

# Hilma Jeremia (the Proponent)

MEFT ECC APPLICATION REFERENCE No. APP-003252

Final Environmental Management Plan (EMP) to support  
the Application for Environmental Clearance Certificate  
(ECC) for the Proposed Exploration Activities in the  
Exclusive Prospecting License (EPL) No. No. 8157,  
**Okahandja District, Otjozondjupa Region**

November 2021

13 Feld Street,  
P. O. Box 3489  
WINDHOEK, NAMIBIA

# PROPONENT, LISTED ACTIVITIES AND RELATED INFORMATION SUMMARY

## TYPE OF AUTHORISATIONS REQUIRING ECC

Exclusive Prospecting License (EPL) No. 8157  
for ECC for Exploration /Prospecting

## MEFT ECC APPLICATION REFERENCE No.

APP-003252

## NAME OF THE PROPONENT

Hilma Jeremia

## COMPETENT AUTHORITY

Ministry of Mines and Energy (MME)

## ADDRESS OF THE PROPONENT AND CONTACT PERSON

13 Feld Street, P. O. Box 3489

**WINDHOEK, NAMIBIA**

## CONTACT PERSON:

Fillemon Tuneeko

Supervisor: Health Safety Environment and Community (HSEC)

**Phone:** +264 61 246533

**Fax:** +264 61 246588

**Mobile:** +264 811430505 / 812856198

**Email:** ftuneeko@osinoresources.com

## PROPOSED PROJECT

Proposed Minerals Exploration / Prospecting activities in the Exclusive  
Prospecting License (EPL) No. 8157, Okahandja District, Otjozondjupa Region

## PROJECT LOCATION

Okahandja District, Otjozondjupa Region

(Latitude: -21.284167, Longitude: 17.489722)

## ENVIRONMENTAL CONSULTANTS



*Risk-Based Solutions (RBS) CC*

(Consulting Arm of Foresight Group Namibia (FGN) (Pty) Ltd)

41 Feld Street Ausspannplatz

Cnr of Lazarett and Feld Street

P. O. Box 1839, **WINDHOEK, NAMIBIA**

Tel: +264 - 61- 306058. Fax: +264 - 61- 306059

Mobile: + 264-811413229. Email: [smwiya@rbs.com.na](mailto:smwiya@rbs.com.na)

Global Office / URL: [www.rbs.com.na](http://www.rbs.com.na)

## ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Dr. Sindila Mwiya

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

## Summary Profile and Qualifications of the Environmental Assessment Practitioner (EAP) / International Resources Consultant – Dr Sindila Mwiya

Dr Sindila Mwiya has more than twenty (20) years of practical field-based technical industry experience in Environmental Assessment (SEA, EIA, EMP, EMS), Energy (Renewable and Non-renewable energy sources), onshore and offshore resources (minerals, oil, gas and water) exploration / prospecting, operation and utilisation, covering general and specialist technical exploration and recovery support, Health, Safety and Environment (HSE) permitting for Geophysical Surveys such as 2D, 3D and 4D Seismic, Gravity and Electromagnetic Surveys for mining, energy and petroleum (oil and gas) operations support, through to engineering planning, layout, designing, logistical support, recovery, production / operations, compliance monitoring, rehabilitation, closure and aftercare projects lifecycles. He continues to work internationally in the resources (mining and petroleum) and energy sectors, from permitting through to exploration and production. From the frontier regions (high risk hydrocarbons exploration zones) of South Africa and Namibia, to the prolific oil and gas fields of the Middle East, Angola and the West African Gulf of Guinea, Dr Mwiya has been directly involved in field-based aerial, ground and marine geophysical (gravity, magnetics and seismic) surveys, been onboard exploration drilling rigs, onboard production platforms, conducted public and stakeholder consultations and engagements, and worked with highly technical and well organised and committed clients and third-party teams from emerging and well established global resources and energy companies from many countries such as the UK, France, USA, Russia, Canada, Croatia, Norway, the Netherland, Spain, Brazil, China, South Africa, Equatorial Guinea, Angola and Nigeria. He is fully aware of all the competing interests and niche donation-based business environmental advocacy opportunism that exists in the resources sector from the local, regional, and international perspectives.

Through his companies, Risk-Based Solutions (RBS) and Sivieda Group Namibia (SGN) which he founded, he has undertaken more than 200 projects for Local (Namibian), Continental (Africa) and International (Global) based clients. He has worked and continues to work for Global, Continental and Namibian based reputable resources (petroleum and mining / minerals) and energy companies such as Shell Namibia B. V. Limited (Namibia/ the Netherlands), Reconnaissance Energy Africa Ltd (REN/ReconAfrica) (UK/Canada/Namibia), Debmarine (DBMN) (Namibia), Osino Resource Corporation (Canada/USA/Namibia), MEL (UK, Namibia), Dundee Precious Metals (Namibia / Canada), Headspring Investment (Namibia/ Russia), EMGS (UK/ Norway), Lepidico (Australia / UK), Best Sheer / Bohale (Namibia / China), CGG Services UK Limited (UK/ France/Namibia), BW Offshore (Norway/Singapore /Namibia), Tullow Oil (UK/Namibia), Petrobras Oil and Gas (Brazil) / BP (UK)/ Namibia, REPSOL (Spain/ Namibia), ACREP (Namibia/Angola), Preview Energy Resources (UK), HRT Africa (Brazil / USA/ Namibia), Chariot Oil and Gas Exploration (UK/ Namibia), NABIRM (USA/ Namibia), Serica Energy (UK/ Namibia), Eco (Atlantic) Oil and Gas (Canada / USA/ Namibia), ION GeoVentures (USA), PGS UK Exploration (UK), TGS-NOPEC (UK), Maurel & Prom (France/ Namibia), GeoPartners (UK), PetroSA Equatorial Guinea (South Africa / Equatorial Guinea/ Namibia), Preview Energy Resources (Namibia / UK), Sintezneftegaz Namibia Ltd (Russia/ Namibia), INA Namibia (INA INDUSTRIJA NAFTE d.d) (Croatia/ Namibia), Namibia Underwater Technologies (NUTAM) (South Africa/Namibia), InnoSun Holdings (Pty) Ltd and all its subsidiary renewable energy companies and projects in Namibia (Namibia / France), HopSol (Namibia/Switzerland), Momentous Solar One (Pty) Ltd (Namibia / Canada), OLC Northern Sun Energy (Pty) Ltd (Namibia) and more than 100 local companies. Dr Sindila Mwiya is highly qualified with extensive practical field-based experience in petroleum, mining, renewable energy (Solar, Wind, Biomass, Geothermal and Hydropower), Non-Renewable energy (Coal, Petroleum, and Natural Gas), applied environmental assessment, management, and monitoring (Scoping, EIA, EMP, EMP, EMS) and overall industry specific HSE, cleaner production programmes, Geoenvironmental, geological and geotechnical engineering specialist fields.

Dr Sindila Mwiya has undertaken and continues to undertake and manage high value projects on behalf of global and local resources and energy companies. Currently, (2020-2023) Dr Sindila Mwiya is responsible for permitting planning through to operational and completion compliance monitoring, HSE and engineering technical support for multiple major upstream onshore and offshore petroleum, minerals, and mining projects, Solar and Wind Energy Projects, manufacturing and environmentally sustainable, automated / smart and Climate Change resilient homes developments in different parts of the World including Namibia. He continues to work as a National Technical Permitting Advisor and International Resources Consultant, national Environmental Assessment Practitioner (EAP) / Environmentally Sustainable, automated / smart and Climate Change resilient homes developer, Engineering / Technical Consultant for RBS / Sivieda Group, Project Manager, Programme Advisor for the Department of Natural and Applied Sciences, Namibia University of Science and Technology (NUST) and has worked as a Lecturer, University of Namibia (UNAM), External Examiner/ Moderator, NUST, National (Namibia) Technical Advisor (Directorate of Environmental Affairs, Ministry of Environment, Forestry and Tourism / DANIDA – Cleaner Production Component) and Chief Geologist for Engineering and Environment Division, Geological Survey of Namibia, Ministry of Mines and Energy and a Field-Based Geotechnician (Specialised in Magnetics, Seismic, Gravity and Electromagnetics Exploration and Survey Methods) under the Federal Institute for Geoscience and Natural Resources (BGR) German Mineral Exploration Promotion Project to Namibia, Geophysics Division, Geological Survey of Namibia, Ministry of Mines and Energy.

He has supervised and continues to support several MScs and PhDs research programmes / projects and has been a reviewer on international, national and regional researches, plans, programmes and projects with the objective to ensure substantial local skills development, pivotal to the national socioeconomic development through the promotion of sustainable natural resources coexistence, management, development, recovery, utilisation and for development policies, plans, programmes and projects financed by governments, private investors, and Namibian development partners. Since 2006 until 2017, he has provided extensive technical support to the Department of Environmental Affairs (DEA), Ministry of Environment, Forestry and Tourism (MEFT) through GIZ in the preparation and amendments of the Namibian Environmental Management Act, 2007, (Act No. 7 of 2007), Strategic Environmental Assessment (SEA) Regulations, Environmental Impact Assessment (EIA) Regulations as well as the SEA and EIA Guidelines and Procedures all aimed at promoting effective environmental assessment and management practices in Namibia. Among his academic achievements, Dr Sindila Mwiya is a holder of a PhD within the broader fields of Engineering Geology/Geotechnical / Geoenvironmental / Environmental Engineering and Artificial Intelligence with a research thesis titled Development of a Knowledge-Based System Methodology (KBSM) for the Design of Solid Waste Disposal Sites in Arid and Semiarid Environments, MPhil/PG Cert and BEng (Hons) (Engineering Geology and Geotechnics) qualifications from the University of Portsmouth, School of Earth and Environmental Sciences, United Kingdom. During the 2004 Namibia National Science Awards, organised by the Namibian Ministry of Education, and held in Windhoek, Dr Sindila Mwiya was awarded the Geologist of the Year for 2004, in the professional category. Furthermore, as part of his professional career recognition, Dr Sindila Mwiya is a life member of the Geological Society of Namibia, Consulting member of the Hydrogeological Society of Namibia and a Professional Engineer registered with the Engineering Council of Namibia.

# Contents List

<b>NON-TECHNICAL SUMMARY</b> .....	<b>VI</b>
<b>1. BACKGROUND</b> .....	<b>- 1 -</b>
1.1 INTRODUCTION .....	- 1 -
1.2 PROPOSED SCOPE OF WORK.....	- 1 -
1.3 REGULATORY REQUIREMENTS .....	- 2 -
1.4 LOCATION, LAND USE, INFRASTRUCTURE AND SERVICES.....	- 2 -
1.4.1 <i>Location and Land Use</i> .....	- 2 -
1.4.2 <i>Supporting Infrastructure and Services</i> .....	- 3 -
1.5 SUMMARY OF THE RECEIVING ENVIRONMENT .....	- 3 -
1.5.1 <i>Climate</i> .....	- 3 -
1.5.2 <i>Topography</i> .....	- 8 -
1.5.3 <i>Habitats and Ecosystem</i> .....	- 9 -
1.5.4 <i>Geology</i> .....	- 9 -
1.5.5 <i>Water</i> .....	- 9 -
1.5.6 <i>Socioeconomic</i> .....	- 10 -
1.5.7 <i>Archaeology, Historical and Cultural Resources</i> .....	- 10 -
<b>2. OBJECTIVES OF THE EMP</b> .....	<b>- 11 -</b>
2.1 SUMMARY OBJECTIVES .....	- 11 -
2.2 EMP MANAGEMENT LINKAGES .....	- 11 -
2.3 SUMMARY OF IMPACT ASSESSMENT RESULTS.....	- 11 -
2.3.1 <i>Summary of Impacts Assessment Methodology</i> .....	- 11 -
2.3.2 <i>Summary of Impact Assessment Results</i> .....	- 11 -
2.4 IMPLEMENTATION OF THE EMP.....	- 24 -
2.4.1 <i>Roles and Responsibilities</i> .....	- 24 -
2.4.2 <i>Proponent's Representative (PR) / Project Manager (PM)</i> .....	- 24 -
2.4.3 <i>Project Health, Safety and Environment (Project HSE)</i> .....	- 24 -
2.4.4 <i>Contractors and Subcontractors</i> .....	- 25 -
<b>3. EMP MITIGATION MEASURES</b> .....	<b>- 26 -</b>
3.1 HIERARCHY OF MITIGATION MEASURES IMPLEMENTATION .....	- 26 -
3.2 MITIGATION MEASURES IMPLEMENTATION.....	- 26 -
<b>4. REHABILITATION COMMITMENTS</b> .....	<b>- 43 -</b>
4.1 REHABILITATION PROCESS.....	- 43 -
4.2 MONITORING OF THE ENVIRONMENTAL PERFORMANCE.....	- 44 -
4.2.1 <i>Rehabilitation Evaluation and Performance Monitoring</i> .....	- 44 -
4.2.2 <i>Overall Environmental Performance Monitoring and Reporting</i> .....	- 45 -
<b>5. CONCLUSION AND RECOMMENDATION</b> .....	<b>- 47 -</b>
5.1 CONCLUSIONS.....	- 47 -
5.2 RECOMMENDATIONS.....	- 47 -
5.3 SUMMARY TOR FOR TEST MINING AND MINING STAGES .....	- 48 -

## List of Figures

Figure 1.1:	Regional location of the EPL No 8157 Area. ....	- 4 -
Figure 1.2:	Detailed regional location of the EPL 8157 showing all the corner coordinates .....	- 5 -
Figure 1.3:	Regional location and national road network of the EPL 8157 .....	- 6 -
Figure 1.4:	Private commercial farmland covered by the EPL 8157 .....	- 7 -
Figure 1.5:	A network of the public and private farmlands roads that may be used to access the EPL 8157 area .....	- 8 -
Figure 2.1:	RBS Schematic presentation of Namibia's Environmental Assessment Procedure. ....	- 12 -

## List of Tables

Table 2.1:	Summary of the proposed activities, alternatives and key issues considered during the Environmental Assessment (EA) process covering Scoping, EIA and EMP Processes. ....	- 13 -
Table 2.2:	Results of the sensitivity assessment of the receptors (Physical, Socioeconomic and Biological environments) with respect to the proposed exploration / prospecting activities. ....	- 14 -
Table 2.3:	Results of the scored time period (duration) over which the impact is expected to last. ....	- 16 -
Table 2.4:	Results of the scored geographical extent of the induced change. ....	- 18 -
Table 2.5:	Results of the qualitative scale of probability occurrence. ....	- 20 -
Table 2.6:	Significant impact assessment matrix for the proposed exploration activities. ....	- 22 -
Table 3.1:	Project planning and implementation. ....	- 28 -
Table 3.2:	Implementation of the EMP .....	- 28 -
Table 3.3:	Public and stakeholders relations.....	- 29 -
Table 3.4:	Measures to enhance positive socioeconomic impacts. ....	- 29 -
Table 3.5:	Environmental awareness briefing and training.....	- 30 -
Table 3.6:	Creation of supporting exploration infrastructure. ....	- 30 -
Table 3.7:	Use of existing access roads, tracks and general vehicle movements. ....	- 31 -
Table 3.8:	Mitigation measures for preventing flora and ecosystem destruction and promotion of conservation.....	- 32 -
Table 3.9:	Mitigation measures for preventing faunal and ecosystem destruction and promotion of conservation.....	- 33 -
Table 3.10:	Mitigation measures to be implemented with respect to the exploration camps and exploration sites. ....	- 34 -
Table 3.11:	Mitigation measures for surface and groundwater protection as well as general water usage. ....	- 35 -
Table 3.12:	Mitigation measures to minimise negative socioeconomic impacts. ....	- 36 -
Table 3.13:	Mitigation measures to minimise health and safety impacts. ....	- 37 -
Table 3.14:	Mitigation measures to minimise visual impacts.....	- 38 -
Table 3.15:	Mitigation measures to minimise vibration, noise and air quality. ....	- 39 -
Table 3.16:	Mitigation measures for waste (solid and liquid) management. ....	- 40 -
Table 3.17:	Rehabilitation plan. ....	- 41 -
Table 3.18:	Environmental data collection. ....	- 42 -

# NON-TECHNICAL SUMMARY

## 1. Background

**Hilma Jeremia** (the “**Proponent**”) has applied for mineral rights under the Exclusive Prospecting License (EPL) No. 8157 with respect to base and rare metals, industrial minerals, dimension stone and precious metals groups (<http://portals.flexicadastre.com/Namibia>). The physical license of the EPL 8157 will only be granted by the Mining Commissioner in the Ministry of Mines and Energy (MME) once the Proponent has obtained an Environmental Clearance Certificate (ECC) from the Environmental Commissioner in the Ministry of Environment, Forestry and Tourism (MEFT).

The EPL 8157 is in the Okahandja District, Otjozondjupa Region. The EPL 8157 has a total area of 99286 Ha and covers the following commercial privately owned farmlands: Ovakokorero, Emmabrun, Twee Koppies, Gembok, Nooitgedag, Erindi Osombaka, Winterhoek, Swartmodder, Fries Land, Alkmaar, Amigo, Okapanda, Okatjeru, Kamonbonde, Hinbrechts, Klein Okatjeru, Graspan, Woltemade, Okatjitambi, Stormberg, Goedgeluk, Buffelsjag, Weiveld, Sannaspost, George, Kameelputt, Hortensia, Euodia, Prinshoek, Klawerjas, Kalkhoch, Okatjetswambo, Engondo, Otjongo, Hartebeestteich Suid, Engaruwau-west and Rema.

The Proponent intends undertake exploration activities covering desktop studies, followed by site-specific activities on targets that may be delineated and using exploration techniques/ methods such as geophysical surveys, geological mapping, trenching, drilling and bulk sampling for laboratory testing.

The proposed exploration 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). This Environmental Management Plan (EMP) report has been prepared by Risk-Based Solutions (RBS) CC to support the application for ECC for the proposed exploration activities. The preparation of this EMP Reports is based on the outcomes of the Environmental Impact Assessment (EIA)

The environmental impacts that the proposed exploration activities and associated infrastructures and facilities will have on the receiving environment (physical, biological and socioeconomic) will depend on the extent of the proposed activities over the development area, management of the area and how the mitigations as detailed in this EMP report are eventually implemented by the Proponent.

## 2. Summary of the Proposed Mitigation Measures

Avoiding sensitive habitats such as Ephemeral River channels, rock heads and mountainous terrains as well as track discipline (including not killing/poaching of fauna and unnecessarily cutting down of trees) must be adhered to and/or enforced at all times. Mitigation measures shall be implemented as detailed in this EMP report and includes the following:

1. Project planning and implementation.
2. Implementation of the EMP.
3. Public and stakeholders relations.
4. Measures to enhance positive socioeconomic impacts.
5. Environmental awareness briefing and training.
6. Erection of supporting exploration infrastructure.
7. Use of existing access roads, tracks and general vehicle movements.
8. Mitigation measures for preventing flora destruction.
9. Mitigation measures for preventing faunal destruction.

10. Mitigation measures to be implemented with respect to the exploration camps and exploration sites.
11. Mitigation measures for surface and groundwater protection as well as general water usage.
12. Mitigation measures to minimise negative socioeconomic impacts.
13. Mitigation measures to minimise health and safety impacts.
14. Mitigation measures to minimise visual impacts.
15. Mitigation measures to minimise vibration, noise and air quality.
16. Mitigation measures for waste (solid and liquid) management.
17. Rehabilitation plan, and.
18. Environmental data collection.

### **3. Conclusions and Recommendations of the EMP**

Based on the findings of the EIA and the mitigation measures provided in this EMP Report, it is hereby recommended that the proposed exploration activities be issued with an Environmental Clearance Certificate (ECC). The following is the summary of the key conditions that shall be implemented by the Proponent for the proposed project activities:

- (i) The Proponent will undertake to implement the conditions of the Access Agreements to be concluded with the owners of the land as may be required to support the proposed exploration activities.
- (ii) The proponent shall implement and adhere to all the provisions of this EMP report.
- (iii) Mitigation measures shall be implemented as detailed in this EMP report.
- (iv) Rehabilitation must be always undertaken in consultation with the land owners.
- (v) The Proponent shall adhere to all the applicable national regulations and standards as well as Good International Industry Practice (GIIP) that defines leading industry best practices as provided for in the Equator Principles and International Finance Corporation (IFC) environmental management guidelines and frameworks, and.
- (vi) The Proponent shall adopt the precautionary approach / principles in instances where baseline information, national or international guidelines or mitigation measures have not been provided or do not sufficiently address the site-specific project impact.

The following are the recommended actions (roles and responsibility) to be implemented by the Proponent as a part of the management of the impacts through implementations of this EMP Report:

- (i) Appoint an Environmental Control Officer 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 proposed project.
- (ii) Provide with other support, human and financial resources, for the implementation of the proposed mitigations, rehabilitation plans and effective environmental management during the planned mine project life cycle.
- (iii) Develop a simplified environmental induction and awareness programme for all the workforce, contractors and sub-contractors.

- (iv) Where contracted service providers are likely to cause environmental impacts, these will need to be identified and contract agreements need to be developed with costing provisions for environmental liabilities.
- (v) 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 Control Officer and to be submitted to the regulators, and.
- (vi) 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 related to the expansion of the current delineated resources or development of completely new mine site within the EPL area.

All the responsibilities to ensure that the recommendations and provisions of this EMP Report are executed accordingly, rest with the Proponent. The Proponent shall provide all appropriate resource requirements for the implementation of this EMP as well as an independently managed (not directly controlled by the Proponent) funding instrument for rehabilitation and associated environmental liabilities.

It is the responsibility of the Proponent to make sure that all members of the workforce including contractors and subcontractors are aware of the provisions of this EMP and its objectives. It is hereby recommended that the Proponent take all the necessary steps to implement all the recommendations of this EMP for the successful execution of the proposed exploration programme.

All the liabilities for environmental damage or damage to any existing public or private property or infrastructure rests with the Proponent.



# 1. BACKGROUND

## 1.1 Introduction

Hilma Jeremia, the Proponent, holds mineral rights under Exclusive Prospecting License (EPL) No. 8157. The following is the summary of the EPL 8157 (Annexes 1 and 2):

- ❖ **Type of License:** Exclusive Prospecting License (EPL) No. 8157 covering subsurface rights.
- ❖ **Authorised Activities:** Prospecting / explorations for subsurface solid state minerals resources.
- ❖ **EPL Holder and Proponent:** Hilma Jeremia.
- ❖ **EPL Status:** Proponent has been granted the Preparedness to Grant the EPL 8157 by the Mining Commissioner in the Ministry of Mines and Energy (MME) on which the application for Environmental Clearance Certificate (ECC) is being made. The physical license for the EPL 8157 will only be granted by the Mining Commissioner once the Proponent has obtained an ECC from the Environmental Commissioner in the Ministry of Environment, Forestry and Tourism (MEFT).
- ❖ **Commodities:** Base and rare metals, industrial minerals, dimension stone and precious metals groups, and.
- ❖ **Size of the EPL:** 99286 Ha.

The Proponent intends to conduct prospecting activities and looking specifically at greenfield areas, historically not known to have minerals potential or no detailed exploration has taken place in some these areas. The Proponent has signed an Agreement with Osino Gold Exploration (Pty) Ltd that will fund the proposed prospecting programme.

## 1.2 Proposed Scope of Work

Under an EPL 8158 regime, the Proponent is only authorised by the Ministry of Mines and Energy to conduct prospecting, not mining. Mining is undertaken under a separate authorisation called a Mining License (ML) which is only granted if an applicant has discovered and proved that the discovered minerals deposit is viable and can be developed into a profitable mine.

The following is the summary of the proposed minerals exploration activities:

- (i) Initial desktop exploration activities covering the review of existing information and all previous prospecting activities undertaken in the general area in order identify any potential target/s. This initial stage will also include the purchase and interpretation of the existing Government high resolution airborne geophysical data sets. No field-based visit or activities undertaken at this stage.
- (ii) Regional reconnaissance assessment covering field-based activities such as regional mapping and sampling to identify and verify potential targeted areas as delineated during the desktop stage (i) above. This stage is only undertaken if stage (i) has found some potential targets needing further investigation / verification. Alternatively, the licence is abandoned if no potential target is found.
- (iii) Initial local field-based activities such as widely spaced geological mapping, sampling, surveying and possible widely spaced trenching and drilling to test the viability of any delineated local target based on the regional data collected under (ii) above. The level or depth of investigation undertaken at this stage is subject to finding a viable / potential minerals deposit that need to be defined. Alternatively, the licence is abandoned if the identified target/s proves not viable, and.

- (iv) Detailed local field-based activities such as localised site-specific detailed geological mapping, trenching, bulk sampling, surveying, and detailed drilling to determine the feasibility of the delineated local targets. If the detailed exploration activities lead to positive results, the exploration data collected will then be put together into a prefeasibility report and if the prefeasibility results prove positive, a detailed feasibility study supported by detailed site-specific drilling, bulk sampling and laboratory testing will be undertaken on the identified site-specific area. A positive feasibility study will be required to support the application for a Mining License (ML) together with a new site-specific Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) with specialist site-specific studies such as flora, fauna, socioeconomic, water, traffic, dust, and noise modelling and archaeology being undertaken to support the application for the new ECC for mining and minerals process operations (opening a mine).

Currently, there no minerals deposits or target known to exist within the EPL 8158 area and the Proponent intend to conduct prospecting activities as part of the search for economic minerals deposits based on the testing of the developed theoretical geological and minerals depositional models. There is no guarantee whatsoever that the proposed prospecting activities will find economic minerals resources that could led to the development of a mine. To find the targets, the company will buy airborne geophysical data (magnetics and radiometric) held by the Ministry of Mines and Energy, and the data will be processed and using this information, the Proponent will look for possible targets. The targets will then be visited to see how the surface looks like if possible collect surface samples (Geochemical sampling) followed by further field-based assessments such as geological mapping to validating the airborne-based data delineated targets.

### **1.3 Regulatory Requirements**

The proposed prospecting activities are listed in the Environmental Management Act, 2007, (Act No. 7 of 2007) and the EIA Regulations, 2012 and cannot be undertaken without an Environmental Clearance Certificate (ECC). The Proponent is required to have undertaken Environmental Assessment comprising this Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports for the proposed minerals prospecting activities.

In fulfilment of the environmental requirements, the Proponent appointed Risk-Based Solutions (RBS) CC as the Environmental Consultants led by Dr Sindila Mwiya as the Environmental Assessment Practitioner in the preparation of the EIA and EMP Reports in order to support the application for ECC.

### **1.4 Location, Land Use, Infrastructure and Services**

#### **1.4.1 Location and Land Use**

The EPL 8157 is in the Okahandja District, Otjozondjupa Region. The EPL 8157 has a total area of 99286 Ha and covers the following commercial privately owned farmlands (Figs. 1.2-1.4): Ovakokorero, Emmabrun, Twee Koppies, Gemsbok, Nooitgedag, Erindi Osombaka, Winterhoek, Swartmodder, Fries Land, Alkmaar, Amigo, Okapanda, Okatjeru, Kamonbonde, Hinbrechts, Klein Okatjeru, Graspan, Woltemade, Okatjitambi, Stormberg, Goedgeluk, Buffelsjag, Weiveld, Sannaspost, George, Kameelputt, Hortensia, Euodia, Prinshoek, Klawerjas, Kalkhoch, Okatjetswambo, Engondo, Otjongo, Hartebeestteich Suid, Engaruwau-west and Rema.

The land uses of the EPL area and surrounding general area is mainly centred on commercial agriculture including cattle, small stock, and game farming linked to tourism and trophy hunting operations (Figs. 1.2-1.4). Irrigated crop farming operations are also increasingly being adopted despite limited water supply challenges in the local areas. Bush thickening or encroachment is viewed as an economic problem in the general area.

The land use of the minerals licence area is mainly dominated by commercial cattle and small stock agriculture. Bush thickening or encroachment is viewed as an economic problem in the general area with an estimated 4,000 to 12,000 plants/ha – mainly *Acacia mellifera* being the dominant problematic species (Bester 2001, Cunningham 1998, Mendelsohn et al. 2002).

The area is not part of the communal conservancy system in Namibia with no protected area nearby the mineral license.

## **1.4.2 Supporting Infrastructure and Services**

The EPL area is accessible along the minor roads C30, D2120, D2125, 2124, and 2128 (Figs. 1.2 -1.4). Within the EPL 8157 area, few local tracks and private farm roads linked main public roads may be used to access the EPL area. Private minor roads may require high clearance 4 x 4 vehicles and may only be used with permission from the land owners (Fig. 1.5).

The following supporting infrastructures and services will be required if detailed field-based studies such as geological mapping, trenching, or drilling need to be conducted following the delineation of potential targets requiring field verifications and / or investigations:

- (i) External and internal roads network: The Proponent will use the already existing external and internal road networks during the exploration phase.
- (ii) Water supply: Raw water will be sourced from local groundwater resources. The Proponent will utilise the existing boreholes with permission from the land owners. The exploration activities such as drilling operations will require limited water resources which could also be supplied by a tanker truck.
- (iii) Energy: The proposed exploration operations will use diesels and solar energy as may be required for exploration equipment and lighting, respectively, and.
- (iv) Accommodation and other supporting facilities and services: The exploration team will utilise the existing accommodation facilities and services in the area. In absence of such facilities and services, the Proponent will provide onsite camping accommodation and supporting portable infrastructures such as chemical toilets as well as other requirements as may be applicable. The establishment of an exploration camp will only be done with the permission of the land owner.

If, required, field-based exploration activities will only be conducted once an Access Agreement has been concluded with the affected land owner/s.

## **1.5 Summary of the Receiving Environment**

### **1.5.1 Climate**

The EPL area receives summer rainfall which is brought by northeast winds, generally from October to April. The average rainfall varies considerably and ranges between 380 mm and 450 mm. The mean annual gross evaporation is between 3000 mm - 3200 mm.

The numbers of rainfall events expressed as an annual average in days as determined from the regional data is 10-30 days. The sun shines for an annual average of 10 hours a day.

The annual mean temperature for Otjiwarongo area is around 24°C with the mean monthly temperatures ranging between 23°C to 14°C throughout the year. Based on regional data sets, temperatures at 08h00, 14h00 and 20h00 are estimated to be around 14°C, 24°C and 18°C respectively.

Seasonal variations in the wind fields are presented by the average wind data for January, April, July and October. An increase in the north to north-easterly winds during summer (January) and autumn (April) is likely.

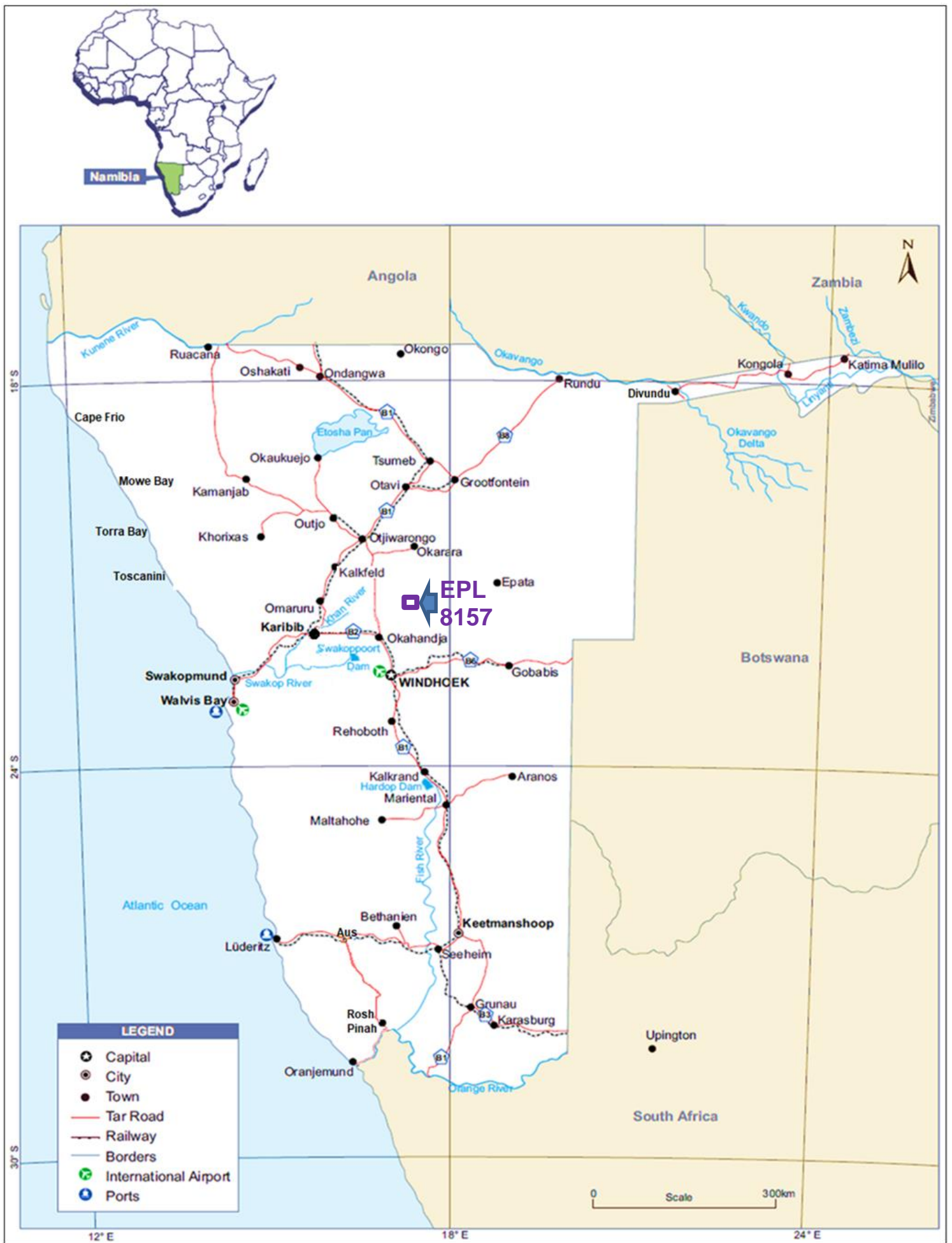


Figure 1.1: Regional location of the EPL No 8157 Area.

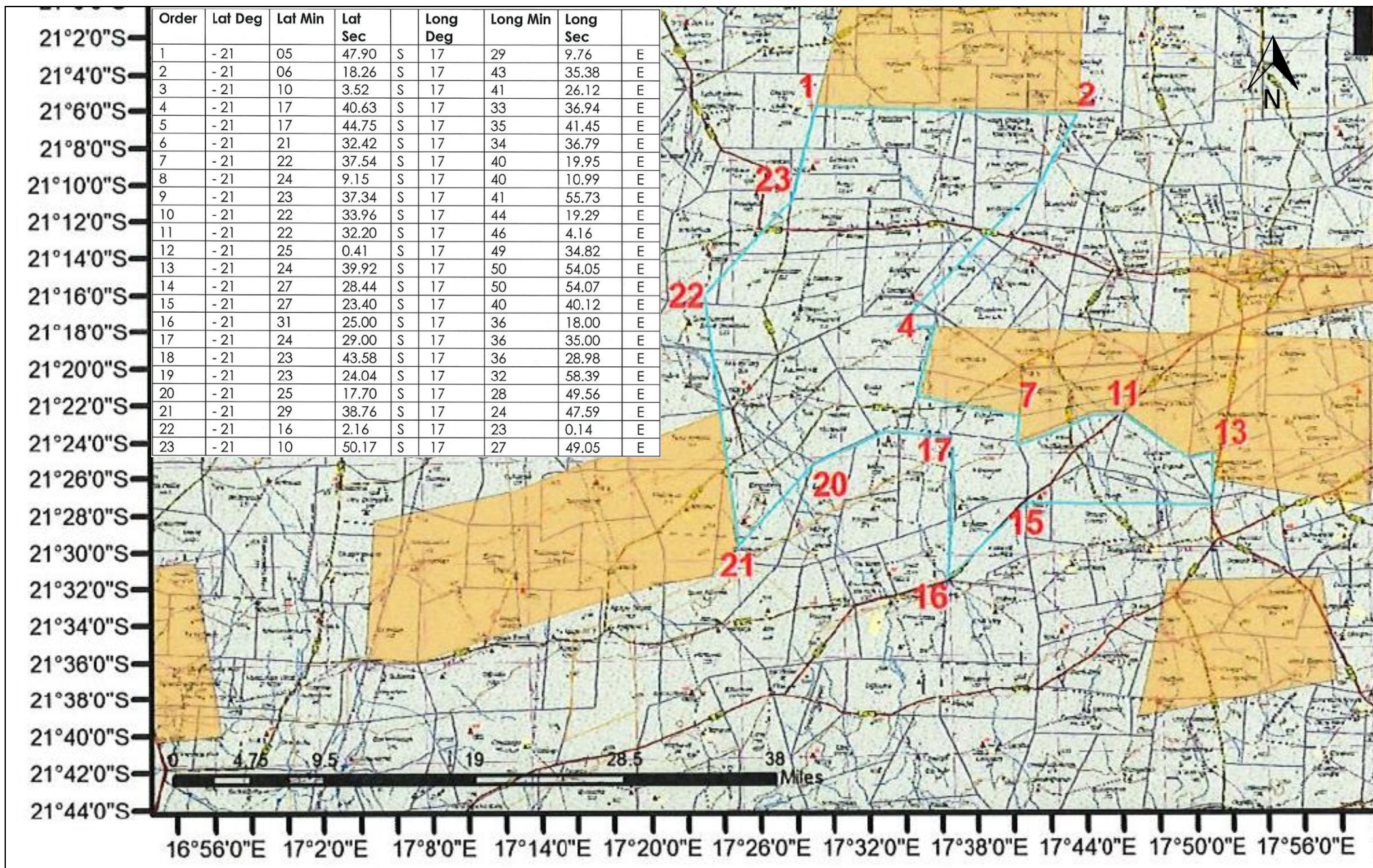


Figure 1.2: Detailed regional location of the EPL 8157 showing all the corner coordinates (Source: MME, 2021).

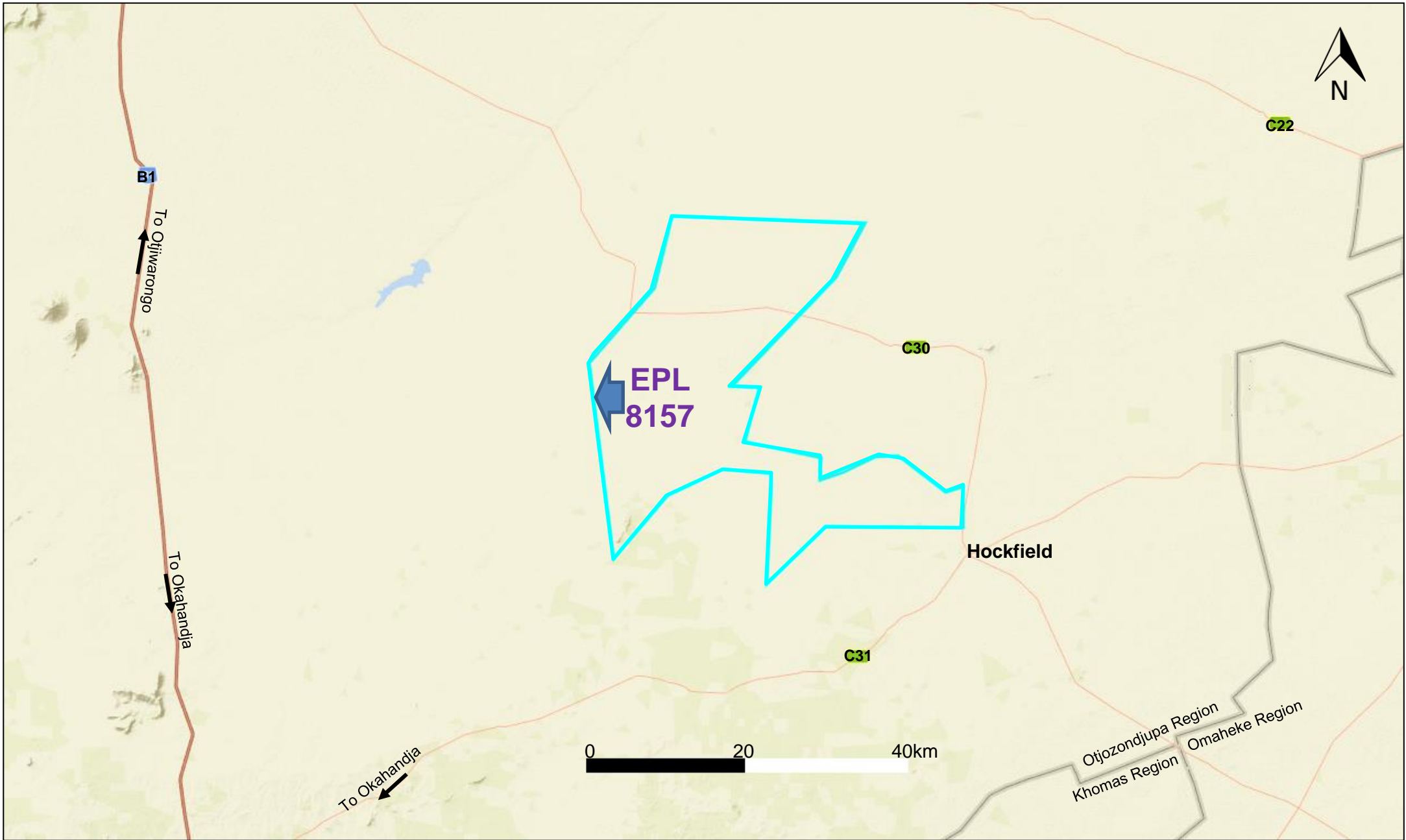


Figure 1.3: Regional location and national road network of the EPL 8157 (Source: <http://portals.flexicadastre.com/Namibia>).



Figure 1.4: Private commercial farmland covered by the EPL 8157 (Source: Namibia 1:1000000 Registration Divisions Extract).

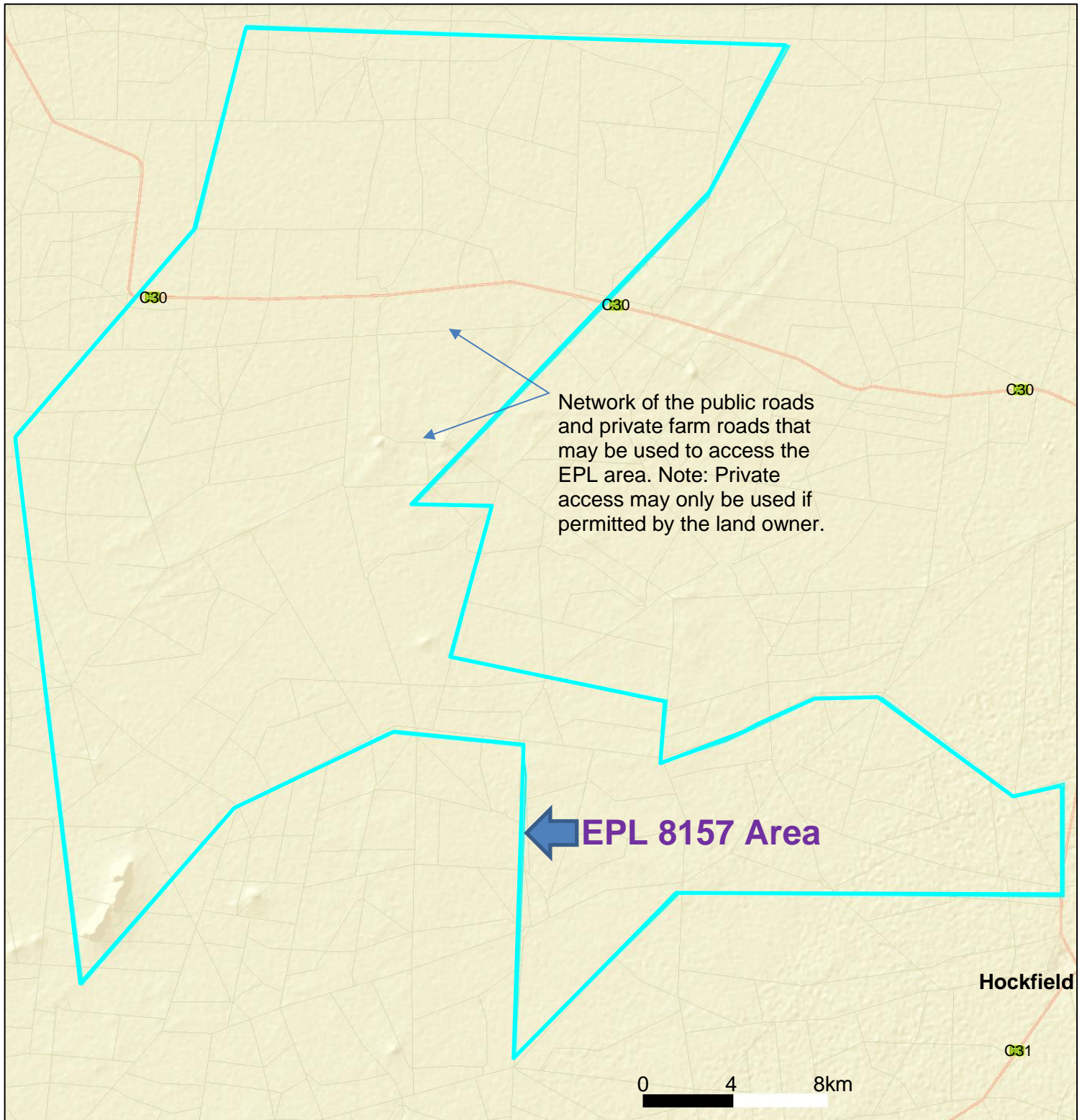


Figure 1.5: A network of the public and private farmlands roads that may be used to access the EPL 8157 area (Source: <http://portals.flexicadastre.com/Namibia>).

## 1.5.2 Topography

The local landscape is characterised by general flat topography with minor valleys created by local Ephemeral River cutting the EPL. Ephemeral Rivers are key habitats and are a vital link to the local ecosystems. Other land use activities found in the general surrounding areas includes: agriculture, minerals exploration and growing tourism activities.



### 1.5.3 Habitats and Ecosystem

The EPL 8158 falls within the Thornbush shrubland dominated by *Acacia mellifera*, *Acacia reficiens*, *Acacia fleckii*, *Boscia albitrunca*, *Lonchocarpus nelsii* and *Acacia erioloba* (Fig. 1.5). It is estimated that at least 77 reptile, 9 amphibian, 84 mammal, 208 bird species (breeding residents), at least 79-110 larger trees and shrubs and up to 111 grasses are known to or expected to occur in the general Otjiwarongo area of which a high proportion (e.g. 35.1% endemic reptiles) are endemics.

The most important areas in the general EPL 8158 area are:

- (i) **Protected species:** The protected tree species – *Acacia erioloba*, *Albizia anthelmintica*, *Aloe litoralis*, *Boscia albitrunca* and *Ziziphus mucronata* – are viewed as the most important if found within the EPL particularly around any targeted site-specific development area (Figs. 1.4 and 1.5), and.
- (ii) **Rocky area / rock heads:** Rocky areas generally have high biodiversity and consequently viewed as important habitat for all vertebrate fauna and flora. Mountains and inselbergs are generally considered as sites of special ecological importance high in biotic richness and endemism (Curtis and Barnard 1998). Hills/ridges in particular have unique fauna – e.g. *Pachydactylus* and *Rhoptropus* species – and flora – e.g. *Aloe asperifolia*, *A. namibensis*, various *Commiphora* species, etc.
- (iii) **Ephemeral drainage lines:** Ephemeral drainage lines usually support larger trees and consequently viewed as important habitat for all vertebrate fauna and flora. Ephemeral rivers are viewed as sites of special ecological importance mainly for its biotic richness; large desert-dwelling mammals; high value for human subsistence and tourism (Curtis and Barnard 1998). Such vegetated rivers in an otherwise extreme arid environment are unique habitat and a virtual lifeline to many desert dwelling faunas. Temporary rainwater pools and seeps are also known to occur in some of the major Ephemeral Rivers making these habitats a virtual lifeline to various desert dwelling fauna, and.

The general EPL area is regarded as “moderate to high” in overall (all terrestrial species) diversity and endemism (Mendelsohn *et al.* 2002). According to Simmons (1998b) central Namibia has between 161-200 endemic vertebrates (all vertebrates included).

The overall diversity and abundance of large herbivorous mammals (big game) is viewed as “high” with 7-8 species while the overall diversity of large carnivorous mammals (large predators) is determined at 4 species with leopard and cheetah being the most important with “high” densities followed by brown hyena with “medium” densities (Mendelsohn *et al.* 2002).

### 1.5.4 Geology

The EPL 8158 Area falls within the eastern part of the southern Central Zone of the north-easterly trending intracontinental branch of the Pan-African Damara orogenic belt, just north of the Okahandja lineament (Roesener, *et al.*, 2004 and Miller 2008). According to Miller, (1992), the Damara rocks were deposited during successive phases of rifting, spreading, subduction and continental collision. Much of the basal succession (Nosib Group), laid down in or marginal to intracontinental rifts, consists of quartzite, arkose, conglomerate, phyllite, calc-silicate and subordinate limestone and evaporitic rocks. Local alkaline ignimbrite with associated subvolcanic intrusions ranges from 840 to 720 million years in age.

### 1.5.5 Water

According to the Department of Water Affairs and Forestry, (2001) and the regional and local geology, the EPL 8158 falls within an area with very limited economic groundwater water resources (aquifers). Water supply in the general area is from local groundwater resources (Department of Water Affairs, 2001). The proposed project activities (exploration programme) will utilise local groundwater resources. No site-specific hydrogeological specialist study, groundwater modelling or water sampling and testing

activities have been undertaken for this study. Some parts of the EPL area are covered by local fractured, fissured, karstified and porous rocks that seems to have localised moderate groundwater potential. The overall water vulnerability to pollution as a result of the proposed exploration as well as other existing activities is moderate.

### **1.5.6 Socioeconomic**

Locally, the EPL 8158 falls within Omatako Constituency with population of 17, 619. The exploration area has a relatively low population density of 0.7 /km<sup>2</sup> and Omatako Constituency is the least populated constituency in Otjozondjupa Region. The household main income in Omatako constituency are: Farming, wages and salaries, cash remittance business, non-farming and pension.

### **1.5.7 Archaeology, Historical and Cultural Resources**

The EPL area is likely to evidence from the early colonial period relates to mining in the general area and a combination of trade, missionary activity and indigenous tribes use of iron for various applications. Early colonial remains are expected to be relatively abundant on EPL 8158, although it is likely that if these are related to historical mining activity, they will form part of the general area of mining interest in the vicinity. It is expected that the area of interest will be extensively disturbed and that little might remain of either pre-colonial or early colonial sites in the near vicinity. The Proponent must not disturb major natural shelters or cavities that may be unearthed because they could hold some highly significant historical or cultural sites that would require detailed documentation and possibly mitigation measures

## **2. OBJECTIVES OF THE EMP**

### **2.1 Summary Objectives**

This EMP provides a detailed plan of actions required in the implementation of the mitigation measures for minimising and maximising the identified negative and positive impacts respectively. The EMP also provides the management actions with roles and responsibilities requirements for the successful implementation of environmental management strategies by Proponent.

### **2.2 EMP Management Linkages**

The mitigation measures described in this EMP report are based on the impacts assessment results detailed in the EIA Report. The EMP must be continuously updated during the implementation of the proposed project activities and throughout the project lifecycle. This EMP Reports incorporates the provisions of the Namibian Environmental regulations and policies as well as international environmental best practices in mining development, operational, rehabilitation, closure and aftercare activities.

### **2.3 Summary of Impact Assessment Results**

#### **2.3.1 Summary of Impacts Assessment Methodology**

The EIA and EMP process used for this project took into considerations the provisions of the Environmental Impact Assessment (EIA) Regulations, 2012 and the Environmental Management Act (EMA), 2007, (Act No. 7 of 2007) as outlined in Fig. 2.1.

The Proponent intends undertake exploration activities covering desktop studies, followed by site-specific activities on targets that may be delineated and using exploration techniques/ methods such as geophysical surveys, geological mapping, trenching, drilling, bulk sampling and test mining. The detailed outline of all the activities associated with each of the exploration stages as sources of potential environmental impacts are outlined in Table 2.1. The impact assessment methodology adopted a two-dimensional matrix approach in predicting the potential impacts of the proposed project on the receiving environment. The two-dimensional matrix consisted of the following cross-referencing (Tables 2.2 and 2.3):

- ❖ The activities linked to the project that could have an impact on the receiving environment, and.
- ❖ The existing environmental and social conditions that could possibly be affected by the project.

The impact assessment considerations included land disturbance/land use impacts. potential impacts to specially designated areas. impacts to soil, water and air resources. impacts to vegetation, wildlife, wildlife habitat, and sensitive species. visual, cultural, paleontological, socioeconomic and potential impacts from hazardous materials are provided in the EIA Report.

#### **2.3.2 Summary of Impact Assessment Results**

In order to determine the likely environmental impacts as well as the overall significant impacts of individual sources associated with the proposed exploration activities within the EPL area (Table 2.1), an impact identification and assessment process was undertaken as detailed in this report. Details of the impact assessment results, definitions, methodology as well as the baseline \ receiving environment are provided in the EIA Report.

As detailed in the EIA Report, the significant impact identification and assessment processes focused on the evaluation of the influences of the proposed project activities pathways and the likely targets or receptor (receiving environment). In this process, components of the project activities that are likely to impact the natural environment (physical, biological and socioeconomic) were broken down into individual development stages and activities.

The summary of the overall impact and significant impact assessment results as detailed in the EIA Report associated with the proposed activities / sources of potential impacts with respect to the receiving environment that could potentially be affected are presented in Tables 2.2-2.4 and Table 2.5 respectively.

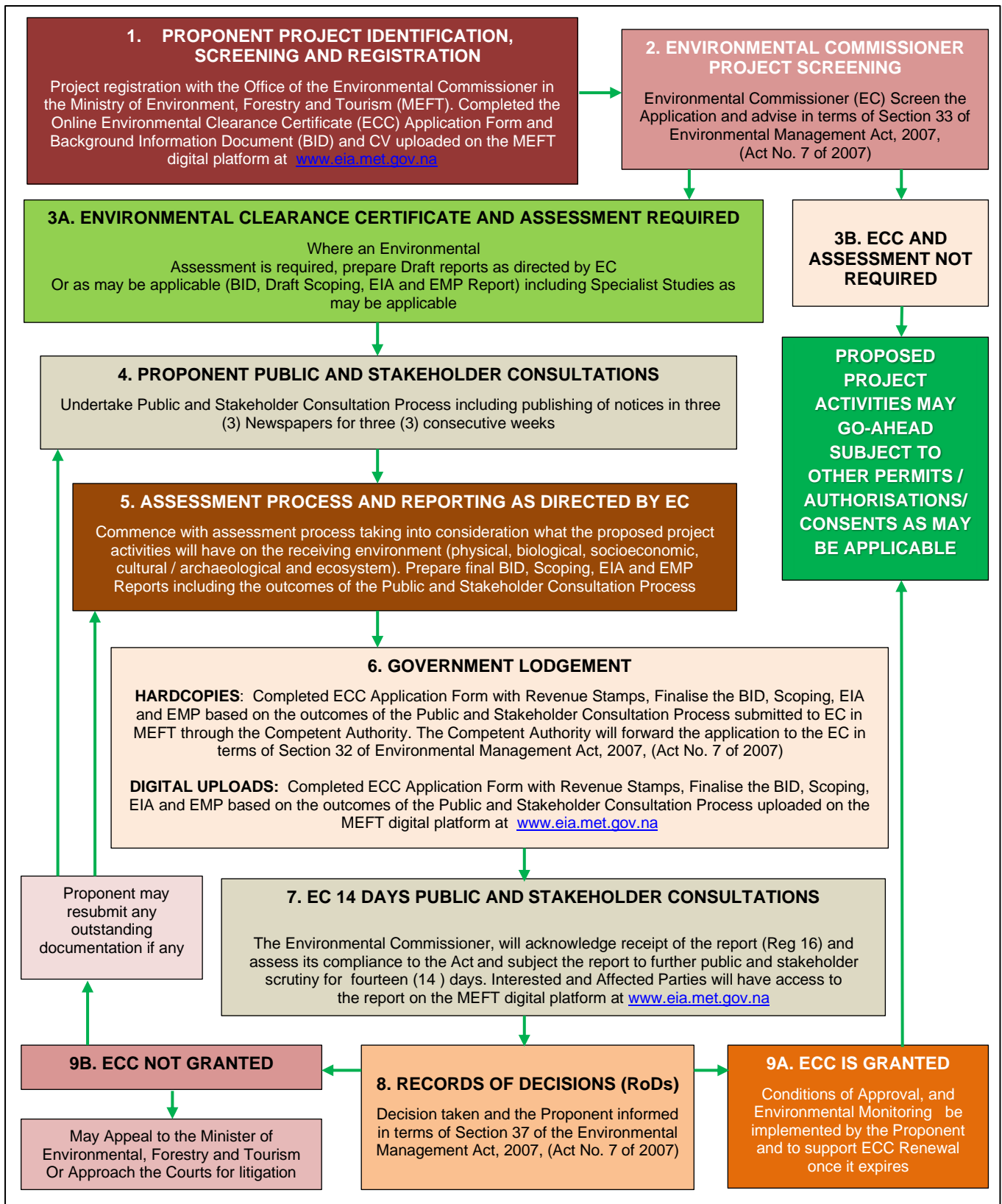


Figure 2.1: RBS Schematic presentation of Namibia's Environmental Assessment Procedure.

Table 2.1: Summary of the proposed activities, alternatives and key issues considered during the Environmental Assessment (EA) process covering Scoping, EIA and EMP Processes.

PROJECT ACTIVITIES		ALTERNATIVES CONSIDERED	Key Issues to be Evaluated and Assessed with Environmental Management Plan (EMP) / Mitigation Measures Developed	
1. <b>Project Implementation and Initial Desktop Exploration Activities</b>	Review of existing information and all previous activities in order identify any potential target/s in within the EPL Area	(i) Location for Minerals Occurrence: A number of economic deposits are known to exist in different parts of Namibia and some have been explored by different companies over the years. The proponent intends to explore / prospect for possible economic minerals occurrence in the EPL area as licensed. Minerals occurrence is linked to the geology or local rock outcrops and site-specific.	Potential land use conflicts / opportunities for coexistence between proposed exploration and other existing land uses such as conservation, tourism and agriculture	
	2. <b>Regional Reconnaissance Field-Based</b>		Reginal mapping and sampling to identify and verify potential targeted areas based on the recommendations of the desktop work undertaken under (1) above	PHYSICAL ENVIRONMENT
3. <b>Initial Local Field-Based Activities</b>			May include: Widely spaced geological mapping, sampling, surveying and possible trenching and drilling in order to determine the viability of any delineated local target/s	
	4. <b>Detailed Local Field-Based Activities on Delineated Targets If Any</b>		Following the delineation of potential target/s, conduct detailed mapping, trenching, sampling, surveying and drilling in order to determine the viability of the project.	SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT
5. <b>Prefeasibility and Feasibility Studies</b>			Assess the viability of any delineated local target/s and more detailed mapping, trenching, bulk sampling, drilling and test mining activities where applicable. If the project proves viable, a feasibility report and application for Mining License will be undertaken.	

Table 2.2: Results of the sensitivity assessment of the receptors (Physical, Socioeconomic and Biological environments) with respect to the proposed exploration / prospecting activities.

RECEPTOR SENSITIVITY			PHYSICAL ENVIRONMENT					BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT						
SENSITIVITY RATING		CRITERIA	Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources	
1	Negligible	The receptor or resource is resistant to change or is of little environmental value.																	
2	Low	The receptor or resource is tolerant of change without detriment to its character, is of low environmental or social value, or is of local importance.																	
3	Medium	The receptor or resource has low capacity to absorb change without fundamentally altering its present character, is of high environmental or social value, or is of national importance																	
4	High	The receptor or resource has moderate capacity to absorb change without significantly altering its present character, has some environmental or social value, or is of district/regional importance.																	
5	Very High	The receptor or resource has little or no capacity to absorb change without fundamentally altering its present character, is of very high environmental or social value, or is of international importance.																	
1. Initial Desktop Exploration Activities	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	(iii) Purchase and analysis of existing Government aerial hyperspectral	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2. Regional Reconnaissance Field-Based Activities	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Table 2.2: Cont.

RECEPTOR SENSITIVITY			PHYSICAL ENVIRONMENT					BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT					
SENSITIVITY RATING		CRITERIA	Water Quality	Physical Infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
1	Negligible	The receptor or resource is resistant to change or is of little environmental value.																
2	Low	The receptor or resource is tolerant of change without detriment to its character, is of low environmental or social value, or is of local importance.																
3	Medium	The receptor or resource has low capacity to absorb change without fundamentally altering its present character, is of high environmental or social value, or is of national importance																
4	High	The receptor or resource has moderate capacity to absorb change without significantly altering its present character, has some environmental or social value, or is of district/regional importance.																
5	Very High	The receptor or resource has little or no capacity to absorb change without fundamentally altering its present character, is of very high environmental or social value, or is of international importance.																
3. Initial Local Field-Based Activities	(i)	Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(ii)	Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(iii)	Ground geophysical survey (Subject to the positive outcomes of i and ii above)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(iv)	Possible Trenching (Subject to the outcomes of i - iii above)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(v)	Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(vi)	Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4. Detailed Local Field-Based Activities	(i)	Access preparation and related logistics to support activities	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	(ii)	Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(iii)	Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(iv)	Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
5. Prefeasibility and Feasibility Studies	(i)	Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	(ii)	Detailed drilling and bulk sampling and testing for ore reserve calculations	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	(iii)	Geotechnical studies for mine design	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	(iv)	Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(v)	EIA and EMP to support the ECC for mining operations	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(vi)	Preparation of feasibility report and application for Mining License	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Table 2.3: Results of the scored time period (duration) over which the impact is expected to last.

RECEPTOR SENSITIVITY		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT											
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources							
<table border="1"> <thead> <tr> <th>SCALE</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>T</td> <td>Temporary</td> </tr> <tr> <td>P</td> <td>Permanent</td> </tr> </tbody> </table>		SCALE	DESCRIPTION	T	Temporary	P	Permanent																	
SCALE	DESCRIPTION																							
T	Temporary																							
P	Permanent																							
<b>1. Initial Desktop Exploration Activities</b>	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	(iii) Purchase and analysis of existing Government aerial hyperspectral	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
<b>2. Regional Reconnaissance Field-Based Activities</b>	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						



Table 2.3: Cont.

DURATION OF IMPACT		PHYSICAL ENVIRONMENT					BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT					
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
SCALE		DESCRIPTION															
T		Temporary															
P		Permanent															
<b>3. Initial Local Field-Based Activities</b>	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iv) Possible Trenching (Subject to the outcomes of i - iii above)	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
<b>4. Detailed Local Field-Based Activities</b>	(i) Access preparation and related logistics to support activities	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
<b>5. Prefeasibility and Feasibility Studies</b>	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iii) Geotechnical studies for mine design	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(v) EIA and EMP to support the ECC for mining operations	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(vi) Preparation of feasibility report and application for Mining License	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T

Table 2.4: Results of the scored geographical extent of the induced change.

GEOGRAPHICAL EXTENT OF IMPACT		PHYSICAL ENVIRONMENT					BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT																	
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources												
<table border="1"> <thead> <tr> <th>SCALE</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>limited impact on location</td> </tr> <tr> <td>O</td> <td>impact of importance for municipality</td> </tr> <tr> <td>R</td> <td>impact of regional character</td> </tr> <tr> <td>N</td> <td>impact of national character</td> </tr> <tr> <td>M</td> <td>impact of cross-border character</td> </tr> </tbody> </table>		SCALE	DESCRIPTION	L	limited impact on location	O	impact of importance for municipality	R	impact of regional character	N	impact of national character	M	impact of cross-border character																
SCALE	DESCRIPTION																												
L	limited impact on location																												
O	impact of importance for municipality																												
R	impact of regional character																												
N	impact of national character																												
M	impact of cross-border character																												
<b>1. Initial Desktop Exploration Activities</b>	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
	(ii) Purchase and analysis of existing Government high resolution magnetic and radiometric geophysical data	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
	(iii) Purchase and analysis of existing Government aerial hyperspectral	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
<b>2. Regional Reconnaissance Field-Based Activities</b>	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												

Table 2.4: Conti.

GEOGRAPHICAL EXTENT OF IMPACT		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT				SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT																		
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources													
<table border="1"> <thead> <tr> <th>SCALE</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>limited impact on location</td> </tr> <tr> <td>O</td> <td>impact of importance for municipality</td> </tr> <tr> <td>R</td> <td>impact of regional character</td> </tr> <tr> <td>N</td> <td>impact of national character</td> </tr> <tr> <td>M</td> <td>impact of cross-border character</td> </tr> </tbody> </table>		SCALE	DESCRIPTION	L	limited impact on location	O	impact of importance for municipality	R	impact of regional character	N	impact of national character	M	impact of cross-border character																	
SCALE	DESCRIPTION																													
L	limited impact on location																													
O	impact of importance for municipality																													
R	impact of regional character																													
N	impact of national character																													
M	impact of cross-border character																													
<b>3. Initial Local Field-Based Activities</b>	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
	(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
	(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
	(iv) Possible Trenching (Subject to the outcomes of i - iii above)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
	(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
	(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L												
<b>4. Detailed Local Field-Based Activities</b>	(i) Access preparation and related logistics to support activities	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L													
	(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L													
	(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L													
	(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L													
<b>5. Prefeasibility and Feasibility Studies</b>	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L													
	(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L													
	(iii) Geotechnical studies for mine design	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L													
	(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L													
	(v) EIA and EMP to support the ECC for mining operations	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L													
	(vi) Preparation of feasibility report and application for Mining License	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L													

Table 2.5: Results of the qualitative scale of probability occurrence.

IMPACT PROBABILITY OCCURRENCE		PHYSICAL ENVIRONMENT					BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT																	
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources												
<table border="1"> <thead> <tr> <th>SCALE</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Extremely unlikely (e.g. never heard of in the industry)</td> </tr> <tr> <td>B</td> <td>Unlikely (e.g. heard of in the industry but considered unlikely)</td> </tr> <tr> <td>C</td> <td>Low likelihood (egg such incidents/impacts have occurred but are uncommon)</td> </tr> <tr> <td>D</td> <td>Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)</td> </tr> <tr> <td>E</td> <td>High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)</td> </tr> </tbody> </table>		SCALE	DESCRIPTION	A	Extremely unlikely (e.g. never heard of in the industry)	B	Unlikely (e.g. heard of in the industry but considered unlikely)	C	Low likelihood (egg such incidents/impacts have occurred but are uncommon)	D	Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)	E	High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)																
SCALE	DESCRIPTION																												
A	Extremely unlikely (e.g. never heard of in the industry)																												
B	Unlikely (e.g. heard of in the industry but considered unlikely)																												
C	Low likelihood (egg such incidents/impacts have occurred but are uncommon)																												
D	Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)																												
E	High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)																												
<b>1. Initial Desktop Exploration Activities</b>	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A												
	(ii) Purchase and analysis of existing Government high resolution magnetic and radiometric geophysical data	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A												
	(iii) Purchase and analysis of existing Government aerial hyperspectral	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A												
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A												
<b>2. Regional Reconnaissance Field-Based Activities</b>	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A												
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A												
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A												
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A												
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A												

Table 2.5: Cont.

IMPACT PROBABILITY OCCURRENCE		PHYSICAL ENVIRONMENT					BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT					
SCALE	DESCRIPTION	Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
A	Extremely unlikely (e.g. never heard of in the industry)																
B	Unlikely (e.g. heard of in the industry but considered unlikely)																
C	Low likelihood (egg such incidents/impacts have occurred but are uncommon)																
D	Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)																
E	High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)																
<b>3. Initial Local Field-Based Activities</b>	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	(iv) Possible Trenching (Subject to the outcomes of i - iii above)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
<b>4. Detailed Local Field-Based Activities</b>	(i) Access preparation and related logistics to support activities	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
<b>5. Prefeasibility and Feasibility Studies</b>	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	(iii) Geotechnical studies for mine design	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	(v) EIA and EMP to support the ECC for mining operations	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	(vi) Preparation of feasibility report and application for Mining License	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

Table 2.6: Significant impact assessment matrix for the proposed exploration activities.

SIGNIFICANT IMPACT						PHYSICAL ENVIRONMENT					BIOLOGICAL ENVIRONMENT				SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT						
IMPACT SEVERITY [ Magnitude, Duration, Extent, Probability ]	RECEPTOR CHARACTERISTICS (SENSITIVITY)					Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
	Very High (5)	High(4)	Medium (3)	Low (2)	Negligible (1)																
Very High (5)	Major [5/5]	Major [4/5]	Moderate [3/5]	Moderate [2 /5]	Minor 1/5																
High (4)	Major [5/4]	Major [4/4]	Moderate [3/4]	Moderate [2/4]	Minor[1/4]																
Medium (3)	Major [5/3]	Moderate[4/3]	Moderate[3/3]	Minor[2/3]	None[1/3]																
Low (2)	Moderate [5/2]	Moderate[4/2]	Minor[3/2]	None[2/2]	None[1/2]																
Negligible (1)	Minor [5/1]	Minor [4/1]	None [3/1]	None [2/1]	None [1/1]																
<b>1. Initial Desktop Exploration Activities</b>	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	
	(iii) Purchase and analysis of existing Government aerial hyperspectral	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	
<b>2. Regional Reconnaissance Field-Based Activities</b>	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	

Table 2.6: Cont.

SENSITIVITY						PHYSICAL ENVIRONMENT					BIOLOGICAL ENVIRONMENT				SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT						
IMPACT SEVERITY <small>Magnitude, Duration, Extent, Probability</small>	RECEPTOR CHARACTERISTICS (SENSITIVITY)					Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
	Very High (5)	High(4)	Medium (3)	Low (2)	Negligible (1)																
Very High (5)	Major [5/5]	Major [4/5]	Moderate [3/5]	Moderate [2 /5]	Minor 1/5																
High (4)	Major [5/4]	Major [4/4]	Moderate [3/4]	Moderate [2/4]	Minor[1/4]																
Medium (3)	Major [5/3]	Moderate[4/3]	Moderate[3/3]	Minor[2/3]	None[1/3]																
Low (2)	Moderate [5/2]	Moderate[4/2]	Minor[3/2]	None[2/2]	None[1/2]																
Negligible (1)	Minor [5/1]	Minor [4/1]	None [3/1]	None [2/1]	None [1/1]																
3. Initial Local Field-Based Activities	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	
	(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	
	(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	
	(iv) Possible Trenching (Subject to the outcomes of i - iii above)	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	
	(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	
	(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	
4. Detailed Local Field-Based Activities	(i) Access preparation and related logistics to support activities	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	3/2	3/2	3/2	3/2	3/2	2/2	2/2	2/2	2/2	2/2	
	(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	3/2	3/2	3/2	3/2	3/2	2/2	2/2	2/2	2/2	2/2	
	(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	
	(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	3/2	3/2	3/2	3/2	2/2	2/2	2/2	2/2	2/2	
5. Prefeasibility and Feasibility Studies	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	
	(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	
	(iii) Geotechnical studies for mine design	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	
	(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	
	(v) EIA and EMP to support the ECC for mining operations	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	
	(vi) Preparation of feasibility report and application for Mining License	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	

## 2.4 Implementation of the EMP

### 2.4.1 Roles and Responsibilities

Management of the environmental elements that may be affected by the different activities of the proposed exploration is an important element of the proposed exploration activities. 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 exploration activities may have on the receiving environment (physical and biological environments).

### 2.4.2 Proponent's Representative (PR) / Project Manager (PM)

The Proponent is to appoint a **Proponent's Representative (PR) / Project Manager (PM)** with the following responsibilities with respect to the EMP implementation:

- ❖ Act as the site project manager and implementing agent.
- ❖ Ensure that the Proponent's responsibilities are executed in compliance with the relevant legislation.
- ❖ Ensure that all the necessary environmental authorizations and permits have been obtained.
- ❖ Assist the exploration contractor/s in finding environmentally responsible solutions to challenges that may arise.
- ❖ Should the PR be of the opinion that a serious threat to, or impact on the environment may be caused by the exploration activities, he/she may stop work. the Proponent must be informed of the reasons for the stoppage as soon as possible.
- ❖ The PR has the authority to conduct disciplinary proceedings in accordance with the company policies and national legislation requirements and provisions 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 PR can have person(s) and/or equipment removed from the site or work suspended until the matter is remedied.
- ❖ Maintain open and direct lines of communication between the landowners and Proponent, as well as any other identified Interested and Affected Parties (I&APs) with regards to environmental matters, and.
- ❖ Attend regular site meetings and inspections as may be required for the proposed exploration programme.

### 2.4.3 Project Health, Safety and Environment (Project HSE)

The Proponent is to appoint a Project Health, Safety and Environment (Project HSE) with the following responsibilities with respect to the EMP implementation:

- ❖ Assist the PR in ensuring that the necessary environmental authorizations and permits have been obtained.
- ❖ Assist the PR and Contractor in finding environmentally responsible solutions to challenges that may arise.
- ❖ Conduct environmental monitoring as per EMP requirements.



- ❖ Carry out regular site inspections (on average once per week) of all exploration areas with regards to compliance with the EMP. report any non-compliance(s) to the PR 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 each field-based exploration activity. audit reports to be submitted to the PR.
- ❖ Continuously review the EMP and recommend additions and/or changes to the EMP document.
- ❖ Monitor the Contractor's environmental awareness training.
- ❖ Keep records of all activities related to environmental control and monitoring, the latter to include a photographic record of the exploration activities, rehabilitation process, and a register of all major incidents, and.
- ❖ Attend regular site meetings.

#### 2.4.4 Contractors and Subcontractors

The responsibilities of the **Contractors and Subcontractors** that may be appointed by the Proponent to undertake certain field-based activities of the proposed exploration programme include:

- ❖ Comply with the relevant legislation and the EMP provision.
- ❖ Preparation and submission to the Proponent through the Project HSE of the following Management Plans:
  - Environmental awareness training and inductions.
  - Emergency preparedness and response.
  - Waste management, and.
  - Health and safety.
- ❖ Ensure adequate environmental awareness training for senior site personnel.
- ❖ Environmental awareness presentations (inductions) to be given to all site personnel prior to work commencement. the Project HSE 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 EMP provisions.
  - Roles and responsibilities, including emergency preparedness.
  - Basic rules of conduct (do's and don'ts).
  - EMP: aspects, impacts and mitigation.
  - Conduct disciplinary proceedings in accordance with the company policies and national legislation requirements and provisions for transgressions 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.

### **3. EMP MITIGATION MEASURES**

#### **3.1 Hierarchy of Mitigation Measures Implementation**

A hierarchy of methods for mitigating significant adverse effects has been adopted in order of preference and as follows:

- (i) Enhancement, e.g. provision of new habitats.
- (ii) Avoidance, e.g. sensitive design to avoid effects on ecological receptors.
- (iii) Reduction, e.g. limitation of effects on receptors through design changes, and.
- (iv) Compensation, e.g. community benefits.

#### **3.2 Mitigation Measures Implementation**

The Environmental Management Plan (EMP) provides a detailed plan of action required in the implementation of the mitigation measures for minimising and maximising the identified negative and positive impacts respectively.

The EMP also provides the management actions with roles and responsibilities requirements for implementation of environmental management strategies by the Proponent through the Contractors and Subcontractors who will be undertaking the exploration activities.

The EMP gives commitments including financial and human resources provisions for effective management of the likely environmental liabilities during and after the implementation of the proposed exploration programme.

Based on the findings of the EIA, key mitigation measures as detailed in Tables 3.1 – 3.18 have been prepared to be implemented by the Proponent with respect to the proposed exploration programme activities and in particular for the field-based exploration activities. The following is the summary of the key areas of the migration measures provided in Tables 3.1-3.18:

1. Project planning and implementation.
2. Implementation of the EMP.
3. Public and stakeholders relations.
4. Measures to enhance positive socioeconomic impacts.
5. Environmental awareness briefing and training.
6. Erection of supporting exploration infrastructure.
7. Use of existing access roads, tracks and general vehicle movements.
8. Mitigation measures for preventing flora destruction.
9. Mitigation measures for preventing faunal destruction.
10. Mitigation measures to be implemented with respect to the exploration camps and exploration sites.
11. Mitigation measures for surface and groundwater protection as well as general water usage.
12. Mitigation measures to minimise negative socioeconomic impacts.

13. Mitigation measures to minimise health and safety impacts.
14. Mitigation measures to minimise visual impacts.
15. Mitigation measures to minimise vibration, noise and air quality.
16. Mitigation measures for waste (solid and liquid) management.
17. Rehabilitation plan, and.
18. Environmental data collection.

Table 3.1: Project planning and implementation.

OBJECTIVES	INDICATOR	SCHEDULE	RESPONSIBILITY
<p>Establish a strong environmental awareness protocol from project implementation to final closure in order to ensure the least possible impact to the environment.</p>	<ol style="list-style-type: none"> <li>1. Resources (Human and Financial) are provided for the Environmental Awareness and Training, Regular Safety, Health and Environment meetings and for internal and external Environmental Monitoring Costs as well as for any rehabilitation costs that may arise.</li> <li>2. Appointment of a senior and experienced persons as Proponent's Representative (PR), Project Manager (PM) and Project HSE to assume responsibility for environmental issues.</li> <li>3. All individuals including sub-contractors who work on, or visit, the sites are aware of the contents of the Environmental Policy and the EMP.</li> <li>4. The EMP and Environmental Policy will be included in Tender Documents.</li> <li>5. Field visit will take place during which main access tracks will be discussed in cooperation with the land owner/s</li> </ol>	<ol style="list-style-type: none"> <li>1. Regional reconnaissance field-based mapping and sampling activities.</li> <li>2. Initial local field-based mapping and sampling activities.</li> <li>3. Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>4. Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Proponent's Representative (PR)</li> <li>(ii) Project Manager (PM)</li> <li>(iii) Project HSE</li> <li>(iv) Contractor</li> <li>(v) Subcontractors</li> </ol>

Table 3.2: Implementation of the EMP.

IMPLEMENTATION STRATEGY	INDICATOR	SCHEDULE	RESPONSIBILITY
<ol style="list-style-type: none"> <li>1. Define roles and responsibilities in terms of the EMP. To make all personnel, contractors and subcontractors aware of these roles and responsibilities to ensure compliance with the EMP provisions.</li> <li>2. Implement environmental management that is preventative and proactive.</li> <li>3. Establish the resources, skills, etc. required for effective environmental management.</li> </ol>	<ol style="list-style-type: none"> <li>1. Senior staff and senior contractors are aware of, and practice the EMP requirements. These persons shall be expected to know and understand the objectives of the EMP and will, by example, encourage suitable environmentally friendly behaviour to be adopted during the exploration</li> <li>2. Recognition will be given to appropriate environmentally acceptable behaviour.</li> <li>3. Inappropriate behaviour will be corrected. An explanation to why the behaviour is unacceptable must be given, and, if necessary, the person will be disciplined. e.g. fees set out for non-compliance</li> </ol>	<ol style="list-style-type: none"> <li>(i) Regional reconnaissance field-based mapping and sampling activities.</li> <li>(ii) Initial local field-based mapping and sampling activities.</li> <li>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>(iv) Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Proponent's Representative (PR)</li> <li>(ii) Project Manager (PM)</li> <li>(iii) Project HSE</li> <li>(iv) Contractor</li> <li>(v) Subcontractors</li> </ol>

Table 3.3: Public and stakeholders relations.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Maintain sound relationships with the other land users/ land owner/s and another stakeholders / public	<ol style="list-style-type: none"> <li>Always consult and obtain consent from land owners</li> <li>No littering or any other activity prohibited</li> <li>Permission to utilise water as well as all applicable permits are obtained.</li> </ol>	<ol style="list-style-type: none"> <li>Regional reconnaissance field-based mapping and sampling activities.</li> <li>Initial local field-based mapping and sampling activities.</li> <li>Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>Proponent's Representative (PR)</li> <li>Project Manager (PM)</li> <li>Project HSE</li> <li>Contractor</li> <li>Subcontractors</li> </ol>

Table 3.4: Measures to enhance positive socioeconomic impacts.

IMPLEMENTATION STRATEGY	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<p>Measures to enhance positive socioeconomic impacts in order to:</p> <ol style="list-style-type: none"> <li>Avoid exacerbating the influx of unemployed people to the area.</li> <li>Develop a standardised recruitment method for sub-contractor and field workers.</li> </ol>	<ol style="list-style-type: none"> <li>Stipulate a preference for local contractors in its tender policy. Preference to local contractors should still be based on competitive business principles and salaries and payment to local service providers should still be competitive.</li> <li>Develop a database of local businesses that qualify as potential service providers and invite them to the tender process.</li> <li>Scrutinise tender proposals to ensure that minimum wages were included in the costing.</li> <li>Stipulate that local residents should be employed for temporary unskilled/skilled and where possible in permanent unskilled/skilled positions as they would reinvest in the local economy.</li> <li>Must ensure that potential employees are from the area, they need submit proof of having lived in the area for a minimum of 5 years.</li> <li>Must ensure that contractors adhere to Namibian Affirmative Action, Labour and Social Security, Health and Safety laws. This could be accomplished with a contractual requirement stipulating that monthly proof should be submitted indicating payment of minimum wages to workers, against their ID numbers, payment of social security and submission of affirmative action data.</li> <li>Encouraged to cater for the needs of employees to increase the spending of wages locally.</li> </ol>	<ol style="list-style-type: none"> <li>Regional reconnaissance field-based mapping and sampling activities.</li> <li>Initial local field-based mapping and sampling activities.</li> <li>Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>Proponent's Representative (PR)</li> <li>Project Manager (PM)</li> <li>Project HSE</li> <li>Contractor</li> <li>Subcontractors</li> </ol>

Table 3.5: Environmental awareness briefing and training.

IMPLEMENTATION STRATEGY	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<p>Implement environmental awareness briefing / training for individuals who visit, or work, on site.</p>	<ol style="list-style-type: none"> <li>1. Every senior/supervisory member of the team shall familiarise themselves with the contents of the EMP. They shall understand their roles and responsibilities with regard to personnel and project compliance with the EMP.</li> <li>2. Subject to agreement of the parties, the Environmental Coordinator will hold an Environmental Awareness Briefing meeting, which shall be attended by all contractors before the start of the mineral exploration activities.</li> <li>3. Briefings on the EMP and Environmental Policy shall discuss the potential dangers to the environment of the following activities: public relations, littering, off-road driving, waste management, poaching and plant theft etc. The need to preserve soil, conserve water and implement water saving measures shall be presented.</li> <li>4. Individuals can be questioned on the Environmental Philosophy and EMP and can recall contents.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Regional reconnaissance field-based mapping and sampling activities.</li> <li>(ii) Initial local field-based mapping and sampling activities.</li> <li>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>(iv) Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Proponent's Representative (PR)</li> <li>(ii) Project Manager (PM)</li> <li>(iii) Project HSE</li> <li>(iv) Contractor</li> <li>(v) Subcontractors</li> </ol>

Table 3.6: Creation of supporting exploration infrastructure.

IMPLEMENTATION STRATEGY	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<ol style="list-style-type: none"> <li>1. Get Environmental Clearance before implementation</li> <li>2. Get consent from the land owner before implementation</li> <li>3. Establishment of the supporting exploration infrastructure done on an area with the least disturbance to the environment and within the non-sensitive areas</li> </ol>	<ol style="list-style-type: none"> <li>1. Documented Environmental Clearance from MEFT.</li> <li>2. All on site exploration infrastructure (e.g. water tanks, sewage tanks, waste disposal) are not situated on environmental sensitive area and have disturbed as less as possible.</li> <li>3. No littering.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Regional reconnaissance field-based mapping and sampling activities.</li> <li>(ii) Initial local field-based mapping and sampling activities.</li> <li>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>(iv) Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Proponent's Representative (PR)</li> <li>(ii) Project Manager (PM)</li> <li>(iii) Project HSE</li> <li>(iv) Contractor</li> <li>(v) Subcontractors</li> </ol>

Table 3.7: Use of existing access roads, tracks and general vehicle movements.

IMPLEMENTATION STRATEGY	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<ol style="list-style-type: none"> <li>1. Always obtain consent from the land owners</li> <li>2. Plan a road/track network that considers the environmental sensitivity of the area and a long-term tourism potential, and which is constructed in a technically and environmentally sound manner.</li> <li>3. Stick to the recommended track and sensitivity management zones.</li> </ol>	<ol style="list-style-type: none"> <li>1. Avoid unnecessary affecting areas viewed as important habitat – i.e. Ephemeral River and its network of tributaries of ephemeral rivers. rocky outcrops. clumps of protected tree species.</li> <li>2. Make use of existing tracks/roads as much as possible throughout the area.</li> <li>3. Do not drive randomly throughout the area (could cause mortalities to vertebrate fauna and unique flora. accidental fires. erosion related problems, etc.).</li> <li>4. Avoid off-road driving at night as this increases mortality of nocturnal species.</li> <li>5. Implement and maintain off-road track discipline with maximum speed limits (e.g.30km/h) as this would result in fewer faunal mortalities and limit dust pollution.</li> <li>6. Use of "3-point-turns" rather than "U-turns".</li> <li>7. Where tracks have to be made to potential exploration sites off the main routes, the routes should be selected causing minimal damage to the environment – e.g. use the same tracks. cross drainage lines at right angles. avoid placing tracks within drainage lines. avoid collateral damage (i.e. select routes that do not require the unnecessary removal of trees/shrubs, especially protected species).</li> <li>8. Leave vehicles on tracks and walk to point of interest, when possible.</li> <li>9. Rehabilitate all new tracks created.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Regional reconnaissance field-based mapping and sampling activities.</li> <li>(ii) Initial local field-based mapping and sampling activities.</li> <li>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>(iv) Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Proponent's Representative (PR)</li> <li>(ii) Project Manager (PM)</li> <li>(iii) Project HSE</li> <li>(iv) Contractor</li> <li>(v) Subcontractors</li> </ol>

Table 3.8: Mitigation measures for preventing flora and ecosystem destruction and promotion of conservation.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Prevent flora and ecosystem destruction and promote conservation	<ol style="list-style-type: none"> <li>1. Limit the development and avoid rocky outcrops throughout the entire area.</li> <li>2. Avoid development and associated infrastructure in sensitive areas – e.g. Ephemeral 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.</li> <li>3. Avoid placing access routes (roads and tracks) through 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.</li> <li>4. Avoid driving randomly through the area (i.e. “track discipline”), but rather stick to permanently placed roads/tracks – especially during the detailed field-based exploration phase. This would minimise the effect on localised potentially sensitive habitats in the area.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>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 EPL 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.</li> <li>11. 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 any exploration activities including supporting activities such as camping within 20m of the main drainage line(s) to minimise erosion problems as well as preserving the riparian associated fauna.</li> <li>12. Conduct a thorough investigation on the flora associated with the proposed exploration site(s).</li> <li>13. Prevent the introduction 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.</li> <li>14. 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 ephemeral riparian vegetation, not only locally, but downstream as well.</li> </ol>	<p>(i) Regional reconnaissance field-based mapping and sampling activities.</p> <p>(ii) Initial local field-based mapping and sampling activities.</p> <p>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</p> <p>(iv) Prefeasibility and feasibility studies.</p>	<p>(i) Proponent's Representative (PR)</p> <p>(ii) Project Manager (PM)</p> <p>(iii) Project HSE</p> <p>(iv) Contractor</p> <p>(v) Subcontractors</p>



Table 3.9: Mitigation measures for preventing faunal and ecosystem destruction and promotion of conservation.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<p>Prevent faunal and ecosystem destruction and promote conservation</p>	<ol style="list-style-type: none"> <li>1. Limit the development and avoid rocky outcrops throughout the entire area.</li> <li>2. Avoid development &amp; 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.</li> <li>3. Avoid placing access routes (roads &amp; tracks) through 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.</li> <li>4. Avoid driving randomly through the area (i.e. “track discipline”), but rather stick to permanently placed roads/tracks – especially during the detailed field-based exploration phase. This would minimise the effect on localised potentially sensitive habitats in the area.</li> <li>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.</li> <li>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.</li> <li>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).</li> <li>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.</li> <li>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 &amp; domestic stock mortalities, etc.) for the neighbouring farmers.</li> <li>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 EPL 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.</li> <li>11. Implement erosion control. The area(s) towards &amp; adjacent the drainage line(s) are easily eroded and further development may exacerbate this problem. Avoid undertaking exploration activities including supporting activities such as camping within 20m of the main drainage line(s) to minimise erosion problems as well as preserving the riparian associated fauna.</li> <li>12. Conduct a thorough investigation on the fauna associated with the proposed exploration site(s).</li> <li>13. Prevent the number of domestic pets – e.g. cats &amp; dogs – accompanying the workers during the field-based exploration activities as cats decimate the local fauna and interbreed &amp; 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.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Regional reconnaissance field-based mapping and sampling activities.</li> <li>(ii) Initial local field-based mapping and sampling activities.</li> <li>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>(iv) Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Proponent's Representative (PR)</li> <li>(ii) Project Manager (PM)</li> <li>(iii) Project HSE</li> <li>(iv) Contractor</li> <li>(v) Subcontractors</li> </ol>

Table 3.10: Mitigation measures to be implemented with respect to the exploration camps and exploration sites.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<p>Promotion of conservation through preservation of flora, fauna and ecosystem around the exploration camps and exploration sites</p>	<ol style="list-style-type: none"> <li>1. Select camp sites and other temporary lay over sites with care – i.e. avoid important habitats.</li> <li>2. Use portable toilets to avoid faecal pollution around camp and exploration sites.</li> <li>3. Initiate a suitable and appropriate refuse removal policy as littering could result in certain animals becoming accustomed to humans and associated activity and result in typical problem animal scenarios – e.g. baboon, black-backed jackal, etc..</li> <li>4. Avoid and/or limit the use of lights during nocturnal exploration activities as this could influence and/or affect various nocturnal species – e.g. bats and owls, etc. Use focused lighting for least effect.</li> <li>5. Prevent the killing of species viewed as dangerous – e.g. various snakes – when on site.</li> <li>6. Prevent the setting of snares for ungulates (i.e. poaching) or collection of veld foods (e.g. tortoises) and unique plants (e.g. various Aloe and Lithop) or any form of illegal hunting activities.</li> <li>7. Avoid introducing dogs and cats as pets to camp sites as these can cause significant mortalities to local fauna (cats) and even stock losses (dogs).</li> <li>8. Remove and relocate slow moving vertebrate fauna (e.g. tortoises, chameleon, snakes, etc.) to suitable habitat elsewhere on property.</li> <li>9. Avoid the removal and/or damaging of protected flora potentially occurring in the general area – e.g. various Aloe, Commiphora and Lithop species.</li> <li>10. Avoid introducing ornamental plants, especially potential invasive alien species, as part of the landscaping of the camp site, etc., but rather use localised indigenous species, should landscaping be attempted, which would also require less maintenance (e.g. water).</li> <li>11. Remove all invasive alien species on site, especially Prosopis sp., which is already becoming a major ecological problem along various water courses throughout Central Namibia. This would not only indicate environmental commitment, but actively contribute to a better landscape.</li> <li>12. Inform contractors/workers regarding the above-mentioned issues prior to exploration activities and monitor for compliance thereof throughout.</li> <li>13. Rehabilitate all areas disturbed by the exploration activities – i.e. camp sites, exploration sites, etc..</li> <li>14. Implement a policy of replacing 2 tree species (preferably the same species) for every 1 protected tree species having to be removed (if necessary).</li> <li>15. Although fires are not expected to be a major issue in the general area due to the overall lack of grass cover, some years it may be necessary to consider fire prevention. Ensure that adequate firefighting equipment (e.g. fire beaters, extinguishers, etc.) is available at camp sites and clear kitchen areas to avoid accidental fires.</li> <li>16. Employ an independent environmental auditor to ensure compliance, especially of the rehabilitation of all the affected areas.</li> </ol>	<p>(i) Regional reconnaissance field-based mapping and sampling activities.</p> <p>(ii) Initial local field-based mapping and sampling activities.</p> <p>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</p> <p>(iv) Prefeasibility and feasibility studies.</p>	<p>(i) Proponent's Representative (PR)</p> <p>(ii) Project Manager (PM)</p> <p>(iii) Project HSE</p> <p>(iv) Contractor</p> <p>(v) Subcontractors</p>

Table 3.11: Mitigation measures for surface and groundwater protection as well as general water usage.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<p>Effective management / protection of surface and groundwater resources and general water resources usage</p>	<ol style="list-style-type: none"> <li>1. Always use as little water as possible. Reduce, reuse and re-cycle water where possible.</li> <li>2. All leaking pipes / taps must be repaired immediately they are noticed.</li> <li>3. Never leave taps running. Close taps after you have finished using them.</li> <li>4. Never allow any hazardous substance to soak into the soil.</li> <li>5. Immediately tell your Contractor or Environmental Control Officer / Site Manager when you spill, or notice any hazardous substance being spilled during the field-based exploration activities or around the camp site.</li> <li>6. Report to your Contractor or Environmental Control Officer / Site Manager when you notice any container, which may hold a hazardous substance, overflow, leak or drip.</li> <li>7. Immediately report to your Contractor or Environmental Control Officer / Site Manager when you notice overflowing problems or unhygienic conditions at the ablution facilities.</li> <li>8. No washing of vehicles, equipment and machinery, containers and other surfaces.</li> <li>9. Limit the operation to a specific site and avoid sensitive areas and in particular the Ephemeral River Channel. This would sacrifice the actual area for other adjacent Ephemeral River areas and thus minimise any likely negative effect on water resources.</li> <li>10. Disposal of wastewater into any public stream is prohibited.</li> <li>11. The Proponent must obtain permission of the land owners before utilising any water resources or any associated infrastructure.</li> <li>12. If there is a need to drilling a water borehole to support the exploration programme the Proponent must obtain permission form the land owner and Department of Water Affairs in the Ministry of Agriculture and Forestry. In an event of discovery of economic minerals resources, the sources of water supply for the mining related operations will be supplied by NamWater.</li> <li>13. If there are any further (larger scale) exploration/drilling activities and/or mining activities to follow from the initial planned drill holes, groundwater monitoring must be implemented to include water level monitoring and also water sampling on a bi-annual basis. In order to have greater transparency on the water monitoring activities, the affected landowners / farmers must be given full access to the results of the water monitoring analyses.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Regional reconnaissance field-based mapping and sampling activities.</li> <li>(ii) Initial local field-based mapping and sampling activities.</li> <li>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>(iv) Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Proponent's Representative (PR)</li> <li>(ii) Project Manager (PM)</li> <li>(iii) Project HSE</li> <li>(iv) Contractor</li> <li>(v) Subcontractors</li> </ol>

Table 3.12: Mitigation measures to minimise negative socioeconomic impacts.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<p>Effective management of socioeconomic benefits of the proposed project activities</p>	<ol style="list-style-type: none"> <li>1. The employment of local residents and local companies should be a priority. To ensure that potential employees are from the area, they need submit proof of having lived in the area for a minimum of 5 years.</li> <li>2. Providing information such as the number and types of jobs available, availability of accommodation facilities and rental costs and living expenses, could make potential job seekers wary of moving to the area.</li> <li>3. Addressing unrealistic expectations about large numbers of jobs would be created.</li> <li>4. Exploration camp if required should be established in close consultation with the land owners.</li> <li>5. Exploration camp should consider provision of basic services.</li> <li>6. When the contracts an employee is terminated or not renewed, contractors should transport the employee out of the area to their hometowns within two days of their contracts coming to an end.</li> <li>7. Tender documents could stipulate that contractors have HIV/Aids workplace policies and programmes in place and proof of implementation should be submitted with invoicing.</li> <li>8. Develop strategies in coordination with local health officers and NGO's to protect the local communities, especially young girls.</li> <li>9. Contract companies could submit a code of conduct, stipulating disciplinary actions where employees are guilty of criminal activities in and around the vicinity of the EPL. Disciplinary actions should be in accordance with Namibian legislation.</li> <li>10. Contract companies could implement a no-tolerance policy regarding the use of alcohol and workers should submit to a breathalyser test upon reporting for duty daily.</li> <li>11. Request that the Roads Authority erect warning signs of heavy exploration vehicles on affected public roads.</li> <li>12. Ensure that drivers adhere to speed limits and that speed limits are strictly enforced.</li> <li>13. Ensure that vehicles are road worthy and drivers are qualified.</li> <li>14. Train drivers in potential safety issues.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Regional reconnaissance field-based mapping and sampling activities.</li> <li>(ii) Initial local field-based mapping and sampling activities.</li> <li>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>(iv) Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Proponent's Representative (PR)</li> <li>(ii) Project Manager (PM)</li> <li>(iii) Project HSE</li> <li>(iv) Contractor</li> <li>(v) Subcontractors</li> </ol>

Table 3.13: Mitigation measures to minimise health and safety impacts.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<p>Promotion of health and safe working environment in line with national Labour Laws</p>	<ol style="list-style-type: none"> <li>1. Physical hazards: Follow national and international regulatory and guidelines provisions, use of correct Personal Proactive Clothing at all times, training programme, as well as the implementation of a fall protection program in accordance with the Labour Act.</li> <li>2. Some of the public access management measures that may be considered in an event of vandalism occurring are: <ul style="list-style-type: none"> <li>• All exploration equipment must be in good working condition and services accordingly.</li> <li>• Control access to the exploration site through using gates on the access road(s) if required.</li> <li>• The entire site, must be fenced off. the type of fencing to be used would, however, be dependent on the impact on the visual resources and/or cost. and.</li> <li>• Notice or information boards relating to public safety hazards and emergency contact details to be put up at the gate(s) to the exploration area.</li> </ul> </li> <li>3. There is a comprehensive First Aid Kit on site and that suitable anti-histamine for bee stings / snake bites should be available.</li> <li>4. Rubber gloves are used in case of an accident to reduce the risk of contracting HIV/AIDS.</li> <li>5. All individuals have received instructions concerning the dangers of dehydration or hyperthermia. Encourage all to drink plenty of clean water not directly from the surface water bodies.</li> <li>6. No person under the influence of alcohol or drugs is allowed to work on site.</li> <li>7. The Exploration Manager ensures compliance with the requirements of the relevant Namibian Labour, Mining and Health and Safety Regulations.</li> <li>8. Dangerous or protected / sensitive areas are clearly marked and access to these areas is controlled or restricted.</li> <li>9. Due care must be taken when driving any vehicles on any roads particularly the gravel roads. ALL Drivers must drive with their headlights switched on when travelling on the gravel roads (day and night).</li> <li>10. Persons driving a vehicle must be in possession of a valid driver's license</li> <li>11. Awareness on HIV/AIDS among workers is raised</li> </ol>	<ol style="list-style-type: none"> <li>(i) Regional reconnaissance field-based mapping and sampling activities.</li> <li>(ii) Initial local field-based mapping and sampling activities.</li> <li>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>(iv) Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Proponent's Representative (PR)</li> <li>(ii) Project Manager (PM)</li> <li>(iii) Project HSE</li> <li>(iv) Contractor</li> <li>(v) Subcontractors</li> </ol>

Table 3.14: Mitigation measures to minimise visual impacts.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<p>Preserve the landscape character in the development of supporting infrastructure and choice of visual screening</p>	<ol style="list-style-type: none"> <li>1. Consider the landscape character and the visual impacts of the exploration area including camp site from all relevant viewing angles, particularly from public roads.</li> <li>2. Use vegetation screening where applicable. Do not cut down vegetation unnecessary around the site and use it for site screening.</li> <li>3. Avoid the use of very high fencing.</li> <li>4. Minimise access roads and no off-road that could result in land scarring is allowed.</li> <li>5. Minimise the presence of secondary structures: remove inoperative support structures.</li> <li>6. Remove all infrastructure and reclaim, or rehabilitate the project site after exploration activities are completed.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Regional reconnaissance field-based mapping and sampling activities.</li> <li>(ii) Initial local field-based mapping and sampling activities.</li> <li>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>(iv) Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Proponent's Representative (PR)</li> <li>(ii) Project Manager (PM)</li> <li>(iii) Project HSE</li> <li>(iv) Contractor</li> <li>(v) Subcontractors</li> </ol>

Table 3.15: Mitigation measures to minimise vibration, noise and air quality.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<p>Promote of effective management of vehicle movement, drilling and blasting operations and use of Personal Protective Equipment (PPE) in mitigating air quality and vibrations impacts in line with national laws</p>	<ol style="list-style-type: none"> <li>1. Limit vehicle movements and adhere to the speed of 60 km/h.</li> <li>2. Vehicles and all equipment must be properly serviced to minimise noise pollution.</li> <li>3. Use of Personal Protective Equipment (PPE) to minimise Occupational Health Safety impacts due to noise pollution around the site.</li> <li>4. National or international acoustic design standards must be followed.</li> <li>5. Drilling and blasting operations can major sources of vibration, noise and dust and where required the following mitigation measure shall be implemented.               <ul style="list-style-type: none"> <li>• Drilling and blasting operations shall only be done by a qualified person who must at all times adhere to the required blasting protocol.</li> <li>• Prior warning shall be given to all persons, neighbour and visitors before the blasting takes place.</li> <li>• Careful planning and timing of the blast program to minimise the size of the charge.</li> <li>• Where practicable, use of explosive products with lower detonation velocities, but noting that this would require more explosives to achieve the same blast result.</li> <li>• Use of detonating caps with built-in time delays, as this effectively reduces each detonation into a series of small explosions.</li> <li>• Use of a procedure ("decking the charge") which subdivides the charge in one blast hole into a series of smaller explosions, with drill patterns restricted to a minimum separation from any other loaded hole.</li> <li>• Over-drilling the holes to ensure fracturing of the rock.</li> <li>• Staggering the detonation for each blast hole in order to spread the explosive's total overpressure over time.</li> <li>• Matching, to the extent possible, the energy needed in the "work effort" of the borehole to the rock mass to minimise excess energy vented into the receiving environment.</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>(i) Regional reconnaissance field-based mapping and sampling activities.</li> <li>(ii) Initial local field-based mapping and sampling activities.</li> <li>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>(iv) Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Proponent's Representative (PR)</li> <li>(ii) Project Manager (PM)</li> <li>(iii) Project HSE</li> <li>(iv) Contractor</li> <li>(v) Subcontractors</li> </ol>

Table 3.16: Mitigation measures for waste (solid and liquid) management.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<p>Promotion of effective waste (solid and liquid) management through the adoption of sound and hierarchical approach to waste management, which would include waste minimisation, re-use, recovery, recycling, treatment, and proper disposal.</p>	<ol style="list-style-type: none"> <li>1. Burial of waste on anywhere within the EPL area is not allowed and all generated solid waste must be disposed at the at an approved municipal waste disposal site.</li> <li>2. Toilet and ablution facilities must be provided on site and should not be located close to Ephemeral Rivers or visible discontinuities (fractures, joints or faults).</li> <li>3. Provide site information on the difference between the two main types of waste, namely:               <ul style="list-style-type: none"> <li>• General Waste. and</li> <li>• Hazardous Waste.</li> </ul> </li> <li>4. Sealed containers, bins, drums or bags for the different types of wastes must be provided. Never dispose of hazardous waste in the bins or skips intended for general waste.</li> <li>5. All solid and liquid wastes generated from the proposed project activities shall be reduced, reused, or recycled to the maximum extent practicable.</li> <li>6. Trash may not be burned or buried, except at approved sites under controlled conditions in accordance with the municipal regulations.</li> <li>7. Never overfill any waste container, drum, bin or bag. Inform your Contractor or the Environmental Control Officer / Site Manager if the containers, drums, bins or skips are nearly full.</li> <li>8. Never litter or throwaway any waste on the site, in the field or along any road. No illegal dumping.</li> <li>9. Littering is prohibited.</li> <li>10. Latrines and French drains built &gt;100m from watercourses or pans to avoid pollution of primary and secondary aquifers.</li> <li>11. Chemical toilets or suitable waste water management system shall be provided on site and around the camp as may be required.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Regional reconnaissance field-based mapping and sampling activities.</li> <li>(ii) Initial local field-based mapping and sampling activities.</li> <li>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</li> <li>(iv) Prefeasibility and feasibility studies.</li> </ol>	<ol style="list-style-type: none"> <li>(i) Proponent's Representative (PR)</li> <li>(ii) Project Manager (PM)</li> <li>(iii) Project HSE</li> <li>(iv) Contractor</li> <li>(v) Subcontractors</li> </ol>



Table 3.17: Rehabilitation plan.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<p>Contributions toward environmental preservation and sustainability through rehabilitation of disturbed areas such as exploration sites and remove all unwanted part of the fixtures and restore the sites to close an approximation of the pristine state as is technically, financially and reasonably possible.</p>	<p>1. The following rehabilitation actions are practiced:</p> <ul style="list-style-type: none"> <li>• Small samples are preferably removed from site to avoid additional scars in the landscape.</li> <li>• Litter from the site has been taken to the appropriate disposal site.</li> <li>• Debris, scrap metal, etc is removed before moving to a new site or closure of the mine.</li> <li>• Water tanks are dismantled and removed if not need for after use.</li> <li>• Tracks on site and the access road are rehabilitated by smoothing the 'middle mannetjie'(middle ridge between the tracks) and raking the surface.</li> </ul> <p>2. The following should be undertaken at all disturbed areas that require further rehabilitation:</p> <ul style="list-style-type: none"> <li>• if applicable the stockpiled subsoil to be replaced (spread) and/or the site is neatly contoured to establish effective wind supported landscape patterns.</li> <li>• Replace the stored topsoil seed bank layer.</li> <li>• Five (5) years after rehabilitation the sites are not visible from 500 m away.</li> </ul>	<p>(i) Regional reconnaissance field-based mapping and sampling activities.</p> <p>(ii) Initial local field-based mapping and sampling activities.</p> <p>(iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</p> <p>(iv) Prefeasibility and feasibility studies.</p>	<p>(i) Proponent's Representative (PR)</p> <p>(ii) Project Manager (PM)</p> <p>(iii) Project HSE</p> <p>(iv) Contractor</p> <p>(v) Subcontractors</p>

Table 3.18: Environmental data collection.

IMPLEMENTATION STRATEGY	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
<p>1. Collect data that will add value to environmental monitoring and reporting to the regulators</p> <p>2. Collect data that will add to the general scientific and geographic knowledge of the environment in which the exploration process takes place.</p> <p>3. Acknowledged that the required skills and knowledge to collect all the suggested data may not be available within the mine /exploration team, however, as much data as is practical should be collected.</p>	<p>1. Environmental Monitoring Report Compiled and submitted by the Environmental Coordinator to the regulators</p> <p>2. The following types of information should be gathered:</p> <ul style="list-style-type: none"> <li>• Fauna. What tracks or signs of animal activity have been seen? (photographs and GPS recording) What animals, birds etc were identified? Alternatively provide a description and/ or photo if unidentified.</li> <li>• Unusual weather conditions, e.g. records of the prevailing wind direction and the direction from which storm events come. Was there fog or rain, frost overnight or intense heat? Preferably have a thermometer and rain gauge on site.</li> <li>• Vegetation. Record trees, shrubs, grass, etc. that are found in the vicinity along each of the profiles. Some plants do only occur after rainfall and might not have been seen for decades.</li> <li>• Any archaeological, cultural or historical sites that may be found. GPS coordinates, photograph and plot the position on a 1: 50 000 maps.</li> <li>• other including surface water, spring, large scale geological features etc</li> </ul>	<p>(i) Monthly during regional reconnaissance field-based mapping and sampling activities.</p> <p>(ii) Monthly during initial local field-based mapping and sampling activities.</p> <p>(iii) Monthly during detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling.</p> <p>(iv) Monthly during prefeasibility and feasibility studies.</p>	<p>(i) Proponent's Representative (PR)</p> <p>(ii) Project Manager (PM)</p> <p>(iii) Project HSE</p> <p>(iv) Contractor</p> <p>(v) Subcontractors</p>

## 4. REHABILITATION COMMITMENTS

### 4.1 Rehabilitation Process

The following is the summary of key rehabilitation process to be implemented by the proponent in consultation with the land owners:

#### ❖ **Step 1: Backfilling excavated or disturbed areas:**

- Transporting all stockpiled overburden back to the excavated voids.
- Backfilling the trenches, pits and quarries using original excavated and stockpiled materials.
- If applicable, backfill the various layers of overburden in the reverse order in which they were removed, i.e. Last out should be first in as far as possible, and.
- When backfilling, bear in mind that some space must be left for the backfilling of the soil on top of the overburden.

#### ❖ **Step 2: Remove all waste and unwanted materials:**

- Once the drilling slimes ponds have dried sufficiently, scrape out the slimes and transporting back to an exploration excavated voids during the overburden backfilling stage.
- Allow the pollution control dam to evaporate completely, scrape all waste that has collected in the pond and dispose of these and the pond lining at a suitable site.
- Bulldoze the walls of the pollution control pond over and contour.
- Collect remaining domestic waste on site and transport to an approved municipal waste disposal site.
- Clean out the oil traps, collect the waste material in drums and transport to a suitable site for disposal, and.
- Manually remove all weedy species that are present at the site (the entire plant can easily be removed because the plants tend not to root deeply).

#### ❖ **Step 3: Remove all structures:**

- Remove all building materials from the exploration / test mining site and either:
  - Transporting to a new site if it is to be used or stored elsewhere. or
  - Disposing at a suitable approved municipal waste disposal site. or
  - Making them available to the farmer or local persons, or,
  - Selling at an auction.
- Remove all machinery from the site and transport to a new site where it is to be used or stored or sell at an auction.
- Remove all fences that have been constructed and either make the material available to the local persons/farmer, dispose at a suitable site or sell at an auction.
- Remove the generators from the sites from site and either transport to a new site for storage or sell it to the farmer or an Auction.

- Seal all petrol, diesel, oil and grease containers and remove from the site to a storage facility or make it available to the farmer.
- Collect all scrap metal and dispose at a suitable site or sell at an auction, and.
- Break up all concrete slabs and structures on site and transport the fragments to a suitable site for disposal.

❖ **Step 4: Rehabilitate the excavated voids:**

- Replace the subsoil layer by backfilling the soil on top of the overburden and contour cap the subsoil with a topsoil layer about 10cm deep, and.
- Cap the topsoil containing the seedbank with a layer of gravel by manually spreading the fragments across the surface using a rake.

❖ **Step 5: Rehabilitate site-specific storm-water channel:**

- Remove all the site structures created.
- Dispose of the plastic/wire and use the fill material to backfill the storm-water channel.
- Cap with a layer of topsoil to a depth of about 10cm, and.
- Cap the topsoil containing the seedbank with a gravel layer by manually spreading the fragments across the surface using a rake.

❖ **Step 6: Rehabilitate all adjacent exploration / test mining sites affected:**

- Rip the surfaces to a depth of 40 cm to 50 cm using a multi-toothed ripper and tractor.
- Cover with a layer of topsoil to a depth of about 10 cm, and.
- Cap the topsoil containing the seedbank with a layer of gravel by manually spreading the fragments across the surface using a rake.

❖ **Step 7: Rehabilitate all unwanted access roads created:**

- Rip the road surface to a depth of at least 50 cm using a multi-toothed ripper and tractor.
- Disk the ripped surface to break up the clods.
- Cover with a layer of topsoil to a depth of about 10 cm, and.
- Cap the topsoil containing the seedbank with a gravel layer by manually spreading the fragments across the surface using a rake.

## **4.2 Monitoring of the Environmental Performance**

### **4.2.1 Rehabilitation Evaluation and Performance Monitoring**

The following is the summary of key rehabilitation evaluation and performance monitoring to be implemented by the proponent:

- ❖ **Monitoring:** Monitoring program is instituted to ensure that the requirements of the mining site rehabilitation program are met. Rehabilitation program may be subjected to various natural or man-made forces that can hinder the progress and lead to problems or failure or

the rehabilitation program. Regular monitoring will ensure that these factors are identified early so they may be resolved through appropriate recommendations.

- ❖ **Frequency:** All rehabilitated areas should be monitored over a three (3) years period from the onset of the rehabilitation procedures. The frequency of monitoring suggested above is dependent on satisfactory performance. If, however, the requirements are not being met, the frequency of monitoring can be increased. It is suggested that the monitoring be conducted once a year around September when the grasses and forbs are flowering.
- ❖ **Methods:** The rehabilitated areas might be monitored by the sampling randomly located 1m<sup>2</sup> quadrates. Approximately 10 quadrates per hectare (or a minimum of 3) should be sampled per plant community. The factors that will be examined in each quadrate include:
  - Percentage basal cover.
  - Percentage aerial cover.
  - Species composition and diversity.
  - Vigor and health of plants.
  - Presence of and evidence of fauna, and.
  - Nature of the substrate.
- ❖ **Controls:** To enable a comparison, control plots located within the surrounding un-mining areas should also be monitored. This will give an indication of the progress of rehabilitated areas versus the natural vegetation and will set the goals, which ultimately should be achieved. By monitoring the natural vegetation annually, it will also be possible to assess the natural changes that are taking place. These findings can then be applied to the rehabilitated areas so as to account for the changes, which may have resulted from natural events. Approximately 5 to 10 quadrates of 1m<sup>2</sup> should be sampled per community type to set the controls.
- ❖ **Maintenance:** Maintenance requirements may include seeding (if there is poor germination of the seedbank), fertiliser applications, correcting erosion problems, removing weeds, etc. Maintenance of the rehabilitated areas will be necessary periodically. The need for and extent of maintenance activities will be determined during the regular monitoring of the site, and.
- ❖ **Qualified Personnel:** The rehabilitation procedures from implementation to monitoring should be overseen by qualified personnel. Any persons involved in the rehabilitation of the mining site should be trained in the techniques involved.

#### **4.2.2 Overall Environmental Performance Monitoring and Reporting**

The monitoring of the environmental performances for the proposed exploration project can be divided into two (2) parts and these are:

- (i) Routine / ongoing daily monitoring activities to be undertaken by the Project HSE Officer with the support of the external specialist consultants as maybe required, and.
- (ii) Preparation of annual Environmental Monitoring Report and Environmental Closure covering all activities related to the Environmental Management Plan during exploration / prospecting stages and at closure of the proposed exploration to be undertaken by the Project HSE Officer with the support of the external specialist consultants as maybe required.

The proponent will be required to report regularly (twice in a year or as the case maybe) to the

Environmental Commissioner in the Ministry of Environment and Tourism (MEFT), the environmental performances as 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 Environmental Commissioner. The process of undertaking appropriate monitoring as per specific topic (such as fauna and flora) and tracking performances against the objectives and documenting all environmental activities is part of internal and external auditing to be coordinated by the Project HSE Officer.

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 to be undertaken by the Project HSE Officer with the support of the external specialist consultants as maybe required. 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 the completion of the proposed project activities. The report shall be submitted to the Environmental Commissioner in the Ministry of Environment and Tourism and will represent the final closure and fulfilment of the conditions of the Environmental Clearance Certificate (ECC) issued by the Environmental Commissioner and the conditions of the Pro-Forma Environmental Contract signed by the Proponent, Environmental Commissioner and the Mining Commissioner.

## 5. CONCLUSION AND RECOMMENDATION

### 5.1 Conclusions

Hilma Jeremia (**the Proponent**) intends to undertake exploration activities in the Exclusive Prospecting Licence (EPL) No. 8158 covering base and rare metals, industrial minerals, and precious metals groups. The exploration activities to be undertaken as assessed in this environmental assessment are as follows:

- (i) Initial desktop exploration activities.
- (ii) Regional reconnaissance field-based activities.
- (iii) Initial local field-based activities including detailed mapping, sampling and drilling operations.
- (iv) Detailed local field-based activities including detailed mapping, sampling and drilling operations, and.
- (v) Prefeasibility and feasibility studies including possible test mining.

The overall severity of potential environmental impacts of the proposed exploration activities on the receiving environment (physical, biological, socioeconomic environments and ecosystem functions, services, use and non-use values or passive uses) will be of low magnitude, temporally duration, localised extent, and low probability of occurrence. The Proponent must obtain permission of the land owners (surface rights holders) before exercising their subsurface rights in all the farms covered by the EPL 8158.

### 5.2 Recommendations

It is hereby recommended that the proposed exploration activities be issued with an Environmental Clearance Certificate (ECC) with the following key conditions:

- (i) The Proponent shall negotiate Access Agreements with the land owners as may be applicable or required to access the farms.
- (ii) In consultation with the land owners and where possible and if key and core conservation, tourism or archaeological resources areas are identified within the EPL area, such areas shall be excluded from the proposed minerals exploration activities.
- (iii) The Proponent shall adhere to all the provisions of the EMP and conditions of the Access Agreement to be entered between the Proponent and the land owner/s in line with all applicable national legislations and regulations.
- (iv) Before entering any private property such as private farms or communal areas, the Proponent shall give advance notices to the surface land rights holders and always obtain permission to access the land to undertake prospecting activities in any given area.
- (i) Where possible, and if good quality freshwater is found during the detailed exploration borehole drilling operations, the Proponent shall support other land users in the area in terms of access to good quality freshwater resources for both human consumption, wildlife and agricultural uses as may be requested by the local community / land owner/s. With permission from the Department of Water Affairs in the Ministry of Agriculture, Water and Land Reform (MAWLR), the abstraction of the groundwater resources shall include water levels monitoring, sampling and quality testing on a bi-annual basis, and that the affected landowner/s must have access to the results of the water monitoring analyses as part of the ongoing stakeholder disclosure requirements on shared water resources as may be applicable.

The Proponent must take all the necessary steps to implement all the recommendations of the EMP for the successful implementation and completion of the proposed exploration programme covering the EPL 8158. Recommended actions to be implemented by the Proponent as part of the management of the likely impacts through implementations of the EMP are:

- (i) The Proponent shall obtain permission from the land owners to enter the EPL area to undertake field-based exploration / prospecting activities.
- (ii) The Proponent shall implement precautionary measures / approach to environmental management. Once a viable and potential economic resource have been identified, the Proponent shall develop and implement a separate EIA and EMP inclusive of the specialist studies such as fauna and flora to be undertaken by specialist consultants as part of the feasibility study stage.
- (iii) Before detailed site-specific exploration activities such as extensive drilling operations and access routes are selected, the Project HSE Officer with the support of the external specialist consultants as maybe required, should consider the flora, fauna and archaeological sensitivity of the area and commission a field survey in advance of any site development as may be required based on the assessment undertaken.
- (iv) The Project HSE Officer shall lead, implement, and promote environmental culture through awareness raising of the workforce, contractors, and sub-contractors in the field during the whole duration of the proposed exploration period.
- (v) The Proponent to provide all the necessary support including human and financial resources, for the implementation of the proposed mitigations and effective environmental management during the planned exploration activities for the EPL 8158.
- (vi) Project HSE Officer with the support of the external specialist consultants as maybe required to develop a simplified environmental induction and awareness programme for all the workforce, contractors and sub-contractors.
- (vii) Where contracted service providers are likely to cause environmental impacts, these will need to be identified and contract agreements need to be developed with costing provisions for environmental liabilities.
- (viii) Implement internal and external monitoring of the actions and management strategies developed during the mineral exploration process. Final Environmental Monitoring report shall be prepared by the Project HSE Officer with the support of the external specialist consultants as maybe required to be submitted to the regulators and to mark the closure of the proposed mineral exploration, and.
- (ix) 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 possible mining projects.

All the liabilities for environmental damage or damage to any existing public or private property or infrastructure rests with the Proponent.

### **5.3 Summary ToR for Test Mining and Mining Stages**

Once economic resources are discovered for possible mining operations, a separate field-based and site-specific Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) shall be undertaken as part of the prefeasibility and feasibility studies. The site-specific EIA and EMP shall cover the area/s identified to have potential economic minerals resources and the assessment shall include the entire planned mine layout areas such as the pit / shaft, waste rock, tailings dump, access, office blocks, mechanical workshop, water, and energy infrastructure support areas (water, energy, and road / access).



In addition to the site-specific possible mining EIA and EMP Terms of Reference (ToR) to be developed during the prefeasibility study phase, the following field-based and site-specific specialist studies shall be undertaken in an event that economic minerals resources are discovered for possible development of a mining project within the EPL 8158 area:

- (i) Groundwater studies including modelling as may be applicable.
- (ii) Field-based flora and fauna assessments.
- (iii) Dusts, noise and sound assessments and modelling linked to engineering studies.
- (iv) Socioeconomic assessment, and.
- (v) Others as may be identified / recommended by the stakeholders/ land owners/ Environmental Commissioner or specialists during the prefeasibility and feasibility phases.

The aims and objectives of the Environmental Assessment (EA) covering Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) to be implemented as part of the feasibility study if a variable resource is discovered are:

- (i) To assess all the likely positive and negative short- and long-term impacts on the receiving environment (physical, biological, and socioeconomic environments) at local (EPL Area), regional, national (Namibia) and Global levels using appropriate assessment guidelines, methods and techniques covering the complete project lifecycle. The EIA and EMP to be undertaken shall be performed with reasonable skill, care and diligence in accordance with professional standards and practices existing at the date of performance of the assessment and that the guidelines, methods and techniques shall conform to the national regulatory requirements, process and specifications in Namibia and in particular as required by the Ministry of Mines and Energy, Ministry of Environment, Forestry and Tourism and Ministry of Agriculture, Water Affairs and Land Reform, and.
- (ii) The development of appropriate mitigation measures that will enhance the positive impacts and reduce the likely negative influences of the negative impacts identified or anticipated. Such mitigation measures shall be contained in a detailed EMP report covering the entire project lifecycle.

## 6. REFERENCES

### 1. FURTHER GENERAL READING

Bühn, B. 1991. Genesis and tectonothermal evolution of Late Proterozoic stratiform manganese deposits of Otjosondu, Damara Belt, east central Namibia. – Unpubl. Ph.D. thesis, Univ. Würzburg, 231 pp.

Bühn, B. and Stanistreet, I.G., 1992/93. A correlation of structural patterns and lithostratigraphy at Otjosondu with the Damara Sequence of southern Central Zone, Namibia. Communications of the Geological Survey of Namibia, 8, 15–21.

Bühn, B. and Stanistreet, I.G., 1997. Insight into the enigma of Neoproterozoic manganese and iron formations from the perspective of supercontinental break-up and glaciation. In: K. Nicholson, J.R. Hein, B. Bühn and S. Dasgupta (Editors), Manganese Mineralization: Geochemistry and Mineralogy of Terrestrial and Marine Deposits. Geological Society Special Publication, 119, 81–90.

Bühn, B., Stanistreet, I.G. and Okrusch, M., 1992. Late Proterozoic outer shelf manganese and iron deposits at Otjosondu (Namibia) related to the Damaran oceanic opening. Economic Geology, 87, 1393–1411.

Bühn, B., Okrusch, M., Woermann, E., Lehnert, K. and Hoernes, S., 1995. Metamorphic evolution of Neoproterozoic manganese formations and their country rocks at Otjosondu, Namibia. Journal of Petrology, 36, 463–496.

Cabral, A. R., Moore, J. M., Mapani, B. S., Koubová, M., & Sattler, C. D., 2011. Geochemical and mineralogical constraints on the genesis of the Otjosondu ferromanganese deposit, Namibia: hydrothermal exhalative versus hydrogenetic (including snowball-earth) origins. South African Journal of Geology, 114(1), 57-76.

Department of Water Affairs and Forestry, 2001. Groundwater in Namibia: An explanation to the hydrogeological map. MAWRD, Windhoek, 1, 128 pp.

Dickson, A.F. 1940. Report on examination of manganese deposits in the neighbourhood of Otjosondu 22-27/11/1941. – Unpubl. rep., 7 pp.

De Villiers, J.E., 1951. The manganese ores of Otjosondu, South-West Africa. Transactions of the Geological Society of South Africa, 54, 89–98.

Geological Survey of Namibia, 1999. Regional geological map of Namibia. Ministry of Mines and Energy, Windhoek, Namibia.

Miller, R.McG. 2008. The geology of Namibia. Geological Survey, Ministry of Mines and Energy, Windhoek, Vol. 3.

Miller, R. McG., 1992. Stratigraphy. *The mineral resource of Namibia, Geological Survey of Namibia, MME*, Windhoek, 1.2 .1 -1.2.13.

Miller, R. McG., 1983a. The Pan – African Damara Orogen of S.W.A. / Namibia, Special Publication of the Geological Society of South Africa, 11, 431 - 515.

Miller, R. McG., 1983b. Economic implications of plate tectonic models of the Damara Orogen, Special Publication of the Geological Society of South Africa, 11, 115 -138.

Ministry of Environment, Forestry and Tourism (MEFT), 2002. Atlas of Namibia. Comp. J. Mendelsohn, A. Jarvis, T. Roberts and C. Roberts, David Phillip Publishers, Cape Town.

Müller, M.A.N. 1984. Grasses of South West Africa/Namibia. John Meinert Publishers (Pty) Ltd, Windhoek, Namibia.

National Statistics Agency (NSA) 2011. Otjozondjupa Region Census Regional Profiles: 2011 Population and Housing Census, Otjozondjupa Region Basic Analysis with Highlights, National Statistics Agency, Windhoek.

Roesener, H., Schneider, G., and Petzel, V., 2004. Okahandja – Otjiwarongo – Tsumeb – Tsumeb: The Roadside Geology of Namibia, (G. Schneider ed.), Gebruder Borntraeger, Berlin, 9.19: 214 – 219.

Roper, H., 1959. The geology of the Otjosundu manganese area, South West Africa. Unpublished Ph.D. thesis, University of Witwatersrand, South Africa, 164pp.

Servant, J. (1956): The manganese deposits at Otjosundu, South West Africa. Congr. geol. intern., 20th Session, Mexico City (1956), 115-22

Schneider, G.I.C., 1992. Manganese, the mineral deposits of Namibia. Geological Survey of Namibia, Windhoek, pp. 2.6-122.6-9.

Steven, N. M., 1993. A study of epigenetic mineralization in the Central Zone of the Damara Orogen, Namibia, with special reference to gold, tungsten, tin, and rare earth element. *Geological Survey of Namibia, Memoir 16*, 166 pp.

Vermaak, C.F. 1969. The geology of the Otjosundu manganese occurrence. – Unpubl. rep. S.A. Minerals Corporation Ltd., 7 pp.

World Travel and Tourism Council, 2018, Travel and Tourism Economic impact 2018, Namibia, London, United Kingdom.

South African National Standards (SANS), 2005. South African National Standard, Ambient Air Quality – Limits for Common Pollutants. SANS 1929:2005. Standards South Africa, Pretoria.

## **2. REFERENCES AND FURTHER READING ON FAUNA AND FLORA**

Alexander, G. and Marais, J. 2007. A guide to the reptiles of southern Africa. Struik Publishers, Cape Town, RSA.

Barnard, P. 1998. Underprotected habitats. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.

Bester, B. 1996. Bush encroachment – A thorny problem. *Namibia Environment 1*: 175-177.

Branch, B. 1998. Field guide to snakes and other reptiles of southern Africa. Struik Publishers, Cape Town, RSA.

Branch, B. 2008. Tortoises, terrapins and turtles of Africa. Struik Publishers, Cape Town, RSA.

Boycott, R.C. and Bourquin, O. 2000. The Southern African Tortoise Book. O Bourquin, Hilton, RSA.

Broadley, D.G. 1983. Fitzsimons' Snakes of southern Africa. Jonathan Ball and AD. Donker Publishers, Parklands, RSA.

Brown, C.J., Jarvis, A., Robertson, T. and Simmons, R. 1998. Bird diversity. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.

Brown, I, Cunningham, P.L. and De Klerk, M. 2006. A comparative study of wetland birds at two dams in central Namibia. *Lanioturdus 39*(1): 2-9.

Buys, P.J. and Buys, P.J.C. 1983. Snakes of Namibia. Gamsberg Macmillan Publishers, Windhoek, Namibia.

- Carruthers, V.C. 2001. Frogs and frogging in southern Africa. Struik Publishers, Cape Town, RSA.
- Channing, A. 2001. Amphibians of Central and Southern Africa. Protea Bookhouse, Pretoria, RSA.
- Channing, A. and Griffin, M. 1993. An annotated checklist of the frogs of Namibia. *Madoqua* 18(2): 101-116.
- Coats Palgrave, K. 1983. Trees of Southern Africa. Struik Publishers, Cape Town, RSA.
- Cole, D.T. and Cole, N.A. 2005. Lithops Flowering Stones. Cactus and Co. Libri
- Craven, P. 1998. Lichen diversity in Namibia. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Craven, P. (ed.). 1999. A checklist of Namibian plant species. Southern African Botanical Diversity Network Report No. 7, SABONET, Windhoek.
- Crouch, N.R., Klopper, R.R., Burrows, J.E. and Burrows, S. M. 2011. Ferns of southern Africa – a comprehensive guide. Struik Nature, Cape Town, RSA.
- Cunningham, P.L. 1998. Potential wood biomass suitable for charcoal production in Namibia. *Agri-Info* 4(5): 4-8.
- Cunningham, P.L. 2006. A guide to the tortoises of Namibia. Polytechnic of Namibia, Windhoek, Namibia.
- Curtis, B. and Barnard, P. 1998. Sites and species of biological, economic or archaeological importance. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Curtis, B. and Mannheimer, C. 2005. Tree Atlas of Namibia. National Botanical Research Institute, Windhoek, Namibia.
- De Graaff, G. 1981. The rodents of southern Africa. Buterworths, RSA.
- Du Preez, L. and Carruthers, V. 2009. A complete guide to the frogs of southern Africa. Struik Publishers, Cape Town, RSA.
- Estes, R.D. 1995. The behaviour guide to African mammals. Russel Friedman Books, Halfway House, RSA.
- Giess, W. 1971. A preliminary vegetation map of South West Africa. *Dinteria* 4: 1 – 114.
- Griffin, M. 1998a. Reptile diversity. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Griffin, M. 1998b. Amphibian diversity. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Griffin, M. 1998c. Mammal diversity. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Griffin, M. 2003. Annotated checklist and provisional national conservation status of Namibian reptiles. Ministry of Environment, Forestry and Tourism (MEFT), Windhoek.
- Griffin, M. and Coetzee, C.G. 2005. Annotated checklist and provisional national conservation status of Namibian mammals. Ministry of Environment, Forestry and Tourism (MEFT), Windhoek.

- Hebbard, S. n.d. A close-up view of the Namib and some of its fascinating reptiles. ST Promotions, Swakopmund, Namibia.
- Hockey, P.A.R., Dean, W.R.J. and Ryan, P.G. 2006. Roberts Birds of Southern Africa VII Edition. John Voelcker Bird Book Fund.
- IUCN, 2015. IUCN red list of threatened animals, IUCN, Gland, Switzerland.
- Joubert, E. and Mostert, P.M.K. 1975. Distribution patterns and status of some mammals in South West Africa. *Madoqua* 9(1): 5-44.
- Komen, L. n.d. The Owls of Namibia – Identification and General Information. NARREC, Windhoek.
- Maclean, G.L. 1985. Robert's birds of southern Africa. John Voelcker Bird Book Fund.
- Maggs, G. 1998. Plant diversity in Namibia. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Mannheimer, C. and Curtis, B. (eds) 2009. Le Roux and Müller's field guide to the trees and shrubs of Namibia. Macmillan Education Namibia, Windhoek.
- Marais, J. 1992. A complete guide to the snakes of southern Africa. Southern Book Publishers, Witwatersrand University Press, Johannesburg, RSA.
- Mendelsohn, J., Jarvis, A., Roberts, A. and Robertson, T. 2002. Atlas of Namibia. A portrait of the land and its people. David Philip Publishers, Cape Town, RSA.
- Monadjem, A., Taylor, P.J., F.P.D. Cotterill and M.C. Schoeman. 2010. Bats of southern and central Africa. Wits University press, Johannesburg, RSA.
- Müller, M.A.N. 1984. Grasses of South West Africa/Namibia. John Meinert Publishers (Pty) Ltd, Windhoek, Namibia.
- Müller, M.A.N. 2007. Grasses of Namibia. John Meinert Publishers (Pty) Ltd, Windhoek, Namibia.
- NACSO, 2010. Namibia's communal conservancies: a review of progress and challenges in 2009. NACSO, Windhoek.
- Passmore, N.I. and Carruthers, V.C. 1995. South African Frogs - A complete guide. Southern Book Publishers, Witwatersrand University Press, Johannesburg, RSA.
- Rothmann, S. 2004. Aloes, aristocrats of Namibian flora. ST promotions, Swakopmund.
- SARDB, 2004. CBSG Southern Africa. In: Griffin, M. 2005. Annotated checklist and provisional national conservation status of Namibian mammals. Ministry of Environment, Forestry and Tourism (MEFT), Windhoek.
- Schultz, M. and Rambold, G. 2007. Diversity shifts and ecology of soil lichens in central Namibia. Talk, Ecological Society of Germany, Austria and Switzerland (GfÖ), 37th Annual Meeting, Marburg: 12/9/2007 to 15/9/2007.
- Schultz, M., Zedda, L. and Rambold, G. 2009. New records of lichen taxa from Namibia and South Africa. *Bibliotheca Lichenologica* 99: 315-354.
- Simmons, R.E. 1998a. Important Bird Areas (IBA's) in Namibia. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Simmons, R.E. 1998b. Areas of high species endemism. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.

Simmons R.E., Brown C.J. and Kemper J. 2015. Birds to watch in Namibia: red, rare and endemic species. Ministry of Environment, Forestry and Tourism (MEFT) and Namibia Nature Foundation, Windhoek.

Skinner, J.D. and Smithers, R.H.N. 1990. The mammals of the southern African subregion. University of Pretoria, RSA.

Skinner, J.D. and Chimimba, C.T. 2005. The mammals of the southern African subregion. Cambridge University Press, Cape Town, RSA.

Stander, P. and Hanssen, L. 2003. Namibia large carnivore atlas. Unpublished Report, Ministry of Environment, Forestry and Tourism (MEFT), Windhoek.

Steyn, M. 2003. Southern African Commiphora. United Litho, Arcadia.

Tarboton, W. 2001. A guide to the nests and eggs of southern African birds. Struik Publishers, Cape Town, RSA.

Taylor, P.J. 2000. Bats of southern Africa. University of Natal Press, RSA.

Tolley, K. and Burger, M. 2007. Chameleons of southern Africa. Struik Nature, Cape Town, RSA.

Van Oudtshoorn, F. 1999. Guide to grasses of southern Africa. Briza Publications, Pretoria, South Africa.

Van Wyk, B. and Van Wyk, P. 1997. Field guide to trees of Southern Africa. Cape Town: Struik Publishers.