-use. Proponent must have enough finances to cover this whole rehabilitation process to acceptable level.

#### *i. Spreading of the stockpiled topsoil/overburden*

The graded slope sides can be spread over with stockpiled topsoil and overburden to encourage revegetation.

#### *ii. Re-vegetation*

Risky slopes/faces can be planted some vegetation in order to increase stability. Vegetation increases stability by binding the soil together and act as a measure of reducing the erosion on these slope slides. The vegetation also improves the soil structure of the slides. Many vegetation species can be grown starting from indigenous to exotic species, the choice of the vegetation type depending on many factors. **Rehabilitation should be timed appropriately. For instance, earthworks should not be undertaken when soil is waterlogged.** Depending on local conditions, revegetation is best done from autumn to early spring

iii. *Trench refill*

Trenches can be filled by upon decommissioning using overburden and spoil material derived from construction areas (dug out areas). When refilling, bulk sample excavations should be battered to slopes not exceeding 1 (vertical): 3 (horizontal). Replace subsoil first and topsoil last with the humus and organic matter on top. Where refilling of a bulk sample excavation is not achievable, the excavation should be self-draining, wherever possible.

iv. *Drill Holes*

All drill holes should be appropriately capped below the ground surface, as soon as possible after completing the drilling program.

*Post rehabilitation management.*

The project must take into consideration the following factors when selecting an appropriate a post rehabilitation management program:

- a) *Surrounding land uses – present and future*
- b) *Surrounding ecological/natural heritage features*
- c) *Stakeholder input (neighbours, local authorities, special interest groups, partners)*
- d) *Method of extraction (depth, proximity to water table)*
- e) *Available resources (topsoil, overburden, seed bank, transplanting opportunities)*
- f) *Geology of the deposit*

5. *Conclusion*

The project impacts are acknowledged as of medium significance. Mitigation measures have been devised so as to ensure environmental friendly operations. Restoration can ultimately result in complete ecological recovery (N, Klages, 2009). In relation to any exploration work to be conducted at the abandoned mine (Farm Kopermyn) there is very little topsoil available, full restoration of the site will be doubtful. Therefore, rehabilitation is the end goal In this case.