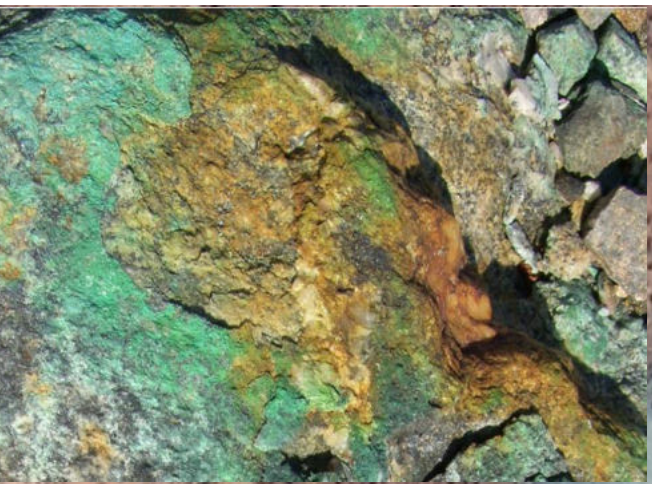
# Africa Huaxia Mining (Pty) Ltd

Final Updated Environmental Management Plan (EMP) Report to Support the Renewal Application for Environmental Clearance Certificate (ECC) for Ongoing / Proposed Mining and Exploration Activities in the Mining License (ML) No. 168, HARDAP REGION, **CENTRAL NAMIBIA**



November 2022

P. O Box 26826
6 Amasoniet Street, Eros
**WINDHOEK NAMIBIA**

# PROPONENT, LISTED ACTIVITIES AND RELATED INFORMATION SUMMARY

## NAME OF THE PROPONENT

Africa Huaxia Mining (Pty) Ltd

## COMPETENT AUTHORITY

Ministry of Mines and Energy (MME)

## MEFT ECC APPLICATION REFERENCE No.

APP-00534

## ADDRESS OF THE PROPONENT AND CONTACT PERSON

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**WINDHOEK NAMIBIA**

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## PROJECT TITLE

Application for Renewal of Environmental Clearance Certificate (ECC) for the Proposed / Ongoing Mining and Exploration Activities in the Mining License (ML) No. 168, Rehoboth Townlands, **HARDAP REGION, CENTRAL NAMIBIA**

## PROJECT LOCATION

Rehoboth Townlands,
Hardap Region, Central Namibia
(Latitude: -23.385684, Longitude: 17.086931)

## ENVIRONMENTAL / PERMITTING DE-RISKING CONSULTANTS

*Risk-Based Solutions (RBS) CC*
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## ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Dr Sindila Mwiya
*PhD, PG Cert, MPhil, BEng (Hons), Pr Eng*

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# NON-TECHNICAL EXECUTIVE SUMMARY

Africa Huaxia Mining (Pty) Ltd (the Proponent) hold mineral rights over the Swartmodder Copper Mine falling under the Mining Licence (ML) No. 168. The ML 168 covering a total area of 10285.9 Ha, was granted on the 16th January 2011 and will expire on the 17th January 2026.

The Swartmodder Copper mine in the ML No. 168 is situated in the Rehoboth District in the Hardap Region, Central Namibia (Figs. 1.2 and 1.3). The 10285.9 Ha ML No. 168 area falls within the Rehoboth townlands covering parts of both the Rehoboth west and east urban constituencies.

The ongoing / proposed underground conventional long-hole open stopping / room and pillar mining techniques is being used to mine the copper deposit. The mine operations have utilised the old adits created way back in 1900 to access the underground ore body.

The proposed prospecting activities are listed in the Environmental Impact Assessment (EIA) Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007) and cannot be undertaken without an Environmental Clearance Certificate (ECC). The Proponent is required to have a valid ECC for the ongoing and proposed exploration and mining activities.

In fulfilment of the environmental requirements, the Proponent appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant and led by Dr Sindila Mwiya as the Environmental Assessment Practitioner (EAP). This Updated Environmental Management Plan (EMP) Report has been prepared to support the application for the renewal of the current ECC granted on the 20th January 2020 and expiring 20th January 2023.

It is estimated that at least 77 reptile, 9 amphibian, 73 mammal and 209 bird species (breeding residents) are known to or expected to occur in the general area of which a high proportion are endemics. The EPL area falls within the greater Kalahari Biome characterised by Acacia woodlands and classified by Giess (1971) as Mixed Tree & Shrub Savannah (Southern Kalahari). The local vegetation cover comprises Nama-Karoo and Acacia Hereroensis. The general area is typical undulating *Acacia* dominated Khomas Hochland terrain with ridges, hills and ephemeral drainage lines. The areas of most concern would be:

- ***Swartmodder River and associated riparian vegetation:*** The Swartmodder River serves as the veritable lifeline for the small stock farmers living along its banks as water is extracted through boreholes (via hand pumps) for human and livestock use. The associated larger riparian trees not only serve as shade and fodder for various species, but also as potential bird roosting/perching/foraging and breeding sites as well as for bark and cavity roosting bats.

- ***Ridges and Outcrops:*** Ridges and outcrops are generally viewed as unique habitat for vegetation not necessarily associated with the surrounding areas. One such feature (as example) located just southwest of the main prospecting site at Swartmodder is a basalt hill (23°23'10.4"S. 17°04'48"E. 1429m) with stands of the endemic *Pennisetum foermeranum* grass. However, all the species associated with this hill, including *P. foermeranum*, are widespread in Namibia and not exclusively associated with this specific site.

The effect that the ongoing / proposed mining and exploration activities and the associated infrastructure would have on the environment would depend on the extent of the development, area of development, management of the area and how the proposed mitigations are eventually implemented by the Proponent.

Access and maintenance routes would have the most impact on the surroundings although these would also be negligible if new accesses are constructed properly, avoided sensitive habitats such as Ephemeral River channels and track discipline (including no killing/poaching fauna along these routes) is adhered to and/or enforced.

The mining operations poses localised negative impacts to the receiving environment. Focusing on developing and utilising the already disturbed and contaminated areas from previous and ongoing

exploration or / and mining operations will greatly be beneficial to the future rehabilitation of the current operation.

Due to the localised extent of the likely negative impacts, compared to the likely positive impacts, it's hereby recommended that a detailed updated EMP Report be prepared to address all the identified impacts with respect to the ongoing operations, mine closure, rehabilitation and aftercare.

The Environmental Management Plan (EMP), described in this report, is based on the findings as outlined in the EIA that was conducted by the Proponent. Africa Huaxia Mining (Pty) Ltd must incorporate the EMP in the Environmental Management System (EMS) of the company in line with the Environmental Policy of the company.

This updated EMP report incorporates the provisions of the Minerals (Prospecting and Mining) Act (No 33 of 1992), Environmental Impact Assessment Regulations (2012) and the Environmental Management Act, 2007, (Act No. 7 of 2007) as well as all the key applicable legislative and permits requirements as outlined in the EIA Report (Chapter 3) and the Environmental Policy of Africa Huaxia Mining.

All the responsibilities to ensure that the recommendations are executed accordingly, rest with the **Africa Huaxia Mining (Pty) Ltd**. The company must provide all appropriate human and financial resources necessary for the effective implementation of this EMP. It is the responsibility of **Africa Huaxia Mining (Pty) Ltd** to make sure that all members of the workforce including contractors and subcontractors are aware of the EMP provisions and its overall objectives.

It is hereby recommended that the ML 168 be issued with a new Environmental Clearance Certificate (ECC) that will be in line with the provisions of Environmental Impact Assessment Regulations (2012) and the Environmental Management Act, 2007, (Act No. 7 of 2007).

# 1. INTRODUCTION TO THE EMP

## 1.1 Project Overview

Africa Huaxia Mining (Pty) Ltd (the Proponent) holds base, rare metal and precious metals mineral rights over the Swartmodder Copper Mine situated in the Mining Licence (ML) No. 168. The following is the summary of the Swartmodder Copper Mine within the ML 168:

- Mining License (ML) No.: 168.
- Name of the Mine: Swartmodder Copper mine.
- Proponent:Africa Huaxia Mining (Pty) Ltd.
- ML Granted on: 16th January 2011.
- ML Expire on: 17th January 2026.
- Environmental Clearance Certificate (ECC): 20th January 2020 and expiring 20th January 2023 and need to be renewed (Fig. 1.1), hence the preparation of this updated EMP.
- Copper Resources: 500 000 tons at 2.5 % Cu.
- Daily metal production: 2.3 tons Cu, and.
- Life of the ongoing mining and exploration operations: 15 years with possible 10 years extension.

The ongoing underground conventional long-hole open stopping / room and pillar mining techniques is being used to mine the copper deposit. The mine operations have utilised the old adits to access the underground ore body.

## 1.2 Regulatory Requirements

The proposed prospecting activities are listed in the Environmental Impact Assessment (EIA) Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007) and cannot be undertaken without an Environmental Clearance Certificate (ECC). The Proponent is required to have a valid ECC for the ongoing and proposed exploration and mining activities.

In fulfilment of the environmental requirements, the Proponent appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant and led by Dr Sindila Mwiya as the Environmental Assessment Practitioner (EAP).

This updated Environmental Management Plan (EMP) has been prepared to support the application for the renewal of the ECC granted on the 20th January 2020 and expiring 20th January 2023 and need to be renewed (Fig. 1.1).

## 1.3 Location and Supporting Infrastructure for the ML No. 168

### 1.3.1 Site Description

The Swartmodder Copper mine in the ML No. 168 is situated in the Rehoboth District in the Hardap Region, Central Namibia (Figs. 1.2 and 1.3). The ML No. 168 falls within the Town Lands of Rehoboth and the targeted copper deposit (the old Swartmodder Mine) is situated about 6 km south of Rehoboth (Figs. 1.3-1.6).

The ML No. 168 area is cut across by a number of major ephemeral river channels (Fig. 1.5). Some of these ephemeral rivers such as the Swartmodder Ephemeral River flow into the Oanob River (Fig. 1.5).

The Oanob River follows directly into the Oanob Dam, a major water supply source to the Town of Rehoboth (Fig. 1.5).

### 1.3.2 Site Accessibility

The eastern part of the ML area is cut across by the B1 main road connection the Town of Rehoboth and Kalkrand and Mariental in the South (Fig. 1.4). The Swartmodder Copper Mine is accessible through a gravel road that come off the B1 Road along to Kalkrand and the main access is situated just after the Rehoboth Golf Course (Figs. 1.4 -1.6).

A number of other major and minor gravel roads interconnects the ML area to the major road network. Rehoboth is also a major rail station situated between Windhoek and the southern Towns of Kalkrand, Mariental and Keetmanshoop.

The main major settlement close to the ML Area is the Town of Rehoboth. The ML area has full mobile and fixed telecommunication infrastructure as well as all the related business services such as banking, security and retail.

### 1.3.3 Water

The sources of human consumption and industrial water supply for the Swartmodder Copper Mine in the ML No. 168 are:

- Existing local borehole within the Mining License (ML No. 168) area supplying water for minerals processing and other associated industrial operations in agreement with the Rehoboth Town Council.

- Rehoboth Town Council supplies water for human consumption from its existing water infrastructure that supplies the Town of Rehoboth.

All the minerals processing water (industrial water) is recycled and reused.

### 1.3.4 Energy

The sources of power supply for the Swartmodder Copper Mine in the ML No. 168 are:

- Rehoboth Town Council line already available in the ML No. 168 area.

- Diesel back-up generators.

- Solar for minor office and administrative power requirements.

Fuel supply is also readily available in the Town of Rehoboth and the proponent has a site installed storage for diesel supply.

ECC – 00486 Serial No: bDlxF9486

REPUBLIC OF NAMIBIA

**MINISTRY OF ENVIRONMENT AND TOURISM**

OFFICE OF THE ENVIRONMENTAL COMMISSIONER

## ENVIRONMENTAL CLEARANCE CERTIFICATE

**ISSUED**

In accordance with Section 37(2) of the Environmental Management Act (Act No. 7 of 2007)

**TO**

Africa Huaxia Mining (Pty) Ltd
P. O Box 26826, Windhoek Namibia, 6 Amasoniet Street, Eros.

TO UNDERTAKE THE FOLLOWING LISTED ACTIVITY

Mining and Exploration in the Mining License No. 168, Hardap Region

DEPUTY ENVIRONMENTAL COMMISSIONER

Issued on the date: 2020-01-20

Expires on this date: 2023-01-20

(See conditions printed over leaf)

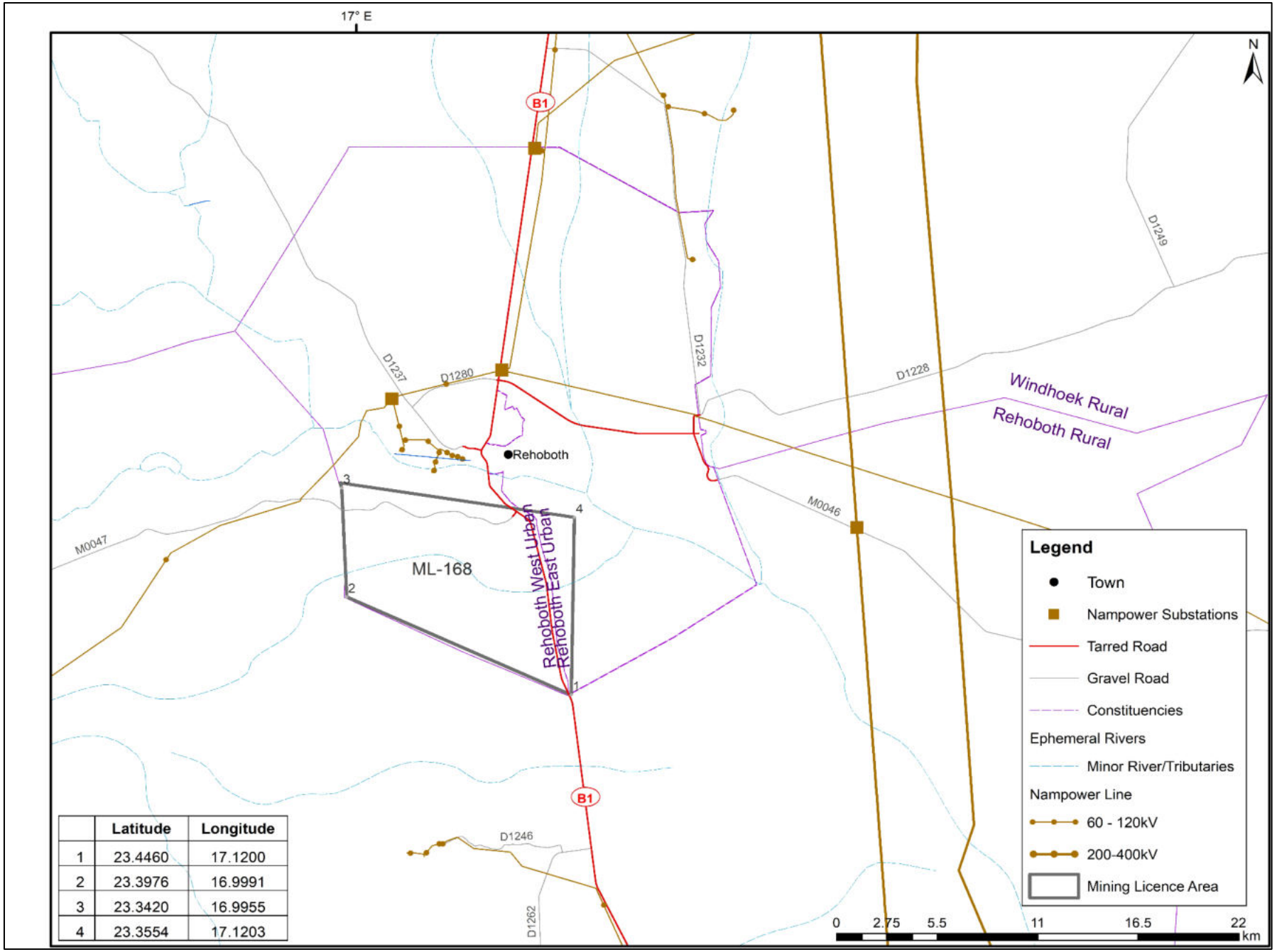
This certificate is printed without erasures or alterations

Reduce Reuse Recycle

NAMIBIA TRASH BIN

Figure 1.1: Copy of the ECC granted on the 20th January 2020 and expiring 20th January 2023 and need to be renewed.


Figure 1.2: Regional locate on of the Swartmodder Copper Mine in the ML No. 168.




| | Latitude | Longitude |
|---|---|---|
| 1 | 23.4460 | 17.1200 |
| 2 | 23.3976 | 16.9991 |
| 3 | 23.3420 | 16.9955 |
| 4 | 23.3554 | 17.1203 |

Figure 1.3: Detailed regional location of the ML No. 168.

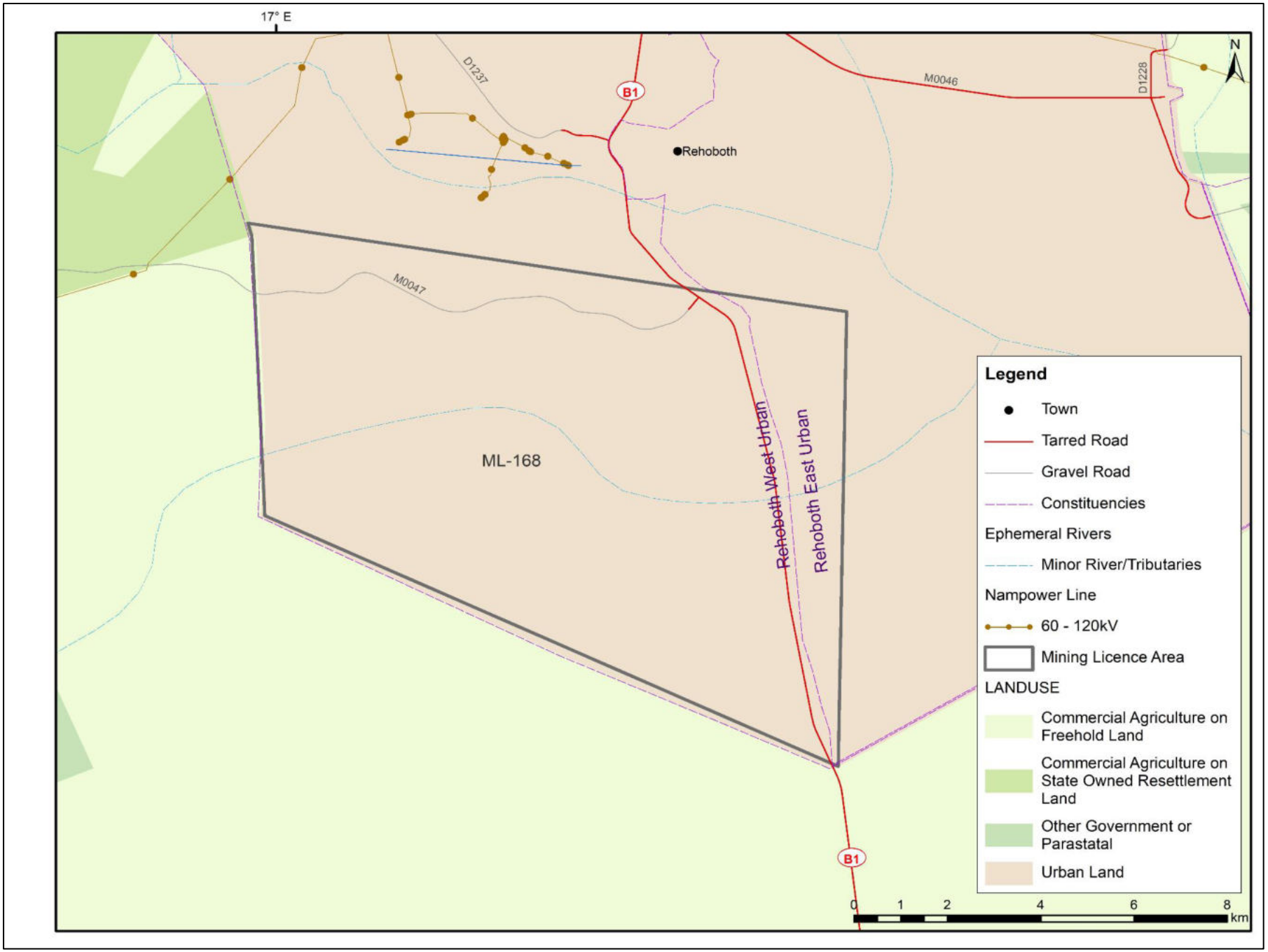



Figure 1.4: Land use covered by the ML No. 168 and surrounding areas.

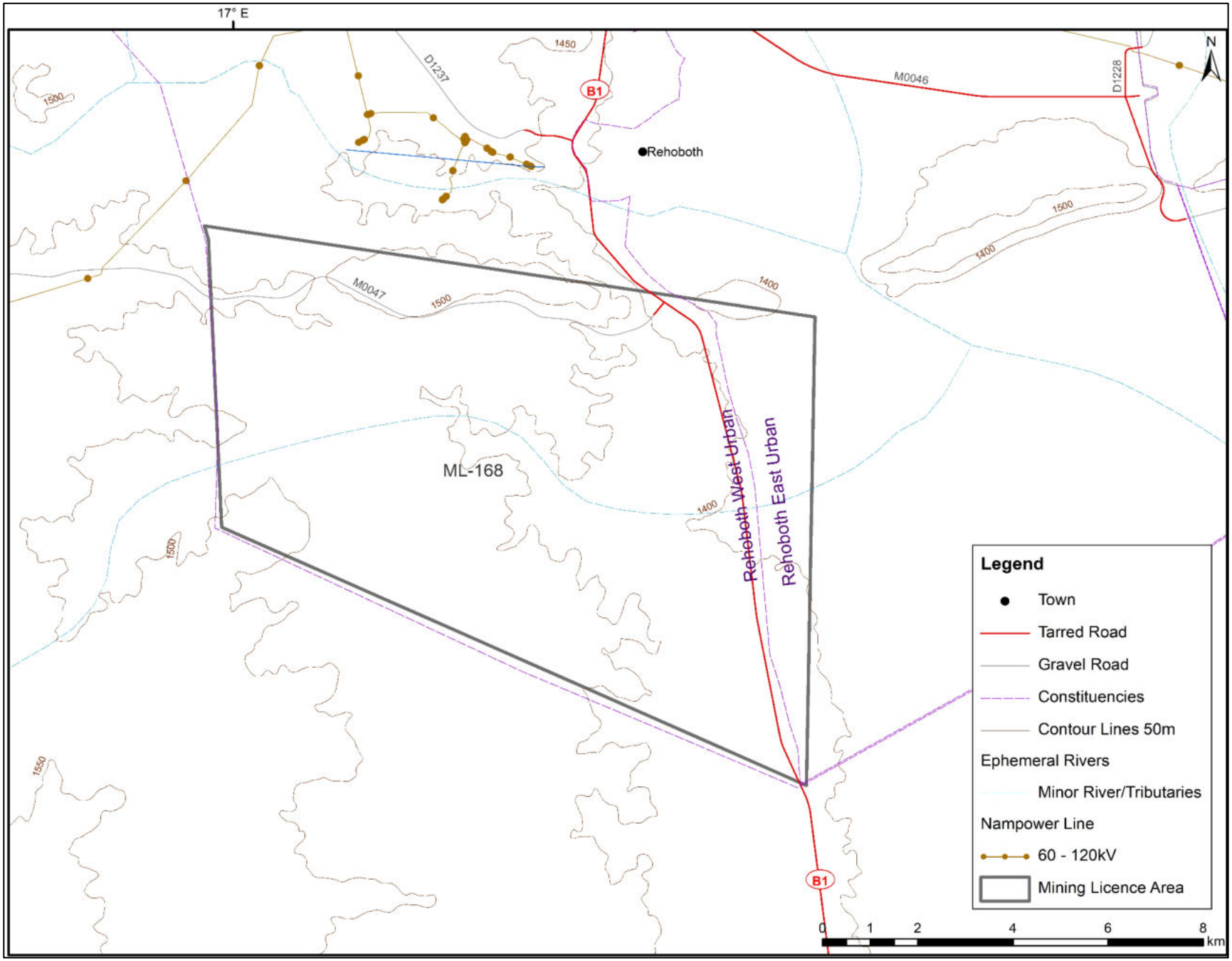



Figure 1.5: Detailed topographic setting of the ML No. 168 and local supporting infrastructure.


Figure 1.6: Satellite image showing the detailed layout of the Swartmodder Copper Mine in the ML No. 168 (Source: Google Earth, 2022).

## 1.3 Key Sensitive Areas

The general area is typical undulating *Acacia* dominated Khomas Hochland terrain with ridges, hills and ephemeral drainage lines. The areas of most concern would be:

### *a) Swartmodder River and associated riparian vegetation*

The Swartmodder River serves as the veritable lifeline for the small stock farmers living along its banks as water is extracted through boreholes (via hand pumps) for human and livestock use. The associated larger riparian trees not only serve as shade and fodder for various species, but also as potential bird roosting/perching/foraging and breeding sites as well as for bark and cavity roosting bats.

### *b) Ridges and Outcrops*

Ridges and outcrops are generally viewed as unique habitat for vegetation not necessarily associated with the surrounding areas (Plate 5.7 and 5.8). One such feature (as example) located just southwest of the main prospecting site at Swartmodder is a basalt hill (23°23'10.4"S. 17°04'48"E. 1429m) with stands of the endemic *Pennisetum foermeranum* grass (Plate 5.4). However, all the species associated with this hill, including *P. foermeranum*, are widespread in Namibia and not exclusively associated with this specific site.

# 2. SUMMARY OF THE PROJECT INFLUENCES

## 2.1 Overview

At least two reasons allow us to consider pollution as the main, most widespread, and most dangerous factor of anthropogenic impact on the environment. First, pollution accompanies most kinds of human activities, including the ongoing monitoring of the ongoing exploration, mining and minerals processing operations.

Second, in contrast with land ecosystems, in the water environment, pollutants quickly spread over large distances from the sources. The danger of the situation is complicated by the fact that when it happens without effective monitoring, it will be too late to do anything.

Among all the diversity of human activities and sources of pollution, we can distinguish two main ways that pollutants are likely to enter the environment and these are:

- Direct discharge of effluents and solid wastes (industrial discharge, waste discharge, sewage, and others.

- Atmospheric emissions and fallout of pollutants transferred by the air masses.

Certainly, the relative contribution of each of these elements and the combined pollution input into the environment will be different for different substances and in different situations. Quantitative estimates of these processes are sometimes difficult because of the lack of reliable data and the extreme complexity of the natural processes over time. For a number of pollutants (metals, nitrates, phosphates, oil and some other hydrocarbons), this task is even more complicated.

They are distributed in the natural environment in the background of natural biogeochemical cycles of the same substances. There are numerous examples when extremely high concentrations of heavy metals, radionuclides, nutrients, and suspended substances are not connected with human activity at all. It can happen as a result of such natural processes such as river flooding and many other natural phenomena.

Land pollution components are very diverse with variety of their sources, scales of distribution, and degree of hazards. These pollutants can be classified in different ways, depending on their composition, toxicity, persistence, sources, volumes, and so on.

In order to analyse likely pollution and its likely effects, it is common to distinguish a group of the most widespread pollutants. These include chlorinated hydrocarbons, heavy metals, nutrients, oil hydrocarbons, surface-active substances, and artificial radionuclides etc. These substances form the so-called background contamination that exists at present in any place in the hydrosphere.

Depending on the type of impact on the water organisms, communities, and ecosystems, the pollutants can be grouped in the following order of increasing hazard:

- Substances causing mechanical impacts (suspensions, films, solid wastes) that damage the respiratory organs, digestive system, and receptive ability.

- Substances provoking eutrophic effects (e.g., mineral compounds of nitrogen and phosphorus, and organic substances) that cause mass rapid growth of phytoplankton and disturbances of the balance, structure, and functions of the water ecosystems.

- Substances with saprogenic properties (sewage with a high content of easily decomposing organic matter) that cause oxygen deficiency followed by mass mortality of water organisms, and appearance of specific microphlora.

- ❖ Substances causing toxic effects (e.g., heavy metals, chlorinated hydrocarbons, dioxins, and furans) that damage the physiological processes and functions of reproduction, feeding, and respiration.

- ❖ Substances with mutagenic properties (e.g., benzo (a) pyrene and other polycyclic aromatic compounds, biphenyls, radionuclides) that cause carcinogenic, mutagenic, and teratogenic effects.

Some of these pollutants (especially chlorinated hydrocarbons) may cause toxic and mutagenic effects. Others (decomposing organic substances) lead to eutrophic and saprogenic effects. Oil and oil products are a group of pollutants that have complex and diverse composition and various impacts on living organisms - from physical and physicochemical damage to carcinogenic effects. To estimate the hazard of different pollutants that may be associated with the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168, the EIA has taken into account not only their hazardous properties associated with various elements but other factors such as the role of pathways and characteristics of the targets. These include the following factors:

- ❖ Likely volumes of their input into the environment.

- ❖ Likely ways and scale of their distribution.

- ❖ Patterns of their behaviour in the water ecosystems.

- ❖ Ability to accumulate in living organisms.

- ❖ Stability of their composition. and,

- ❖ Other properties.

The ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 are likely to have some positive and negative impacts with respect to these key sensitive ecological settings. Mitigation measures are detailed in this updated EMP Report.

## 2.2 Climatic Components

Climatic components have a direct linkage to the air quality. The main aim of the air quality assessment of the likely impact of the project activities within and around the project activities area on the air quality is to determine the likely contaminant sources (HAPs), possible pathways and targets as well as to maximise mitigation measures. Within the general area and surround environments and based on the regional climatic data it is likely that a significant proportion of windblown dust will be generated during the operations.

This is likely to occur when the threshold wind speed of 4.5 m/s is exceeded. The threshold wind speed is dependent on the erosion potential of the exposed surface, which is expressed in terms of availability of erodible material per unit area. Any factor that binds the erodible material will significantly reduce the availability of erodible material on the surface, thus reducing the erosion potential of the surface.

- ❖ Precipitation variations, wind patterns (direction and speed).
- ❖ Evaporation patterns and transpiration influences.
- ❖ Runoff and infiltration patterns.
- ❖ Other.

Overall, the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 will have overall low significant impact on the air quality with mitigations and particularly around the mining and processing plant. However, in terms of production or contribution to the overall negative air quality impacts at local, regional, national and global levels this will be negligible (Table 2.1).

Table 2.1: Overall assessment of the climatic influences and air quality impacts.

| | |
|---|---|
| **Description** | The influence of the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 on the air quality at local, regional, national and global levels will be medium, low and negligible respectively. Locally, the overall contribution of the vehicles and machinery to overall emission levels around the local area will be high. However, during windy events dust will be a major problem in all areas with fine material exposed such as tailings, gravels roads as well as silty and fine sandy areas without any vegetation cover. |
| **Extent** | The extent of impact be localised and will be as follows:<br>• More than 10 km = 1 (v. low)<br>• 10 km – 5 km = 1 (v. low)<br>• 5 km – 1 km = 1 (v. high)<br>• Less than 1 km = 2 (high) (OHS or windy events but Temporal). |
| **Duration** | The duration of the likely impacts will be temporal but may be cumulative to other ongoing activities overtime. |
| **Intensity** | The level of impacts on the surrounding environment including the associated infrastructure would be affected minimally. This would include very little contribution to dust, noise and other associated disturbances in the area. |
| **Mitigation** | Application of Cleaner Production (CP) and Pollution Prevention (P2) and the adoption of Cleaner Technologies right from the beginning including covered containers, and maintenance of structures and equipments as well as the use of filters on all critical material transfer points and the use protective clothing will reduce the impact to medium. Erection of wind barriers in key critical areas as well as the use of vegetation screen and upward coarse graded covers on the fine tailings will important. |
| **Frequency of occurrence** | Climatic pattern and in particular wind speed and direction as well as operational and management practices will influence the frequency of occurrence during the ongoing activities. |
| **Probability** | Overall probability of influence is as follows:<br>• More than 10 km = 1 (v. low = 0.3)<br>• 10 km – 5 km = 1 (v. low = 0.3)<br>• 5 km – 1 km = 1 (v. low = 0.3)<br>• Less than 1 km = 4 (high) (Occupational Health and Safety - OHS and windy events = 0.6 but temporal). |
| **Significance** | Before or without mitigation: **Medium to High** and After mitigation: **Very Low to Low** |
| **Status of the impact** | Negative-Localise and mainly OHS and windy events influences on the air quality that may lead to health impacts but will be temporal and localised. |
| **Legal requirements** | Namibia does not have air quality standard but South African standard could be adopted as part of the best practices and air quality monitoring |
| **Degree of confidence in predictions** | 90% because the ongoing activities are clear and will be undertaken in an environmentally friendly manner. |

## 2.3 Habitat and Biodiversity

It is estimated that at least 77 reptile, 9 amphibian, 73 mammal and 209 bird species (breeding residents) are known to or expected to occur in the general area of which a high proportion are endemics. The EPL area falls within the greater Kalahari Biome characterised by Acacia woodlands and classified by Giess (1971) as Mixed Tree & Shrub Savannah (Southern Kalahari). The local vegetation cover comprises Nama-Karoo and Acacia Hereroensis (Fig. 2.1

The area around the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 comprises varying landscape with the mountainous areas

restricted to the southern parts of the ML. To the northern and central parts of the ML minor hills with major Ephemeral River channels are common. Overall, three types of habitats were delineated and these are:

- ZONE 1: Topographically high covering the southern mountainous area with very high and steep slopes in some places (>20º), limited loose surficial material cover (<0.2m) comprises bare rock heads, boulders, cobbles, gravels and limited or no sands and silts.

- ZONE 2: Intermediate topographically high areas with slopes angles ranging between 10 – 20 degrees with adulating landscape in some places, loose to cemented surficial deposits in some areas. Marks the transition between very high and low topographically areas, and.

- ZONE 3: Topographically low-lying areas with slopes angles generally less than 10 degrees but very sharp scarps in some areas along the major ephemeral river channels. Comprise, loose to cemented well-rounded and poorly sorted river / surficial deposits in some areas. Surficial materials characterized by cobbles, gravels, calcrete, sands and limited silts in heavily vegetated areas of the zone.

The ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 are being undertaken over time and likely to cause some local damages to flora and fauna in the ML area. The main reasons for integrating both fauna and flora in the conceptual model of this study are to evaluate (Fig. 2.1):

- The ecological significance and conservation status with respect to the international and local conservation requirements in order to avoid conflicts between the purposed mine development and conservation.

- The nature and scale of any likely negative impacts on the ecological setting, which include likely temporal or permanent damage to specific species within the vicinity of the targeted areas.

- To identify those species that maybe useful for monitoring of the environmental performances during mining.

All development has potential negative environmental consequences, but identifying the most important flora species including high risk habitats beforehand, coupled with environmentally acceptable mitigating factors, lessens the overall impact of such development.

The summary assessment of the likely impacts of the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 on the flora, fauna and habitat around the Swartmodder Area is shown in Fig. 2.1 and Tables 2.2 and 2.3.

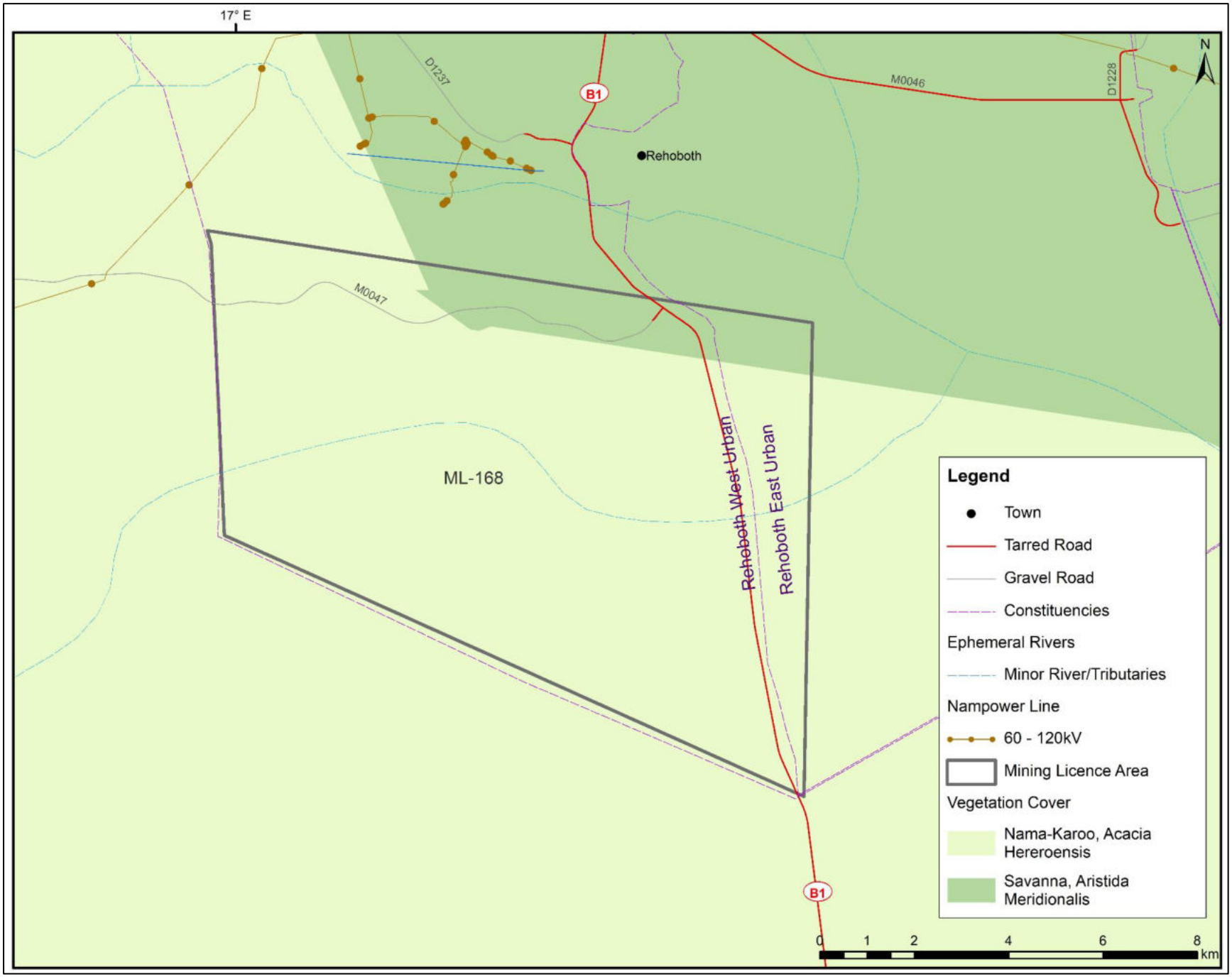



Figure 2.1: Vegetation cover around the ML area.

Table 2.2: Overall assessment and mitigation measures with respect to faunal destruction.

| | |
|---|---|
| **Description** | Faunal destruction will vary depending on the scale/intensity of the ongoing exploration, mining, minerals processing operations and associated and inevitable infrastructure at the Swartmodder Mine in the ML No. 168. |
| **Extent** | **1.** Access routes - Localised disruption/destruction of the habitat and thus consequently fauna associated directly with the actual routes. This however, would be a relatively small area with localised implications.<br>**2.** Prospecting/mining sites - Localised disruption/destruction of the habitat and thus consequently fauna associated directly with the actual sites. This however, would be a relatively small area – depending on scale of operations – with localised implications. |
| **Duration** | **1.** Access routes - The duration of the impact is expected to be permanent along the routes. This however, would be a relatively small area with localised implications.<br>**2.** Prospecting/mining sites - The duration of the impact is expected to be permanent at each site. This however, would be a relatively small area with localised implications. |
| **Intensity** | **1.** Access routes - The actual construction of the routes would be permanently altered. This however, would be a relatively small area with localised implications.<br>**2.** Prospecting/mining - The actual prospecting/mining sites would be permanently altered. This however, would be a relatively small area with localised implications.<br>The areas adjacent the prospecting/mining sites and other associated infrastructure should not be significantly affected. This however, would depend on control over the contractors during the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168, but should be limited to localised implications. Areas not directly affected by the prospecting/mining and associated infrastructure although within the immediate area would be affected minimally. This would include dust, noise & other associated disturbances in the area, but be limited to the ongoing activities periods (exploration and mining operations). |
| **Mitigation** | **1.** Limit the development and avoid rocky outcrops throughout the entire area.<br>**2.** Avoid development & associated infrastructure in sensitive areas – e.g. in/close to drainage lines, cliffs, boulder and rocky outcrops in the area, etc. This would minimise the negative effect on the local environment especially unique features serving as habitat to various species.<br>**3.** Avoid placing access routes (roads & tracks) trough sensitive areas – e.g. over rocky outcrops/ridges and along drainage lines. This would minimise the effect on localised potentially sensitive habitats in the area.<br>**4.** Avoid driving randomly through the area (i.e. “track discipline”), but rather stick to permanently placed roads/tracks. This would minimise the effect on localised potentially sensitive habitats in the area.<br>**5.** Stick to speed limits of maximum 30km/h as this would result in fewer faunal road mortalities. Speed humps could also be used to ensure the speed limit.<br>**6.** Remove (e.g. capture) unique fauna and sensitive fauna before commencing with the development activities and relocate to a less sensitive/disturbed site if possible.<br>**7.** Prevent and discourage the setting of snares (poaching), illegal collecting of veld foods (e.g. tortoises, etc.), indiscriminate killing of perceived dangerous species (e.g. snakes, etc.) and collecting of wood as this would diminish and negatively affect the local fauna – especially during the development phase(s).<br>**8.** Attempt to avoid the removal of bigger trees during the development phase(s) – especially with the development of access routes – as these serve as habitat for a myriad of fauna.<br>**9.** Prevent and discourage fires – especially during the development phase(s) – as this could easily cause runaway veld fires affecting the local fauna, but also causing problems (e.g. loss of grazing & domestic stock mortalities, etc.) for the neighbouring farmers.<br>**10.** Rehabilitation of the disturbed areas – i.e. initial development access route “scars” and associated tracks as well as temporary accommodation sites. Preferably workers should be transported in/out to the ML area on a daily basis to avoid excess damage to the local environment (e.g. fires, wood collection, poaching, etc.). Such rehabilitation would not only confirm the company’s environmental integrity, but also show true local commitment to the environment. |

Table 2.2: *Cont.*

| | |
|---|---|
| | **11.** Implement erosion control. The area(s) towards & adjacent the drainage line(s) are easily eroded and further development may exacerbate this problem. Avoid undertaking activities within 20m of the main drainage line(s) to minimise erosion problems as well as preserving the riparian associated fauna.<br>**12.** Conduct a thorough investigation on the fauna associated with the ongoing monitoring of the ongoing exploration, mining and minerals processing operations.<br>**13.** Prevent the number of domestic pets – e.g. cats & dogs – accompanying the workers as cats decimate the local fauna and interbreed & transmit diseases to the indigenous African Wildcat found in the area. Dogs often cause problems when bonding on hunting expeditions thus negatively affecting the local fauna. The indiscriminate and wanton killing of the local fauna by such pets should be avoided at all costs.<br>**14.** Avoid "overnighting" at the exploration sites as this could lead to problems such as the killing/poaching/collection of local fauna. |
| **Frequency of occurrence** | Expected to be a "once off" issue affecting the selected site(s). Further prospecting & associated road construction throughout the area would however increase the frequency of occurrence. |
| **Probability** | Definite (100%) negative impact on fauna is expected in the actual prospecting/mining areas as well as the access route exploration sites. This however, would be much localised and cover only a small area and avoid sensitive areas.<br><br>Highly Probable (75%) negative impact on fauna is expected in the general areas during the implementation of all the ongoing activities as a result of noise, increased activities, etc.<br><br>Probable (50%) negative impact on fauna is expected from the infrastructure (roads/tracks). Precautionary principle (e.g. avoid unique habitat features as well as adhering to the proposed mitigating measures would minimise this) would decrease the significance of these potential impacts. |
| **Significance** | Before mitigation:<br>**High**<br>After mitigation:<br>**Medium** to **Low** |
| **Status of the impact** | Negative<br>Localised unique habitats (e.g. rocky outcrops, drainage lines & ridges, etc.) with associated fauna would bear the brunt of the ongoing monitoring of the ongoing exploration, mining and minerals processing operations, but be limited in extent and only permanent at the actual prospecting/mining sites and access routes. |
| **Legal requirements** | N/A |
| **Degree of confidence in predictions** | As an ecologist I am sure of the above-mentioned predictions made and would suggest that the mitigation measures be implemented to minimise potentially negative aspects regarding the local fauna in the area. |

Table 2.3: Overall assessment and mitigation measures with respect to flora destruction.

| | |
|---|---|
| **Description** | Floral destruction will vary depending on the scale/intensity of the ongoing exploration, mining, minerals and associated and inevitable infrastructure processing operations at the Swartmodder Mine in the ML No. 168. |
| **Extent** | **1.** Access routes - Localised disruption/destruction of the habitat and thus consequently flora associated directly with the actual routes. This however, would be a relatively small area with localised implications.<br>**2.** Prospecting/mining sites - Localised disruption/destruction of the habitat and thus consequently flora associated directly with the actual sites. This however, would be a relatively small area – depending on scale of operations – with localised implications. |
| **Duration** | **1.** Access routes - The duration of the impact is expected to be permanent along the routes. This however, would be a relatively small area with localised implications.<br>**2.** Prospecting/mining sites - The duration of the impact is expected to be permanent at each site. This however, would be a relatively small area with localised implications. |
| **Intensity** | **1.** Access routes - The actual construction of the routes would be permanently altered. This however, would be a relatively small area with localised implications.<br>**2.** Prospecting/mining - The actual prospecting/mining sites would be permanently altered. This however, would be a relatively small area with localised implications.<br><br>The areas adjacent the prospecting/mining sites and other associated infrastructure should not be significantly affected. This however, would depend on control over the contractors during the ongoing activities but should be limited to localised implications.<br><br>Areas not directly affected by the prospecting/mining and associated infrastructure although within the immediate area would be affected minimally. This would include dust, noise and other associated disturbances in the area, but be limited to the local prospecting/mining periods. |
| **Mitigation** | **1.** Limit the development and avoid rocky outcrops throughout the entire area.<br>**2.** Avoid development and associated infrastructure in sensitive areas – e.g. Swartmodder River, in/close to drainage lines, cliffs, boulder and rocky outcrops in the area, etc. This would minimise the negative effect on the local environment especially unique features serving as habitat to various species.<br>**3.** Avoid placing access routes (roads and tracks) trough sensitive areas – e.g. over rocky outcrops/ridges and along drainage lines. This would minimise the effect on localised potentially sensitive habitats in the area.<br>**4.** Avoid driving randomly through the area (i.e. "track discipline"), but rather stick to permanently placed roads/tracks. This would minimise the effect on localised potentially sensitive habitats in the area.<br>**5.** Stick to speed limits of maximum 30km/h as this would result in less dust pollution which could affect certain flora – e.g. lichen species. Speed humps could also be used to ensure the speed limit.<br>**6.** Remove unique and sensitive flora (e.g. all *Aloe* sp.) before commencing with the development activities and relocate to a less sensitive/disturbed site if possible.<br>**7.** Prevent and discourage the collecting of firewood as dead wood has an important ecological role – especially during the development phase(s). Such collecting of firewood, especially for economic reasons, often leads to abuses – e.g. chopping down of live and/or protected tree species such as *Acacia erioloba* which is a good quality wood.<br>**8.** Attempt to avoid the removal of bigger trees during the development phase(s) – especially with the development of access routes – as these serve as habitat for a myriad of fauna.<br>**9.** Prevent and discourage fires – especially during the development phase(s) – as this could easily cause runaway veld fires causing problems (e.g. loss of grazing and domestic stock mortalities, etc.) for the neighbouring farmers. Rehabilitation of the disturbed areas – i.e. initial development access route "scars" and associated tracks as well as temporary accommodation sites. Preferably workers should be transported in/out of the ML on a daily basis to avoid excess damage to the local environment (e.g. fires, wood collection, poaching, etc.). Such rehabilitation would not only confirm the company's environmental integrity, but also show true local commitment to the environment. |

Table 2.3: *Cont.*

| | |
|---|---|
| | **10.** Implement erosion control. The area(s) towards and adjacent the drainage line(s) are easily eroded and further development may exacerbate this problem. Avoid undertaking ongoing activities within 20m of the main drainage line(s) to minimise erosion problems as well as preserving the riparian associated fauna.<br>**11.** Conduct a thorough investigation on the flora associated with the ongoing exploration, mining and minerals processing activities.<br>**12.** Prevent the planting of potentially invasive alien plant species (e.g., *Tecoma stans*, *Pennisetum setaceum*, etc.) for ornamental purposes as part of the landscaping should mining activities eventually commence. Alien species often "escape" and become invasive causing further ecological damage.<br>**13.** Incorporate indigenous vegetation – especially the protected species e.g., *Acacia erioloba*, *Albizia anthelmintica*, etc. – into the overall landscaping should mining activities eventually commence. Indigenous species require less water and overall maintenance.<br>**14.** Avoid "overnighting" at the exploration sites as this could lead to problems such as the fires/firewood collection/plant collection.<br>**15.** A thorough investigation of water use and ground water extraction should take place before actual mining activities commence as this would affect the local flora, especially the Swartmodder riparian vegetation, not only locally, but downstream as well. |
| **Frequency of occurrence** | Expected to be a "once off" issue affecting the selected site(s). Further prospecting and associated ongoing activities throughout the area would however increase the frequency of occurrence. |
| **Probability** | Definite (100%) negative impact on flora is expected in the actual prospecting/mining areas as well as the new access route construction sites. This however, would be much localised and cover only a small area and avoid sensitive areas. Precautionary principle (e.g., avoid unique habitat features as well as adhering to the proposed mitigating measures would minimise this) would decrease the significance of these potential impacts.<br><br>Highly Probable (75%) negative impact on flora is expected in the general areas especially with large scale extraction of groundwater for prospecting/mining activities. |
| **Significance** | Before mitigation:<br>**High**<br>After mitigation:<br>**Medium** to **Low** |
| **Status of the impact** | Negative: Localised unique habitats (e.g., rocky outcrops, drainage lines and ridges, etc.) with associated flora would bear the brunt of the ongoing exploration, mining and minerals processing activities, but be limited in extent and only permanent at the actual prospecting/mining sites and access routes. |
| **Legal requirements** | N/A |
| **Degree of confidence in predictions** | As an ecologist I am sure of the above-mentioned predictions made and would suggest that the mitigation measures be implemented to minimise potentially negative aspects regarding the local flora in the area. |

## 2.4 Health and Safety

Previous mining activities around the ML 168 has left some environmental health and safety impacts that includes open trenches, shafts, unstable tailings dump as well as scrap metals. The ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 will leave additional permanent scars on the natural environment around the mining areas as well as the processing the central mine support infrastructure area. All these health and safety challenges will affect the project development process as well as the day to survival of the local communities and fauna. Table 2.4 outlines a summary evaluation of likely health and safety impacts.

Table 2.4: Health and safety assessment and mitigation measures.

| | |
|---|---|
| **Description** | Health and safety issues cover mainly the impacts of adits, tailings, unfilled exploration trenches as well as unstable slopes in topographically very high mountainous areas (Zone 1). Intermediate adulating landscape (Zone 2) and topographically low-lying areas dominated by ephemeral river channels (Zone 3). |
| **Extent** | Would be a relatively limited and localised within the specific zones. |
| **Duration** | The duration of the impact is expected to be permanent in the actual areas likely to be affected. |
| **Intensity** | The actual site would be permanently altered. This however, would be a relatively limited to the actual zone where specific activities such as mining and mine infrastructure support will take place. The adjacent zones associated with the existing infrastructure would be affected moderately. |
| **Mitigation** | **2**. Develop and adapt an Environmental Management System for the entire the mining project taking into considerations health and safety issues during the ongoing exploration, mining and minerals processing activities.<br>**3.** Avoid placing dumping sites, overburden/storage sites and associated infrastructure in unstable areas of specific zones<br>**4.** Adapt cleaner production principles that reduce the health and safety impacts of the ongoing exploration, mining and minerals processing activities. |
| **Frequency of occurrence** | Expected to be permanent during the operational stage and reduce minimal after closure and rehabilitation. |
| **Probability** | Probable (100%) negative impacts are expected on the actual mining areas (the open cast area) and about 50% chance for negative impacts within the infrastructure (roads/tracks/ site usage) mining support Zone 3. Less than 20% is likely to occur in Zone 1. Precautionary principle (e.g., adhering to the proposed mitigating measures would minimise and decrease the likely significance of these potential impacts. |
| **Significance** | Before mitigation: **High**<br>After mitigation: **Medium to Low** |
| **Status of the impact** | Negative |
| **Legal requirements** | Minerals Act, 1992, EIA Regulation 2012 and Environmental Management Act 2007. |
| **Degree of confidence in predictions** | The specialist consultant is sure that the above-mentioned predictions proposed will minimise potentially negative aspects regarding the local habitats. |

## 2.5 Socioeconomic

Social impacts of the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 are likely to occur considering that the local communities in the area are very reserved to their cultural heritage. A clear understanding of these impacts may help communities understand and anticipate the effects of the ongoing activities around the ML No. 168 Area. One of the major possible conflicts of the ongoing activities may be unrealistic expectations about the job opportunities. It is important for regional and local authorities and local communities to bear in mind that the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 may have limited benefits because rental fees, taxes and royalties are being paid to the central government. Table 2.5 summarises the overall assessment of the likely socioeconomic impacts associated with the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168.

Table 2.5: Overall assessment of the likely socioeconomic impacts and mitigation measures.

| | | |
|---|---|---|
| **Description** | The influence of the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 on the local, regional and national social economic setting includes positive and negative impacts but the positive impacts outweigh the negative ones at central government level. | |
| **Extent** | • The positive impacts include local, regional and national impacts mainly in financial terms and benefits as well as support to the development potential tourism products for this area.<br>• Negative social economic impacts include erosion of family and community values, heritages and resentment to the operations particularly if most of employees are not from Rehoboth. | |
| **Duration** | The duration of the likely impacts (positive and negative) will be permanent and will go beyond the duration of the ongoing activities. | |
| **Intensity** | The levels of positive social economic impacts are very high both at national and regional levels. | |
| **Mitigation** | • Positive – support to local community in areas such as provision of services and employment opportunities are encouraged.<br>• Negative – respect and support to the promotion of local community cultures, family values and heritages | |
| **Frequency of occurrence** | Throughout the ongoing exploration, mining and minerals processing activities life cycle and beyond for both positive and negative impacts. | |
| **Probability** | The likelihood of positive and negative impacts occurring is high | |
| **Significance** | Before for the negative impact mitigation:<br>**High**<br>After mitigation:<br>**Low** | Before for the positive impact mitigation:<br>**High**<br>After mitigation:<br>**Very High** |
| **Status of the impact** | Positive and Negatives | |
| **Legal requirements** | Labour Act, Vision 2030 and Regional Development Strategy for the Hardap Region as well as Poverty Alleviation of Strategies | |
| **Degree of confidence in predictions** | The specialist consultant is sure that the assessment and the recommended mitigation measures, once implemented will minimise the potentially negative impacts and maximise the positive ones. | |

## 2.6 Ground Components

The ground components include the regional and local geology, geomorphology, surface water and groundwater assessments (Figs. 2.2-2.4). Of all the ground components covered in this updated EMP study, the water and scenic beauty are likely to be negatively impacted because of the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 (Fig. 2.4). Table 2.6 summarises the likely negative impacts of the ongoing activities on the ground components.

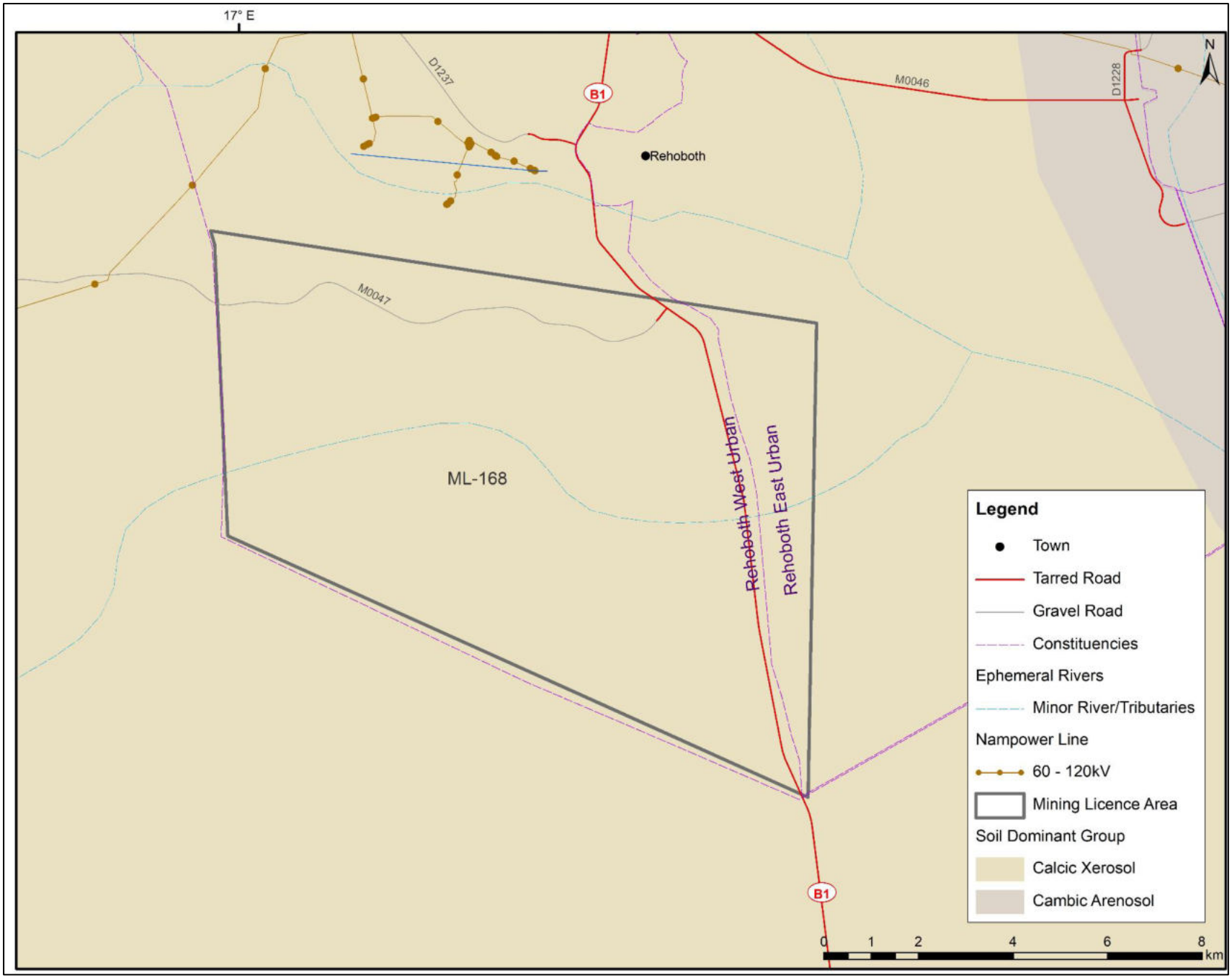



Figure 2.2: Surficial geology around the ML area (Data source: Geological Survey of Namibia, 1999).

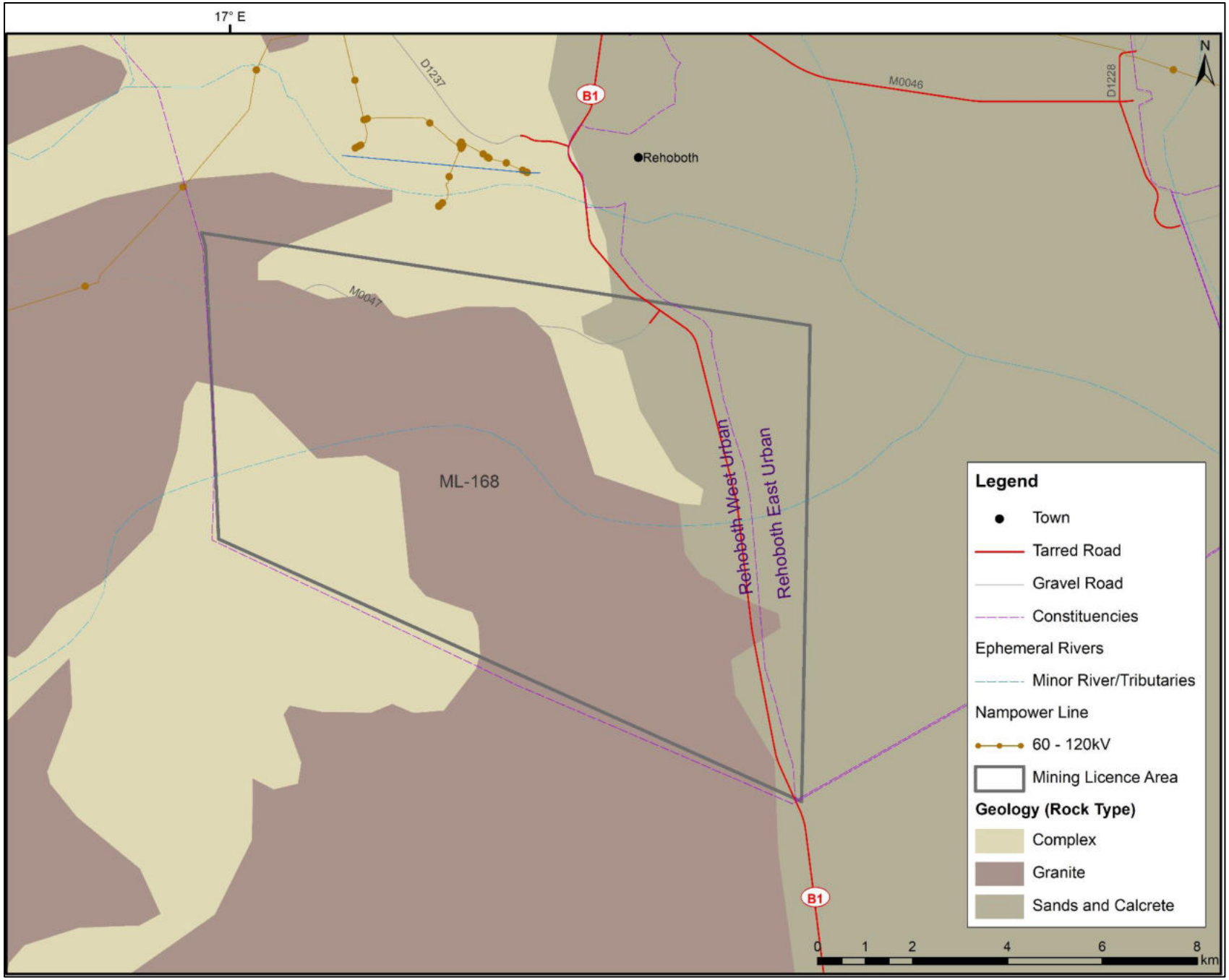



Figure 2.3: Solid geology around the ML area (Data source: Geological Survey of Namibia, 1999).

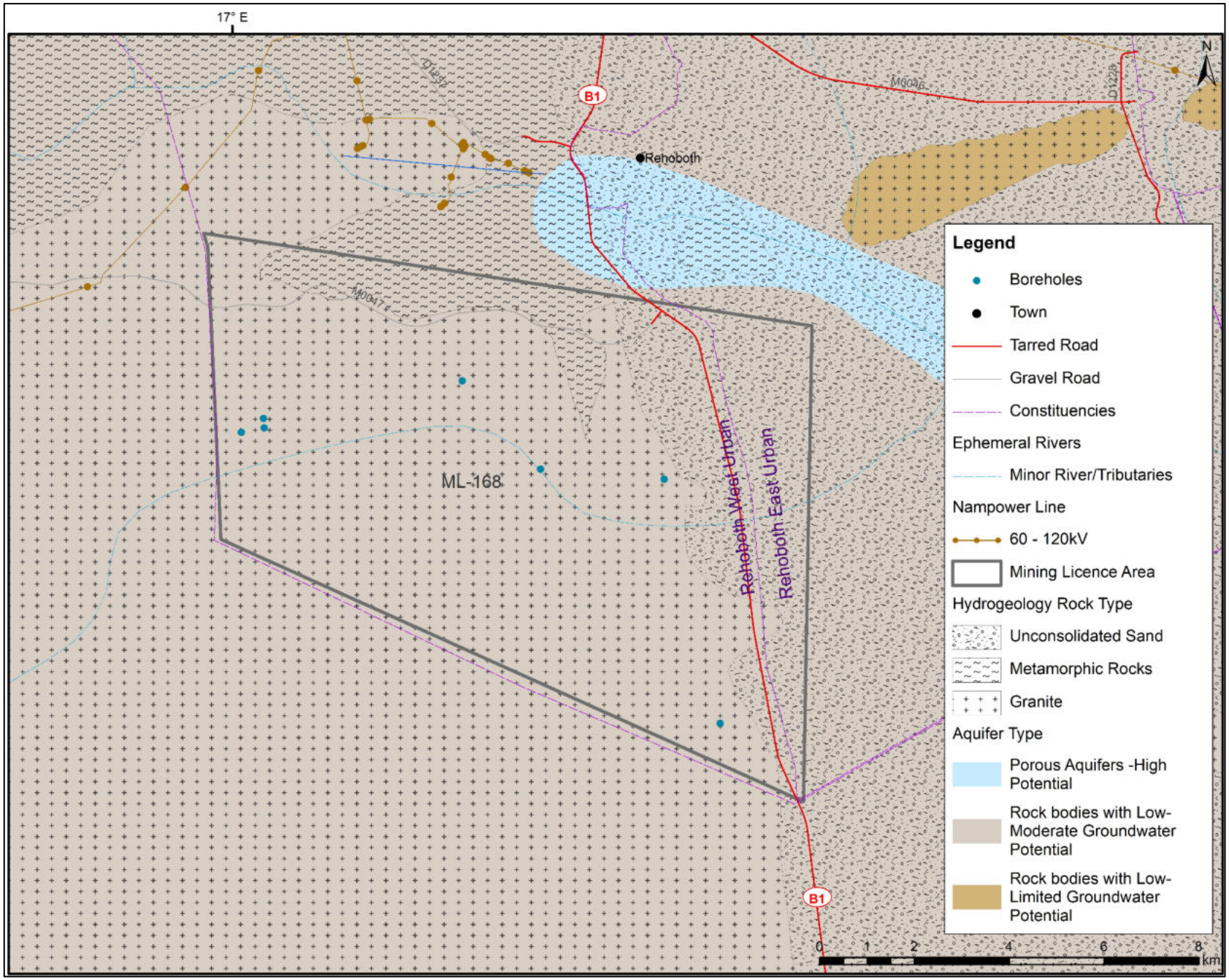



Figure 2.4: Hydrogeological setting around the ML area (Data source: Department of Water Affairs, 2001).

Table 2.6: Overall assessment of the impacts and mitigation measures associated with the ground components.

| | |
|---|---|
| **Description** | The influences and impacts of the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 on the ground components including geology, water and construction materials. |
| **Extent** | The extent of the likely negative impacts as a result of the ongoing activities on the ground components will be localised and in particular will affect the immediate ground components within the ML area. |
| **Duration** | The duration of the likely impacts will be permanent and beyond the duration of the ongoing activities. |
| **Intensity** | The level of impacts is likely to be high to moderate within the immediate environment and low in the surrounding areas. |
| **Mitigation** | 1. Operator must development effective management plan for the protection of sensitive area as recommended in this EMP.<br>2. All solid and liquid wastes generated from ongoing activities shall be reduced, reused, or recycled to the maximum extent practicable. Burial of waste on anywhere is not allowed and all waste must be disposed on approved waste disposal site to be developed as part of the mine plan.<br>3. No littering in the site area including access roads and must be always clean.<br>4. Powder boxes, oil cans, and all other forms of litter must be removed at all times.<br>5. Trash may not be burned or buried, except at approved sites under controlled conditions in accordance with the regulations.<br>6. Disposal of wastewater into any public stream is prohibited.<br>7. All appropriate permits must be obtained before the implementation of any activity. |
| **Frequency of occurrence** | The likely impacts are likely to occur during the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 |
| **Probability** | (0.5) Likely occur during the operational phase |
| **Significance** | Before for the negative impact mitigation:<br>**High to Medium** and after mitigation **Medium to Low** |
| **Status of the impact** | Negative |
| **Legal requirements** | Minerals Act, Water Act Resources Management Act, 2004, Environmental Management Act 2007 and all related Energy Regulations, |
| **Degree of confidence in predictions** | The geological and geotechnical specialist who undertook the study and contribution to the above assessment is sure of the recommendations with a confidence level of 80%. |

# 3. THE EMP FRAMEWORK

## 3.1 Implementation of the EMP

An Environmental Management Plan (EMP) is one of the most important outputs of the environmental assessment process and is the synthesis of all the proposed mitigation and monitoring actions, set to a timeline and with specific assigned responsibilities. The aim of the EMP is to assist Africa Huaxia Mining (Pty) Ltd and their Contractors to ensure that the day-to-day operations are carried out in an environmentally responsible manner, thereby preventing or minimizing the negative effects and maximizing the positive effects of the project-related activities. The summary of the required organisational structure to fully implement the EMP is shown in Fig. 1.3. Provision has also been made, on an ongoing basis, for sufficient management sponsorship and human and financial resources.

The EMPs are presented as comprehensive matrices: for each **Activity**/**Process** and related **Aspects** (defined by the International Organization for Standardization ISO 14001:2004 as *element of an organization's activities or products or services that can interact with the environment*. environment is defined as *surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation*) and **Impacts** (*any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects*), **Management Actions** required to address the impacts arising directly and indirectly from the various aspects of the ongoing exploration, mining and minerals processing activities, with **Responsible Persons** and **Timing** for each, are listed.

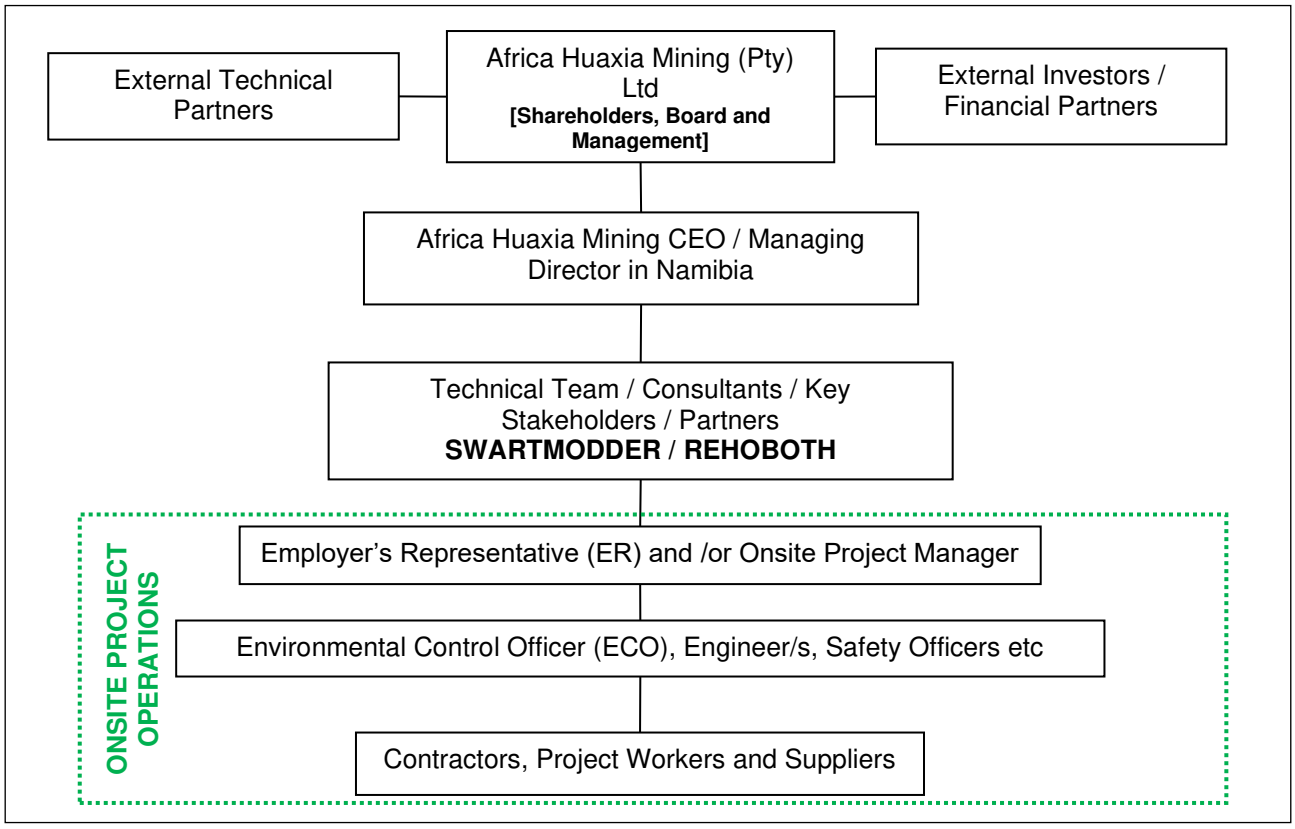



Figure 3.1: Africa Huaxia Mining organisational structure for the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168.

Management of the environmental elements that may be affected by the different activities of the ongoing exploration, mining and minerals processing activities are grouped together into climatic, environmental and ground components. The EMP also identifies the activity groups / environmental elements, the aspects / targets, the indicators, the schedule for implementation and who should be

responsible for the management to prevent major impacts that the different mining and exploration activities and processes may have on the environment. Separate EMPs have been prepared for the project: an EMP for the operational stage, including rehabilitation, of access road(s) to and from the ongoing activities. and EMPs for the Decommissioning/Closure Phases of the ongoing exploration, mining and minerals processing at the Swartmodder Mine in the ML No. 168.

The following abbreviations are used to indicate who should be responsible for the implementation:

1. Mine Manager (MM).
2. Project Geologist (PG).
3. Geological Technician (GT).
4. Contractor (CONT).
5. Environmental Coordinator (ENV).
6. Ministry of Environment and Tourism (MET).
7. Ministry of Mines and Energy (MME).
8. Interested and Affected Parties (I&APs).

## 3.2 General Guidance

(i) Implementation of the mining project can only be undertaken once the Mining License (ML) and the Environmental Clearance as well as all the associated permits have been issued by the by the relevant Government Ministries.

(ii) Field crew must try to avoid damage to vegetation and no-go zones and must adhere to the recommendations contained in this EMP concerning conservation and preservation of natural features.

(iii) All crew members must be informed of special provisions of the Environmental Clearance, the Mining License as well as all other permits issued by the State. Every effort must be made to follow the various permits provisions and the contractor must strive to avoid excessive damage to the roads, trails and landscape. Damages to any natural structures must be reported to the Environmental Coordinator who will then inform the Quality Control Specialist (QCS). The Environmental Coordinator must make sure that necessary repairs / remediation to environmental damage are undertaken in accordance with the recommended approach / guidelines. In the absence of the recommended guidelines, the repair / remediation to environmental damage will need to be undertaken in accordance with best available practices.

(iv) Making of fire in any other place other than the designated area such as a camping area is prohibited. Where the danger of fire is high, all vehicles must be equipped with spark arrestors and must carry operable fire extinguishers,

(v) All communications (public relations) with the local communities, other land users or visitors to the mining area must be channelled through one communication channel. The Public

Relation Officer should play a significant role in this regard and contractor's personnel must be courteous and considerate when dealing with other land users, visitors or members of the general public and in particular the local communities.

## 3.3 Specific Guidance

### 3.3.1 Waste Management

(i) In addition to addressing the prevention, detection, and clean-up of released waste, clean-up equipment. the location and availability of suitable alternative equipment. and a plan of operations need to be put in place to be headed by the Environmental Coordinator.

(ii) All litter in the area must be cleaned at all times.

(iii) After any excavations, all the removed materials including vegetation must be carefully replanted and surrounding ground levelled with all litter removed and the area must be checked by the Environmental Coordinator.

(iv) Pin flags, survey stakes and flagging, trail markers, powder boxes, oil cans, and all other forms of litter must be removed.

(v) All solid and liquid waste generated from the ongoing exploration, mining and minerals processing activities shall be reduced, reused, or recycled to the maximum extent practicable. Burial of waste on the State land during the exploration and mining phases is not allowed and all waste must be disposed on approved waste disposal sites.

(vi) Trash may not be burned or buried, except at approved sites under controlled conditions in accordance with the regulations.

(vii) Disposal of wastewater into any public stream is prohibited.

### 3.3.2 Facilities and Structures

(i) The sitting of a mine settlement and all related facilities or base other than in the designated zone (See Appropriate Development Opportunity Layer) is prohibited.

### 3.3.3 Local Hire

(i) To the extent that are available with sufficient skills, the developer /operators are encouraged to employ local residents and subcontractors if needed.

### 3.3.4 Environmental Awareness Training

(i) The operator of the ongoing exploration, mining and minerals processing activities must include in any plan an Environmental Awareness Training programme for all personnel, including subcontractors, involved in any activity to be coordinated by the Environmental Coordinator. The programme must be designed to inform each person working on the project of environmental, social, and cultural concerns which relates to the individual jobs and responsibilities.

(ii) The programme must employ effective methods to ensure that personnel understand and use techniques necessary to reduce the risk of fire, to preserve the environment, geological, archaeological, water, landscape, habitat zones and all associated biological resources. In addition, the programme must be designed to help personnel increase

their sensitivity and understanding of community values, customs, and lifestyles in areas where they will be operating.

### 3.3.5 Prehistoric, Historic, and Archaeological Sites

(i) If prehistoric, historic, or archaeological materials or artefacts have been discovered in the process of mining and ongoing exploration, the operator must inform the Environmental Coordinator / Mine Manager who must evaluate and prepare an inventory of the discovery. The inventory must include consideration of information provided by local residents and documentation of oral history regarding prehistoric and historic uses of such sites. The Environmental Coordinator or Mine Manager must submit the inventory to the relevant authorities. The Environmental Coordinator / Mine Manager must make every reasonable effort to preserve and protect such site, structure, or object from damage until after consultation with the relevant authorities / specialists have given directions as to the actions that need to be taken.

# 5. OPERATIONAL STAGE

## 5.1 Introduction

Following the completion of the construction of the mine, processing plant and supporting infrastructure, currently, only specialised and maintenance workforce are required to run and maintain the mine, processing plant and supporting infrastructure as well as the ongoing exploration programme. Africa Huaxia Mining (Pty) Ltd is responsible for fulfilling the requirements in the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the operational stage of the ongoing activities.

A Project / Site / Health Safety and Environmental (HSE) Manager / Engineer have been appointed by Africa Huaxia Mining (Pty) Ltd to oversee all the site operation as well as management of other site workforce. Tables 5.1 – 5.4 outline the Environmental Management Plan for the operational stage of the ongoing mining, processing plant and supporting infrastructure.

## 5.2 Roles and Responsibilities

The following is the summary of the role and responsibilities of Project / Site / Health Safety and Environmental (HSE) Manager during the operational stage of the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168:

- Act as the Employer's (Africa Huaxia Mining (Pty) Ltd) on-site project and HSE manager.
- Ensure that the Employer's responsibilities are executed in compliance with the relevant legislation (current and future Namibian legislation that may come into force, as well as International Standards) and the EMP for the Operations Stage of the mine, processing plant and supporting infrastructure.
- Training of operations and maintenance staff to raise environmental awareness so that the day-to-day operations are carried out in an environmentally responsible manner, thereby preventing or minimizing the negative effects and maximizing the positive effects of the project-related activities.
- Conduct regular (monthly) internal compliance audits. independent audits to be conducted bi-annually.
- Report to the Employer on the implementation of the EMP on site.

## 5.3 Other Supporting Teams

Project / Site / Health Safety and Environmental (HSE) Manager will require a supporting team responsible for running various activities on the ground. The following is summary of the supporting teams that recruited during the operational stage of the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168:

- Maintenance team.
- Electrical and electronic. and
- Health Safety and Environmental (HSE).
- Others such as external consultants as required.

Table 5.1: Operational EMP- Mine operation (Mining, Loading, and transporting the mined ore to the plants).

| Development Stage/ Activity | Source of impact | Impact | Mitigation | Responsible person | Time-line |
|---|---|---|---|---|---|
| **Removal of soil, gravels, and loose rock overlaying the deposit** | • Trucks, Earthmoving equipment | • Vegetation removal<br>• Dust<br>• Increased soil erosion | • The upper layer of soil contains dormant seeds for vegetation and is valuable for rehabilitation process. this layer must be stripped and stockpiled.<br>• The stockpile must be surrounded by block to prevent possibility of wind erosion and dust. Devise monitoring for wind erosion on monthly basis.<br>• Revegetate where necessary. | MM, PG, GT, CONT, ENV | Lifecycle of mine |
| **Trenching** | • Earthmoving equipment<br>• New Pits | • Land Scar<br>• Danger to inhabitant fauna, livestock<br>• Waste Rock | • Design for closure principles “Rehabilitation”<br>• Ensure stabilisation of pit walls<br>• Block access to the area<br>• Waste rock and stockpiled soil should be separated for easy rehabilitation.<br>• Refill pits with waste rock, and cover with the saved “stockpiled” top soil during ongoing rehabilitation process | MM, PG, GT, CONT, ENV | Life cycle of mine |

Table 5.1: *Cont.*

| Development Stage/ Activity | Source of impact | Impact | Mitigation | Responsible person | Time-line |
|---|---|---|---|---|---|
| **Drilling** | • Drilling machinery | • Noise and vibration (impact is dependent on proximity to settlements)<br>• Land clearing for drill sites<br>• Possible soil and water contamination by oil spills | • Drilling is to be scheduled only during day time operational hours of mining site and is limited to the demarcated zone for drilling only<br>• Revegetate where necessary<br>• Ensure good maintenance of machinery and regular check-ups for oil spills. | MM, PG, GT, CONT, ENV | • During drilling only.<br>• Life cycle of the mine<br>• |
| **Blasting of local country rocks** | Blasting | • Noise<br>• Blasting vibrations<br>• Fugitive Dust | • Nearby settlement should be notified of scheduled blasting.<br>• Careful examination of the area before blasting should be undertaken<br>• Health and Safety procedure with regard to blasting and handling of explosives should be adopted | MM, PG, GT, CONT, ENV | During blasting |

Table 5.1: *Cont.*

| Development Stage/ Activity | Source of impact | Impact | Mitigation | Responsible person | Time-line |
|---|---|---|---|---|---|
| **Loading and transporting the blasted materials to primary and secondary crushing plant** | Earthmoving equipment, Trucks | • Noise<br>• Fugitive Dust<br>• Road safety<br>• Visual impact | • Proper hearing gear must be worn where needed<br>• Dust masks should also be worn<br>• Use dust control/suppression methods, such as application of water to suppress dust<br>• Diving is only limited to the designated fixed routes, off road driving must be avoided<br>• Headlights must be switched on at all times<br>• All vehicles/ trucks moving in the mining zone should not exceed the speed of 40km/h<br>• The use of fixed routes will reduce the visual impact and minimize the need for post-mining rehabilitation of the tracks | All drivers, supervised by mine manager and Environmental Coordinator. | Life cycle of the mine |
| **Crushing plant process (Primary and Secondary crushing systems)** | • Crushing, mixing grinding, and final grinding | • Dust<br>• Noise | • Induce dust suppression mechanisms (Control of dust guidance) and dust musk should be worn at all times.<br>• Air assessment quality should be carried out throughout the lifespan of the mine, this is done to assess the likely influence of pollutants (e.g. dust, Sulphur dioxide and nitrogen oxides) from the ongoing activities<br>• Proper hearing gear should be worn at all times. | MM, ENV, GT | Life cycle of mine |

Table 5.2: Operational EMP- Plant for processing of copper ore operations.

| Development Stage/ Activity | Source of impact | Impact | Mitigation | Responsible person | Time-line |
|---|---|---|---|---|---|
| **Ore (Copper) processing plant operations** | • Leaching (EDTA)<br>• Cooling down of equipment and processing (high in TDS and TSS)<br>• Tailing Dam | • Contamination (Water Pollution)<br>• Waste<br>• Occupational Health and safety | • Measures should be developed to recycle leached solution and treatment of waste solution<br>• Safety measures should insure proper handling and treatment of effluents.<br>• Ensure treatment of processed water prior to damming or disposing<br>• Treated processed water should be recycled where needed.<br>• Design of tailing dam should ensure possibility of revegetation or rehabilitation of land used.<br>• Access to tailing dam must be restricted. | MM, PG, GT, CONT, ENV | Life cycle of mine |

Table 5.3: Operational EMP- Support service and infrastructure.

| Development Stage/ Activity | Source of impact | Impact | Mitigation | Responsible person | Time-line |
|---|---|---|---|---|---|
| • Support Service and infrastructure (Workshops and garage) | • Garage and workshop<br>• Storage facilities. Fuel storage, chemical for treatment storage, scrap metal storage.<br>• Generators | • Noise | • Proper hearing protection gear must be worn. | MM, PG, GT, CONT, ENV | Lifecycle of mine |
| | | • Pollution: Water pollution from rinse water contaminated with lube oil, wastewater (TDS and TSS). | • Any form of spillage of any toxic chemical should be reported and corrective measures undertaken<br>• Measures should be undertaken to avoid potential spillage during transfer/ handling of fuels, oils and chemicals. This should be in compliance with environmental regulations<br>• During occurrence of spillage, all spills should be cleaned up immediately together with the polluted soil and dispose off at recognized dumping site<br>• Leak and spill control plans should be implemented to ensure the above is adhered to.<br>• Diesel generators should be placed on concrete slab, the entire workshop should be lined by concrete<br>• Fuel should be stored in underground or aboveground tanks<br>• Weekly monitoring of workshop and garage is advisable | MM, PG, GT, CONT, ENV | |
| | | • Chemical leak and accidental oil and fuel spillages | | | |

Table 5.3: *Cont.*

| Development Stage/ Activity | Source of impact | Impact | Mitigation | Responsible person | Time-line |
|---|---|---|---|---|---|
| | | • Waste scrap metal | • Specifications for storage of scrap metals should be developed.<br>• Scrap metal should be removed from mine site on a regular basis and disposed off to approved disposal site, this should be done to avoid accumulation of large quantities on site<br>• Devise measures to reuse scrap metals where possible | MM, PG, GT, CONT, ENV | |

Table 5.4: Operational EMP- On-going exploration, mining and environmental monitoring.

| Development Stage/ Activity | Source of impact | Impact | Mitigation | Responsible person | Time-line |
|---|---|---|---|---|---|
| • On-going Exploration, | • Vehicle, Truck and earthmoving equipment<br>• Sampling and Drilling | • Disturbance of flora and fauna, alteration of habitat | • The Planning and design of the ongoing exploration, mining infrastructure should insure minimum impact to the environment.<br>•<br>• Exploration is limited to demarcated zone for such activity<br>•<br>• Already established routes should be used and adhered to minimise impact | MM, PG, GT, CONT, ENV | All ongoing exploration activities (lifecycle of the mine) |
| | | • Surface and groundwater | • The design and planning of exploration and mining activities should ensure that, Ephemeral River channels and discontinuities are avoided with respect to highly polluting activities. These systems are good for groundwater water recharge | MM, PG, GT, CONT, ENV | |
| | | • Pollution (fugitive dust), gas emissions and waste | • Adoption of cleaner production, pollution prevention and cleaner technology will relatively reduce impacts.<br>• Use dust control/suppression methods, such as application of water or non-toxic chemicals to minimize dust (oil and oil by-products is not a recommended measure to control road dust).<br>• Fuels such as Liquefied Petroleum Gas (LPG) should be used. LPG is non-toxic, non-corrosive, and free of tetra-ethyl lead or additives, it burns cleanly than petrol. | | |

Table 5.4: *Cont.*

| Development Stage/ Activity | Source of impact | Impact | Mitigation | Responsible person | Time-line |
|---|---|---|---|---|---|
| On-going Exploration | | • Waste | • During ongoing exploration, proper waste management practices for both Hazardous and non-hazardous waste should be enforced. No littering in the site area including access roads should be permitted.<br>• A proper waste disposal site must be developed in line with the environmental regulations | MM, PG, GT, CONT, ENV | All ongoing exploration activities (lifecycle of the mine) |
| | | • Social economic | • No mitigation proposed, the likely impacts are more positive than negative, creating job possibility thorough exploration phases of the mine | | |
| | | • Occupational health and safety | • All required operational equipment must be secured for on-going exploration and mining.<br>• An Emergency Preparedness and Response Plan is required.<br>•<br>• Sensitive or dangerous areas should be clearly marked, avoided and with restricted entry<br>•<br>• All Namibian Health and Safety Regulations should be adhered to during all mining and ongoing exploration phases.<br>•<br>• Occupational Health and Safety Training should be implemented.<br>•<br>• First Aid Kit should be available on site at all times.<br>• Use of headlights when driving through gravel roads is advised | MM, PG, GT, CONT, ENV | |

# 6. CLOSURE, REHABILITATION, AFTERCARE

## 6.1 Introduction

The closure, rehabilitation, aftercare and ongoing monitoring stage of the ongoing exploration, mining and minerals processing operations will cover all the activities that aim at restoring site and the surrounding areas to the state before the mine was created. The closure, rehabilitation, aftercare and ongoing monitoring stage will only be implemented once the mine has reached its useful life span. Although the current license period is up to 15 years, the license is renewable deepening on the availability of additional resources that extend the life of the mine.

The closure, rehabilitation, aftercare and ongoing monitoring stage will cover the removal of all structures such as the processing plant, foundation, steel works and concrete casted to hold all structures onsite. The EMP makes provisions for management of a wider array of activities that will be associated with closure, rehabilitation, aftercare and ongoing monitoring of the ongoing exploration, mining and minerals processing operations. Table 8.1 outlines the EMP framework for the decommissioning and closure stage of the ongoing monitoring of the ongoing exploration, mining and minerals processing operations in the ML No. 168.

## 6.2 Roles and Responsibilities

### 6.2.1 Employer's Representative (ER

As part of the decommissioning and closure stage, Africa Huaxia Mining (Pty) Ltd is to appoint an **Employer's Representative (ER)** with the following responsibilities:

- Act as the Employer's (Africa Huaxia Mining (Pty) Ltd) on-site project manager and implementing agent.
- Appoint the Environmental Control Officer (ECO).
- Ensure that the Employer's responsibilities are executed in compliance with the relevant legislation and the EMP for the decommissioning and closure stage.
- Ensure that all the necessary environmental authorizations and permits have been obtained for the decommissioning and closure stage.
- Assist the Contractor in finding environmentally responsible solutions to challenges that may arise (with input from the ECO).
- Should the ER be of the opinion that a serious threat to, or impact on the environment may be caused by the decommissioning and closure stage, he/she may stop work. the Employer must be informed of the reasons for the stoppage as soon as possible.
- The ER has the authority to issue fines for transgressions of basic conduct rules and/or contravention of the EMP.
- Should the Contractor or his/her employees fail to show adequate consideration for the environmental aspects related to the EMP, the ER can have person(s) and/or equipment removed from the site or work suspended until the matter is remedied.
- Report to the Employer on the implementation of this EMP on site (with input from the ECO and/or independent environmental auditor).
- Maintain open and direct lines of communication between the Employer, ECO, Contractor and I&APs with regards to environmental matters. and

- ❖ Attend regular site meetings and inspections on the progress of the decommissioning and closure process.

### 6.2.2 Environmental Control Officer (ECO)

The **Environmental Control Officer (ECO)** has the following responsibilities:

- ❖ Assist the ER in ensuring that the necessary environmental authorizations and permits have been obtained for the decommissioning and closure stage.
- ❖ Assist the ER and Contractor in finding environmentally responsible solutions to challenges that may arise.
- ❖ Conduct environmental monitoring as per EMP requirements.
- ❖ Recommend on the issuing of fines for transgressions of basic conduct rules and/or contraventions of the EMP to the ER.
- ❖ Advise the ER on the removal of person(s) and/or equipment not complying with the specifications of the EMP.
- ❖ Carry out regular site inspections (on average once per week) of all operational areas with regards to compliance with the EMP. report any non-compliance(s) to the ER as soon as possible.
- ❖ Organize for an independent internal audit on the implementation of and compliance to the EMP to be carried out half way through the decommissioning and closure stage. audit reports to be submitted to the ER.
- ❖ Organize for an independent post decommissioning and closure stage environmental audit to be carried out before decommissioning and closure stage certificates are issued by the relevant authorities.
- ❖ Continuously review the EMP and recommend additions and/or changes to the EMP document.
- ❖ Monitor the Contractor's environmental awareness training for all new personnel coming onto site.
- ❖ Keep records of all activities related to environmental control and monitoring. the latter to include a photographic record of the decommissioning and closure stage as well as environmental control and rehabilitation process, and a register of all major incidents. and
- ❖ Attend regular site meetings as part of the decommissioning and closure stage.

### 6.2.3 Contractor

The responsibilities of the **Contractor** include:

- ❖ Comply with the relevant national legislation and the EMP for the decommissioning and closure stage of the mine.
- ❖ Preparation and submission (to Africa Huaxia Mining (Pty) Ltd) of the following Management Plans:
    - o Environmental Awareness Training and Inductions.

- Emergency Preparedness and Response.
- Waste Management.
- Health and Safety, and.
- Electric and Magnetic Fields (EMF) Safety.

❖ Ensure adequate environmental awareness training for senior site personnel.

❖ Environmental awareness presentations (inductions) to be given to all site personnel prior to the decommissioning and closure stage work commencement. the ECO is to provide the course content and the following topics, at least but not limited to, should be covered:

- The importance of complying with the relevant Namibian, International and Best Practice Legislation.
- Roles and Responsibilities, including emergency preparedness.
- Basic Rules of Conduct (Do's and Don'ts).
- EMP: aspects, impacts and mitigation.
- Fines for Failure to Adhere to the EMP, and.
- Health and Safety Requirements.

❖ Record keeping of all environmental awareness training and induction presentations. and

❖ Attend regular site meetings and environmental inspections.

## 6.3 Decommissioning and Closure Stage Supporting Teams

The decommissioning and closure of the ongoing monitoring of the ongoing exploration, mining and minerals processing operations and supporting infrastructure will require an array of specialist teams working very closely with their suppliers and Africa Huaxia Mining (Pty) Ltd site operations team.

The following is a summary of some of the specialists that will be required during the decommissioning and closure stage as part of the team of contractors:

❖ Mechanical and Crane Contractors, Electrical Contractors and Civil/Structural Contractors, each with their respective Sub-contractors and Suppliers, would report directly to the Employer's Representative (ER), acting as the onsite Project Manager.

Table 6.1: Closure, Rehabilitation, Aftercare and ongoing monitoring EMP for all mining and ongoing exploration activities.

| Development Stage/ Activity | Source of impact | Impact | Mitigation | Responsible person | Time-line |
|---|---|---|---|---|---|
| Closure and Rehabilitation | • Excavated trenches, pits | Land scar | • Pits must be refilled with saved stockpiled waste rock and top soil for easy rehabilitation, no vegetation should be cleared during this operation<br>• Revegetate where necessary.<br>• All rehabilitated areas should be monitored over a 4-year period from the onset of the rehabilitation procedures. | MM, PG, GT, CONT, ENV, MET (Ministry of Environment and Tourism) | Ongoing to final Rehabilitation |
| | • Domestic and Industrial waste from mining and processing areas | All waste and unwanted material | • All remaining domestic waste and unwanted material must be collected and transported to an MET approved disposal site.<br>• All weedy species must be removed from site<br>• All scrap metal and debris must be removed and disposed off to a designated area<br>• A site contamination assessment should be conducted and any contaminated material must be disposed of at an appropriate disposal facility.<br>• | | |

Table 6.1: *Cont.*

| Development Stage/ Activity | Source of impact | Impact | Mitigation | Responsible person | Time-line |
|---|---|---|---|---|---|
| | • Support service structures – Workshop and garage,<br>• Base camp<br>• Processing plant | Abandoned structures | • All surrounding fences, workshop structures, generators and any scrap metals must be removed.<br>• All Petrol, diesel, oil and grease containers must be removed from site to a recognized storage facility.<br>• All concrete slabs must be broken loose and dumped filling some of the excavated areas and open adits. These can also be transported and dumped at an approved dumping site.<br>• Pending the approval by relevant authorities, the company may donate the remaining buildings, such as the workers quarters, office complex and the manager's house, to organizations aimed at uplifting the standards of the local communities.<br>• All access roads, tracks are to be rehabilitated | MM, PG, GT, CONT, ENV, MET | Ongoing to final Rehabilitation |
| Aftercare and Ongoing monitoring | • Rehabilitation process. | Environmental performance | • Rehabilitation process should have fulfilled goals and targets raised in the EMP in fulfilment of the provisions stated in the Environmental Management Act no. 7 of 2007. | MM, PG, GT, CONT, ENV, MET | During aftercare and ongoing monitoring. |

# 7. MONITORING AND ENVIRONMENTAL PERFORMANCE

## 7.1 Overview

The monitoring process of the EMP performances for the ongoing monitoring of the ongoing exploration, mining and minerals processing operations is divided into two parts and these are:

(i) Monitoring activities and effects to be undertaken by the Environmental Coordinator (ENV).

(ii) Preparation of an Environmental Monitoring Report covering all activities related to the Environmental Management Plan throughout the life cycle of the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 to be undertaken by the Environmental Coordinator (ENV).

## 7.2 Environmental Reporting

As part of the condition of the Environmental Contract that will be signed between the Ministry of Environment and Tourism and Africa Huaxia Mining (Pty) Ltd to be issued on final clearance of the EIA (Vol. 1 of 2) and this EMP (Vol. 2 of 2), Africa Huaxia Mining (Pty) Ltd will be required to report to the Ministry of Environment and Tourism via the Ministry of Mines and Energy, the environmental performances for every six (6) months as the new regulations may require. This is part of the ongoing environmental monitoring programme.

Environmental monitoring programme is part of the EMP performances assessments and will need to be compiled and submitted as determined by the regulators. The process of undertaking appropriate monitoring as per specific topic (Tables 7.1 - 7.8) and tracking performances against the objectives and documenting all environmental activities is part of internal and external auditing to be coordinated by the Environmental Coordinator / Consultant / Suitable qualified in-house resource person. Tables 7.1 – 7.9 outline the type of information that shall need to be recorded on a regular by the Environmental Coordinator as part of the monitoring process of the activities and the effects.

## 7.3 Environmental Monitoring

The second part of the monitoring of the EMP performance will require a report outlining all the activities related to effectiveness of the EMP at the end of the planned mineral exploration and possible test mining to be undertaken by the Environmental Coordinator. The types of the data sets to be used in the preparation of such a report are outlined in Tables 7.1 - 7.9. The objective will be to ensure that corrective actions are reviewed and steps are taken to ensure compliance for future EIA and EMP implementation.

The report shall outline the status of the environment and any likely environmental liability after completion of the ongoing monitoring of the ongoing exploration, mining and minerals processing operations. The report shall be submitted to the Ministry of Environment and Tourism via the Ministry of Mines and Energy and will represent the final closure and fulfilment of the Environmental Contract conditions to be signed between the Ministry of Environment and Tourism and the Africa Huaxia Mining (Pty) Ltd.

Table 7.1: Monitoring of environmental performance implementation / environmental awareness training.

| Mitigation | Compliance | Follow-up Action Required | By Whom | By When | Completed |
|---|---|---|---|---|---|
| Is there an Environmental awareness training programme? | Environmental Management Act no. 7 of 2007 | Ensure that all personnel before participating in the ongoing project activities attend and understand the content of the EMP. | MM, PG, CONT, ENV, MET, | During the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 | |
| How many people have been given environmental awareness training? | Environmental Management Act no. 7 of 2007 | Ensure that, all personnel on site attend the environmental awareness training programme | MM, PG, CONT, ENV. | | |
| Is a copy of the EMP on site? | Environmental Management Act no. 7 of 2007 | Regularly follow up to ensure availability of the EMP copy on site. | MM, PG, CONT, ENV. | | |
| How effective is the awareness training? Do people understand the contents of the EMP? Where are the weaknesses? Ask 3 people at random various questions about the EMP. | Environmental Management Act no. 7 of 2007 | All personnel must indicate that they understand the contents of the EMP. | MM, PG, CONT, ENV. | | |

Table 7.2: Monitoring of environmental performance for supporting infrastructure.

| Mitigation | Compliance | Follow-up Action Required | By Whom | By When | Completed |
|---|---|---|---|---|---|
| Is the supporting infrastructure positioned to avoid sensitive zones, river channels and potential archaeological sites? | • Environmental Management Act no. 7 of 2007, (MET) | Adhere to site layout plan for the designated project zones. | MM, PG, GT, CONT, MET | During the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 | |
| Has new infrastructure been created?<br>If so, what, and how well planned / built with respect to environment? | • Environmental Management Act no. 7 of 2007, (MET) | Adhere to site layout plan for the designated project zones. | MM, PG, TG,CONT, MET | | |
| Toilets been provided?<br>Where are they situated? | • Environmental Management Act no. 7 of 2007, (MET) | Adhere to site layout plan for the designated project zones. | MM, CONT, ENV | | |
| Do receptacles for waste have scavenging animal proof lids? | • Environmental Management Act no. 7 of 2007<br>• Disposal of Waste Guidance | Adhere to guidelines as mentioned in the Disposal Waste Guidance | MM, CONT, ENV | | |
| What litter is there – who is littering? | • Environmental Management Act no. 7 of 2007<br>• Disposal of Waste Guidance | Adhere to guidelines as mentioned in the Disposal Waste Guidance | MM, CONT, ENV | | |

Table 7.2: *Cont.*

| | | | | | |
|---|---|---|---|---|---|
| Are there facilities for the disposal of oils / etc and how often is it removed to an approved disposal site? | • Petroleum (Exploration and Production) Act 1991 (Act 2 of 1991) | Adhere to guidelines as mentioned in the Disposal Waste Guidance | MM, CONT, ENV, MET | During the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 | |
| Is there evidence of oil / diesel spills?<br>Bunding or not? | • Environmental Management Act no. 7 of 2007<br>• Disposal of Waste Guidance<br>• Petroleum (Exploration and Production) Act 1991 (Act 2 of 1991) | Regular monitory and compliance with effective measure to handle oil spills and contamination with soil. | MM, CONT, ENV. | | |
| What fuel source is being provided for cooking? | • Environmental Management Act no. 7 of 2007 | Adhere to Energy saving measures | MM, CONT, ENV | | |
| Housekeeping | • Environmental Management Act no. 7 of 2007 | | MM, CONT, ENV | | |

Table 7.3: Environmental data collection.

| Mitigation | Compliance | Follow-up Action Required | By Whom | By When | Completed |
|---|---|---|---|---|---|
| Are records being kept? | • Environmental Monitoring Report requirements | Regular monitoring of project site. | ENV | During the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 | |
| Have archaeological sites been found / disturbed / described? | • Environmental Monitoring Report requirements | Regular monitoring of project site. | ENV | | |

Table 7.4: Health and safety.

| Mitigation | Compliance | Follow-up Action Required | By Whom | By When | Completed |
|---|---|---|---|---|---|
| Is there First Aid Kit containing anti-histamines etc? | Health and Safety Guidance | Regular checking of First Aid Kits | MM, PG, GT, CONT, ENV | During the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 | |
| Are dangerous areas clearly marked off? | Health and Safety Guidance | Regular monitoring of sites. | MM, PG, GT, CONT, ENV. | | |
| Do vehicles appear to maintain the recommended speed limits? | • Vehicle Use and Access Guidance<br>• Health and Safety Guidance | Regular monitoring of traffic on site. | MM, PG, GT, CONT, ENV. | | |
| Do vehicles drive with headlights on along the gravel roads at all times? | • Vehicle Use and Access Guidance<br>• Health and Safety Guidance | Regular monitoring of traffic on site. | MM, PG, GT, CONT, ENV. | | |

Table 7.5: Recruitment of labour.

| Mitigation | Compliance | Follow-up Action Required | By Whom | By When | Completed |
|---|---|---|---|---|---|
| What labour source is used? | Labour Act, 2007 (Act No. 7 of 2007) | Adhere to the regulations stipulated in the labour Act. | MM, PG, CONT | During the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 | |
| How has the recruitment practice been done? | Labour Act, 2007 (Act No. 7 of 2007) | Adhere to the regulations stipulated in the labour Act. | MM, PG, CONT | | |

Table 7.6: Management of the natural habitat and surficial materials management.

| Mitigation | Compliance | Follow-up Action Required | By Whom | By When | Completed |
|---|---|---|---|---|---|
| Has there been camp development on or very close sensitive areas? | • Environmental Management Act no. 7 of 2007 | Adhere to site layout plan for designated project zones. | ENV, PG, GT, CONT. | During the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 | |
| Has anyone been caught with plants or animals in their possession? | • Environmental Management Act no. 7 of 2007<br>• Nature Conservation Ordinance 4, 1975<br>• Nature Environmental Management Guidance | Regular monitoring of project site | ENV, PG, GT, CONT. | | |
| Has there been wilful or malicious damage to the environment? | • Environmental Management Act no. 7 of 2007<br>• Nature Conservation Ordinance 4, 1975<br>• Nature Environmental Management Guidance | Regular monitoring of project site | ENV, PG, GT, CONT. | | |
| Has topsoil / seed bank layer been removed from demarcated camp, mining and exploration areas and appropriately stored? | • Environmental Management Act no. 7 of 2007<br>• Nature Conservation Ordinance 4, 1975<br>• Nature Environmental Management Guidance | Regular monitoring of project activities | ENV, PG, GT, CONT. | | |

Table 7.7: Tracks and off-road driving.

| Mitigation | Compliance | Follow-up Action Required | By Whom | By When | Completed |
|---|---|---|---|---|---|
| Are existing tracks used and maintained? | • Environmental Management Act no. 7 of 2007 | Regular monitoring | MM, PG, CONT, I&APs | During the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 | |
| What new tracks have been developed and are they planned? | • Environmental Management Act no. 7 of 2007 | • Adhere to existing access roads and tracks<br>• Regular Monitoring | MM, PG, CONT, I&APs | | |
| What evidence is there of off-road driving? Who appears to be responsible? | • Environmental Management Act no. 7 of 2007 | Regular monitoring | MM, PG, CONT, I&APs | | |
| Are corners being cut, what type of turning circle are there? Three point turns vs. U turns? | • Environmental Management Act no. 7 of 2007 | Regular monitoring | MM, PG, CONT, I&APs | | |
| Have unnecessary tracks been rehabilitated and how well? | • Environmental Management Act no. 7 of 2007 | Regular monitoring | MM, PG, CONT, I&APs | | |

Table 7.8: Management of surface and groundwater.

| Mitigation | Compliance | Follow-up Action Required | By Whom | By When | Completed |
|---|---|---|---|---|---|
| How is potable water supplied and how often? Position of tanks? | • Water Resources Management Act, 2004 (Act No. 24 of 2004)<br>• Saving Water Guidance | Regular monitoring | ENV, PG, GT, CONT | During the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 | |
| Is water being wasted? | • Water Resources Management Act, 2004 (Act No. 24 of 2004)<br>• Saving Water Guidance | Regular monitoring | ENV, PG, GT, CONT | | |
| Is there any leakage from pipes or taps? | • Water Resources Management Act, 2004 (Act No. 24 of 2004)<br>• Saving Water Guidance | Regular monitoring of pipes and taps for leakages | ENV, PG, GT, CONT | | |
| Has casing been left when boreholes hit water and have any records of water strikes been kept? Were water samples taken and RWL measured? | • Water Resources Management Act, 2004 (Act No. 24 of 2004)<br>• Saving Water Guidance | Regular monitoring and record keeping. | ENV, PG, GT, CONT | | |

Table 7.9: Public relations.

| Mitigation | Compliance | Follow-up Action Required | By Whom | By When | Completed |
|---|---|---|---|---|---|
| Have any complaints been made about the mining and exploration activities by the different I&APs? If so, what, and how was the issue resolved? | Environmental Management Act No.7 of 2007 | Create platform for I&APs to present their concerns. These should be collected and addressed accordingly. | MM, PG, GT, CONT | During the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168 | |

# 8. ENVIRONMENTAL AWARENESS

## 8.1 Africa Huaxia Mining (Pty) Ltd Environmental Policy

Table 8.2 summarises the environmental statement with respect to environmental commitment that Africa Huaxia Mining (Pty) Ltd will implement as part of the company environmental policy.

Table 8.1: Environmental statement.

| **Africa Huaxia Mining (Pty) Ltd Environmental Statement** |
|---|
| **Africa Huaxia Mining (Pty) Ltd will:**<br><br>1. Appropriate environmental care will always be exercised in accordance with the EMP during the planning and actual undertaking of the project activities in our jurisdictions.<br>2. Environmental protection measures appropriate to site-specific conditions will be applied in the absence of any legal guidance.<br>3. Promote the development of open and constructive partnerships with the all the relevant stakeholders to address environmental concerns and advance necessary protection measures.<br>4. Promote the advancement of scientific knowledge to be applied to the identification and effective resolution of real environmental problems.<br>5. Encourage pollution prevention, waste minimisation and recycling efforts.<br>6. Observance of environmental legislation will be a priority in all company activities.<br>7. Conduct audits of operations to ensure adherence to this policy and compliance to all relevant regulations. |

## 8.2 Environmental Awareness Guidance

- The Environmental Rules apply to EVERYBODY. This includes all permanent, contract, or temporary workers as well as any other person who visits the mine settlement, mining and exploration area. Any person who visits the license areas will be required to adhere to the company Environmental Code of Conduct.

- The Exploration Geologist or Site Manager will issue warnings and will discipline ANY PERSON who breaks anyone of the Environmental Rules and Procedures. Repeated and continued breaking of the Rules and Procedures will result in a disciplinary hearing and which may result in that person being asked to leave the site permanently.

- The ENVIRONMENT means the whole surroundings around us. The environment is made-up of the soil, water, air, plants and animals. and those characteristics of the soil, water, air, plant and animal life that influence human health and wellbeing, and.

- If any member of the WORK FORCE does not understand, or does not know how to keep any of Environmental Rule or Procedure, that PERSON must seek advice from the ENVIRONMENTAL COORDINATOR, PROJECT GEOLOGIST or SITE MANAGER or

CONTRACTOR. The PERSON that does not understand must keep asking until s/he is able to keep to the all the Environmental Rules and Procedures.

## 8.3 Environmental Awareness Training Guidance Materials

### 8.3.1 Control of Fires

- Never start any open fire and do not burn any vegetation.
- Do not smoke near refuelling depots or any other area where fuel, oil, solvents or paints are used or stored. Make sure that cigarette butts are put-off before throwing them into the refuse bin.
- Do NOT throw cigarette butts anyhow in the field, and.
- Immediately notify your Contractor or the Environmental Coordinator, Exploration Geologist / Site Manager if you see a fire on site.

### 8.3.2 Natural Environmental Management

- Never feed, tease or play with, hunt, kill, destroy or set devices to trap any wild animal (including birds, reptiles and mammals), livestock or pets. Do not bring any wild animal or pet to the exploration site.
- Do not pick any plant or take any animal out of the exploration area EVER. You will be prosecuted and asked to leave the project area.
- Never leave rubbish and food scraps or bones where it will attract animals, birds or insects. Rubbish must be thrown into the correct rubbish bins or bags provided.
- Protect the surface material by not driving over it unnecessarily.
- Do not drive over, build upon, or camp on any sensitive habitats for plants and animals.
- Do not cut down any part of living trees / bushes for firewood, and.
- Do not destroy bird nest, dens, burrow pits, termite hills etc or any other natural objects in the area.

### 8.3.3 Vehicle Use and Access

- Never drive any vehicle without a valid licence for that particular vehicle and do not drive any vehicle that appears not to be road-worthy.
- Never drive any vehicle when under the influence of alcohol or drugs.
- DO NOT make any new roads without permission. Stay within demarcated areas.
- Avoid U-Turns and large turning circles. 3-point turns are encouraged. Do not ever drive on rocky slopes.
- Stay on the road, do not make a second set of tracks and do not cut corners.
- DO NOT SPEED - keep to less than 60 km per hour on the tracks and site roads.
- No off-road driving is allowed.

- Vehicles may only drive on demarcated roads, and.
- Adhere to speed limits and drive with headlights switched on along any gravel road.

### 8.3.4 Control of Dust

- Do not make new roads or clear any vegetation unless instructed to do so by your Contractor or the Environmental Coordinator / Project Geologist / Site Manager, and.
- Try to disturb the surface of the natural landscape as little as possible.

### 8.3.5 Health and Safety

- Drink lots of water every day, but only from the fresh water supplies.
- Take the necessary precautions to avoid contracting the HIV/AIDS virus.
- Only enter or exit the exploration area at the demarcated gates.
- Always keep the gates as you found them.
- Any damage to the fence or gate must be report to the Environmental Coordinator / Exploration Geologist / Project Manager who will then inform the land owner of any damage with all the repairs done to the satisfaction of the land owner or Environmental Coordinator for communal land on behalf of the local community.
- Never enter any area that is out of bounds, or demarcated as dangerous or wander off without informing or permission of team leader.
- Never climb over any fence or trespass on private property without permission of the landowner or consultation with the Environmental Coordinator, Project Geologist / Site Manager.
- Report to your Contractor or the Project Geologist / Site Manager if you see a stranger or unauthorised person in the exploration area.
- Do not remove any vehicle, machinery, equipment or any other object from the exploration camp site or along the profile or at a seismic testing station without permission of your Contractor or the Project Geologist / Site Manager.
- Wear protective clothing and equipment required and according to instructions from your Contractor or the Exploration Geologist or Site Manager, and.
- Never enter or work in the mine or exploration area when under the influence of alcohol or drugs.

### 8.3.6 Preventing Pollution and Dangerous Working Conditions

- Never throw any hazardous substance such as fuel, oil, solvents, etc. into streams or onto the ground.
- Never allow any hazardous substance to soak into the soil.
- Immediately tell your Contractor or Environmental Coordinator/ Project Geologist / Site Manager when you spill, or notice any hazardous substance being spilled anywhere in the field or camp.
- Report to your Contractor or Environmental Coordinator / the Project Geologist / Site Manager when you notice any container, which may hold a hazardous substance, overflow, leak or drip.

- ❖ Immediately report to your Contractor or Environmental Coordinator / the Project Manager when you notice overflowing problems or unhygienic conditions at the ablution facilities.

- ❖ Vehicles, equipment and machinery, containers and other surfaces shall be washed at areas designated by the Contractor or Environmental Coordinator / the Project Geologist / Site Manager, and.

- ❖ If you are not sure how to transport, use, store or dispose any hazardous substance - ASK your Contractor or Environmental Coordinator / the Project Geologist / Site Manager for advice.

### 8.3.7 Saving Water

- ❖ Always use as little water as possible. Reduce, reuse and re-cycle water where possible.

- ❖ Report any dripping or leaking taps and pipes to your Contractor or Environmental Coordinator/ the Project Geologist or Site Manager, and.

- ❖ Never leave taps running. Close taps after you have finished using them.

### 8.3.8 Disposal of Waste

- ❖ Learn to know the difference between the two main types of waste, namely:

  - General Waste. and

  - Hazardous Waste.

- ❖ Learn how to identify the containers, bins, drums or bags for the different types of wastes. Never dispose of hazardous waste in the bins or skips intended for general waste or exploration rubble.

- ❖ Never burn or bury any waste on the camp or in the field.

- ❖ Never overfill any waste container, drum, bin or bag. Inform your Contractor or the Environmental Coordinator/ the Project Geologist / Site Manager if the containers, drums, bins or skips are nearly full.

- ❖ Never litter or throwaway any waste on the site, in the field or along any road. No illegal dumping, and.

- ❖ Littering is prohibited.

### 8.3.9 Religious, Cultural, Historical and Archaeological Objects

- ❖ If you find any suspected religious, cultural, historical or archeologically object or site around the campsite or in the field, you must immediately notify your Contractor or Environmental Coordinator / the Project Geologist **/** Site Manager, and.

- ❖ Never remove, destroy, interfere with or disturb any religious, cultural, historical or archaeological object or site around the campsite or in the field.

### 8.3.10 Dealing with Environmental Complaints

- ❖ If you have any complaint about dangerous working conditions or potential pollution to the environment, immediately report this to your Contractor or the Environmental Coordinator / the Project Geologist / Site Manager, and.

- ❖ If any person complains to you about noise, lights, littering, pollution, or any other harmful or dangerous condition, immediately report this to your Contractor or the Environmental Coordinator / the Site Manager.

## 8.4 Environmental Personnel Register

Table 8.2 shows the Environmental Personnel Register to be signed by every person who receives or attends the Environmental Awareness Training or who has the training material explained to him or her or in possession of the training material.

Table 8.2: Environmental personnel register.

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# 9. CONCLUSION AND RECOMMENDATION

## 9.1. Summary of the EMP

Based on the assessment of both negative and positive impacts undertaken for the ongoing exploration and mining operations, a number of positive and negative impacts have been identified. Mitigation measures for the negative impacts have been proposed and management strategies are provided in this updated Environmental Management Plan (EMP) covering the ongoing exploration, mining and minerals processing operations at the Swartmodder Mine in the ML No. 168.

## 9.2. EMP Implementation Roles and Responsibilities

The following are the recommended actions to be implemented by the Africa Huaxia Mining (Pty) Ltd as a part of the management of the impacts through implementations of the EMP:

(i) Make sure that all the required permit / authorisation / Environmental Clearance Certificate

(ii) Contract an Environmental Coordinator / Consultant / suitable in-house resources person to lead and further develop, implement and promote environmental culture through awareness raising of the workforce, contractors and sub-contractors in the field during the whole duration of the ongoing exploration and mining operations.

(iii) Provide with other support, human and financial resources, for the implementation of the proposed mitigations and effective environmental management during the planned mine project life cycle.

(iv) Develop a simplified environmental induction and awareness programme for all the workforce, contractors and sub-contractors.

(v) Where contracted service providers are likely to cause environmental impacts, these will need to identified and contract agreements need to be developed with costing provisions for environmental liabilities.

(vi) Implement internal and external monitoring of the actions and management strategies developed during the project duration and a final Environmental Monitoring report to be prepared by the Environmental Coordinator / Consultant / Suitable in-house resource person and to be submitted to the regulators as may be required or stipulated in the permit / authorisation / Environmental Clearance Certificate.

(vii) Develop and implement a monitoring programme that will fit into the overall company's Environmental Management Systems (EMS) as well as for any future EIA for drilling and production phases.

All the responsibilities to ensure that the recommendations are executed accordingly, rest with the **Africa Huaxia Mining (Pty) Ltd**. The company must provide all appropriate human and financial resources necessary for the effective implementation of this EMP. It is the responsibility of **Africa Huaxia Mining (Pty) Ltd** to make sure that all members of the workforce including contractors and subcontractors are aware of the EMP provisions and its overall objectives.

## 9.3. EMP Recommendations

It is hereby recommended that the ML 168 be issued with a new Environmental Clearance Certificate (ECC) that will be in line with the provisions of Environmental Impact Assessment Regulations (2012) and the Environmental Management Act, 2007, (Act No. 7 of 2007).