

Stoneheart Investments (Pty) Ltd EPL 4721

Final Updated Environmental Scoping and Environmental Management Plan (EMP) Report to Support the Application for Renewal of Environmental Clearance Certificate for Ongoing / Proposed Minerals Exploration Activities in the Exclusive Prospecting License (EPL) No. 4721, Rehoboth District, **HARDAP REGION, SOUTH CENTRAL NAMIBIA**



December 2022

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

PROPONENT, LISTED ACTIVITIES AND RELATED INFORMATION SUMMARY

NAME OF THE PROPONENT

Stoneheart Investments (Pty) Ltd

COMPETENT AUTHORITY

Ministry of Mines and Energy (MME)

MEFT ECC APPLICATION REFERENCE No.

APP-00533

ADDRESS OF THE PROPONENT AND CONTACT PERSON

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

Contact Person:

Ms. Maggie Shi

Office: + 264 (0)61 402036

Email: maggieming2012@hotmail.com

PROJECT TITLE

Application for Renewal of Environmental Clearance Certificate (ECC) for Ongoing / Proposed Minerals Exploration Activities in the Exclusive Prospecting License (EPL) No. 4721, Rehoboth District, Hardap Region, South Central Namibia

PROJECT LOCATION

Rehoboth District, Hardap Region, South Central Namibia
Latitude: -23.468333, Longitude: 17.031667

ENVIRONMENTAL / PERMITTING DE-RISKING CONSULTANTS



Risk-Based Solutions (RBS) CC

10 Schützen Street, Sivieda House,
Windhoek Central Business District (CBD)
P. O. Box 1839, **WINDHOEK, NAMIBIA**

Tel: +264 - 61- 306058/224780/236598; **Fax:** +264-61-245001

Mobile: +264-811413229; **Email:** smwiya@rbs.com.na

Global Office / URL: www.rbs.com.na

ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Dr. Sindila Mwiya

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

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NON-TECHNICAL SUMMARY

Stoneheart Investments (Pty) Ltd (the Proponent) holds mineral rights for base and rare metals, dimension stone, industrial minerals, non-nuclear fuels minerals, precious metals and precious stones under the Exclusive Prospecting Licence (EPL) No. 4721 granted on the 10/09/2011 and will expire on the 26/05/2024. The Exclusive Prospecting Licence (EPL) No 4721 measuring 18887.7035 Ha is located in the Rehoboth Rural District of the Hardap Region in the south-Central Namibia. The proponent intends to implement an exploration programme aimed at searching or prospecting for possible economic minerals resources within the EPL 4721 area.

This updated Scoping and EMP report has been prepared based on the previous Scoping and EMP Report that was completed in 2019 as well as the Environmental Monitoring activities that have been undertaken since 2019 in order to support the application for the renewal of the ECC that was issued on the 27th September 2019 and expired on the 27th September 2022 and need to be renewed.

The EPL are falls within It is estimated that at least 60-82 species of larger trees and shrubs (>1m) (Coats Palgrave 1983, Curtis & Mannheimer 2005, Mannheimer & Curtis 2009 & Van Wyk & Van Wyk 1997) and at least 10-89 (approximately 100 species) grasses (Burke 2007, Müller 1984, Müller 2007, Van Oudshoorn 1999, Van Rooyen 2001) occur in the general Rehoboth area. It is estimated that at least 77 reptile, 9 amphibian, 73 mammal and 209 bird species (breeding residents) are known to or expected to occur in the general/immediate Rehoboth area of which a large proportion are endemics species. Endemics species include at least 27% of the reptiles, 33% of the amphibians, 11% of the mammals and 71% (10 of the 14 Namibian endemics species) of all the breeding and/or resident birds known and/or expected to occur in the general area.

The effect that the proposed exploration and associated infrastructure would have on the fauna and flora would depend on the extent of the development, area of development, management of the area and how the proposed mitigations are eventually implemented by the proponent (Stoneheart Investments). Access and maintenance routes would have the most impact on the surroundings although these would also be negligible if new accesses are constructed properly, avoided sensitive habitats such as Swartmodder Ephemeral River channel and track discipline (including no killing/poaching fauna along these routes) is adhered to and/or enforced.

The following is the summary of the likely environmental impacts of the proposed exploration / prospecting activities on the receiving environment (physical, biological and socioeconomic environments) without and with mitigations:

- (i) Initial desktop exploration activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible as no field-based activities will be undertaken.
- (ii) Regional reconnaissance field-based activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible. Some field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations. Overall significant impacts will be negligible.
- (iii) Initial local field-based activities: Initial field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations. Overall significant impacts will be negligible. All desktop related activities and laboratory assessments will have negligible impacts with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible, and.
- (iv) Detailed local field-based activities: Overall likely negative impact on the receiving environment will be high and localised impacts without mitigations and localised low impacts with mitigations. Overall significant impacts will be medium without mitigations and low with mitigations.

Current proposed main mineral exploration field-based activities covering mapping, geochemical sampling and drilling will have low localised impacts on the local receiving environment with low significant impacts. Based on the findings of this Environmental Assessment Study covering Environmental Scoping and Environmental Impact Assessment (EMP), it's hereby recommended that the proposed exploration activities be issued with an Environmental Clearance Certificate (ECC) with key conditions of adhering to all the provisions of the EMP, requirement and conditions of the Access Agreement and all applicable national regulations. Mitigation measures must be implemented as detailed in Section 6 (EMP) of this report. The proponent (Stoneheart Investments (Pty) Ltd) must obtain permission of the land owners (surface rights holders) before exercising their subsurface rights in all the farms covered by the EPL 4721.

If additional and more detailed boreholes drilling activities need to be undertaken, extensive environmental monitoring including groundwater monitoring must be undertaken. The groundwater monitoring should include water levels monitoring and sampling on a bi-annual basis, and that the affected landowners / farmers must have access to the results of the water monitoring analyses as part of the stakeholder disclosure requirements.

Once a viable project has been identified (economic resources are discovered) and separate field-based and site-specific Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) must be implemented as part of the prefeasibility and feasibility study with respect to the test mining or possible mining operations. The site-specific EIA and EMP shall cover the area identified to have potential economic minerals resources. The following specialist studies shall be undertaken as part of the EIA and EMP for possible test mining or mining operations: Groundwater studies, flora, fauna, socioeconomic and others as may be identified / recommended by the stakeholders/ land owners/ Environmental Commissioner or specialists.

1. BACKGROUND

1.1 Introduction

Stoneheart Investments (Pty) Ltd (the Proponent) holds mineral rights for base and rare metals, dimension stone, industrial minerals, non-nuclear fuels minerals, precious metals and precious stones under the Exclusive Prospecting Licence (EPL) No. 4721 granted on the 10/09/2011 and will expire on the 26/05/2024. The proponent wants to continue with the exploration or prospecting for the licensed minerals group associated with the various Damara Rocks found within the EPL area. These local rocks are known to host economic minerals resources in different parts of Namibia including the known copper deposit at Swartmodder Mine situated just north of the EPL area.

1.2 Regulatory Requirements

The proposed prospecting activities are listed in the Environmental Impact Assessment (EIA) Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007) and cannot be undertaken without an Environmental Clearance Certificate (ECC). The Proponent is required to have a valid ECC for the ongoing and proposed exploration activities. In fulfilment of the environmental requirements, the Proponent appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant and led by Dr Sindila Mwiya as the Environmental Assessment Practitioner (EAP). This updated Scoping and EMP report has been prepared based on the previous Scoping and EMP Report that was completed in June 2019 as well as the Environmental Monitoring activities that have been undertaken from September 2019 to November 2022 in order to support the application for the renewal of the ECC that was issued on the 27th September 2019 (Fig. 1.1).

1.3 Location, Infrastructure and Services

1.3.1 Location

The Exclusive Prospecting Licence (EPL) No 472 measuring 18887.7035 Ha is located in the Rehoboth Rural District of the Hardap Region in the south-Central Namibia (Figs. 1.2 - 1.3). The EPL 4721 is situated about 12 km and 6 km from the centre of the EPL to the Town Rehoboth and the Swartmodder Copper Mine respectively. The general EPL area comprise adulating landscape dominated by number of dendritic Ephemeral River Channels linked to the main Swartmodder Ephemeral River cuts across the EPL area and can cause major access challenges during the rainy season due to hazard of flash flooding (Figs. 1.3 and 1.4).

1.3.2 Infrastructure and Services

The EPL area is accessible via the B1 main road connecting the Town of Rehoboth and Mariental through the small town of Kalkrand (Figs. 1.2-1.4). A number of other major and minor gravel roads connects the EPL area to the B1. Rehoboth is also a major rail station situated between Windhoek and the southern Towns of Kalkrand, Mariental and Keetmanshoop (Figs. 1.3 and 1.4). The main major settlement close to the EPL Area is the Town of Rehoboth. The EPL area has full mobile and fixed telecommunication infrastructure as well as all the related business services such as banking, security and retail. The proposed project will require reliable sufficient water and energy supply.

The proposed / ongoing exploration activities will not require major water and energy supplies. Sources of water supply for minerals exploration will be obtained from local boreholes to be drilled based on the results of the groundwater exploration activities that will be undertaken as part of the geological mapping and drilling operations. Alternatively, a water tanker collecting water from the existing Rehoboth Town Council / NamWater Scheme that supplies water to the town of Rehoboth.

Electricity supply will be provided by diesel generators and solar as may be required. In an event of a discovery of economic minerals deposit that could be developed into a mining project, the sources of water supply will be provided by NamWater from existing Oanob Dam water supply scheme. Electricity supply will be provided by NamPower or Rehoboth Town Council from already existing infrastructure in the area in addition to use of renewable energies sources such as solar and possible wind.



REPUBLIC OF NAMIBIA
MINISTRY OF ENVIRONMENT AND TOURISM
OFFICE OF THE ENVIRONMENTAL COMMISSIONER

ENVIRONMENTAL CLEARANCE CERTIFICATE

ISSUED

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

TO

Stoneheart investments(Pty)Ltd
P O Box 26826, No. 6 Amasoniet Street, Eros, Windhoek, Namibia.

TO UNDERTAKE THE FOLLOWING, LISTED ACTIVITY

**Exclusive Prospecting Licence (Exploration) EPL 4721, Rehoboth
District, Hardap Region.**



DEPUTY ENVIRONMENTAL COMMISSIONER

Issued on the date: **2019-09-27**

Expires on this date: **2022-09-27**

(See conditions printed over leaf)

This certificate is printed without erasures or alterations



Figure 1.1: Copy of the ECC granted on the 27th September 2019 and expired on the 27th September 2022 and need to be renewed.



Figure 1.2: Regional location of the EPL 4721.

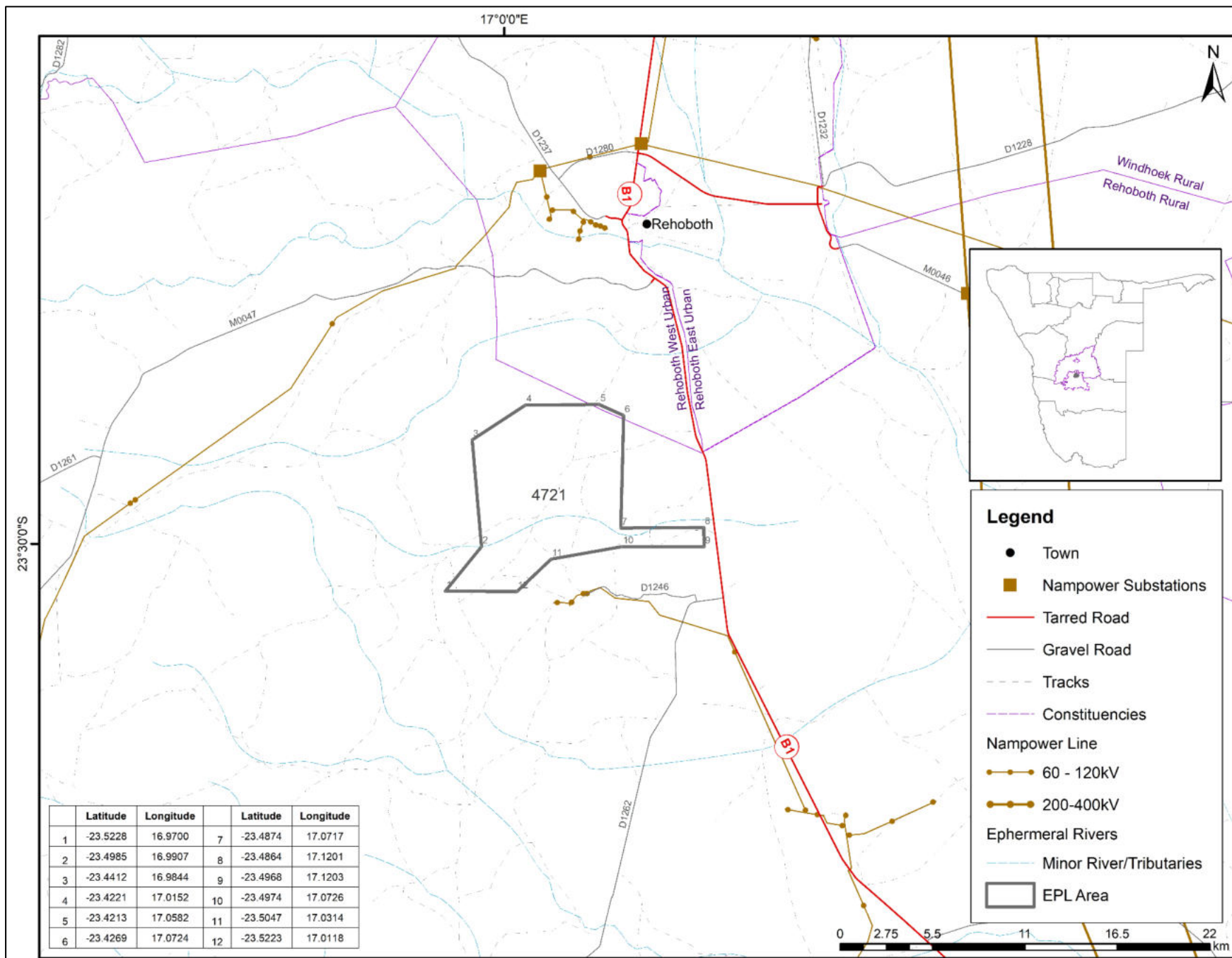


Figure 1.3: Detailed regional location of the EPL 4721.

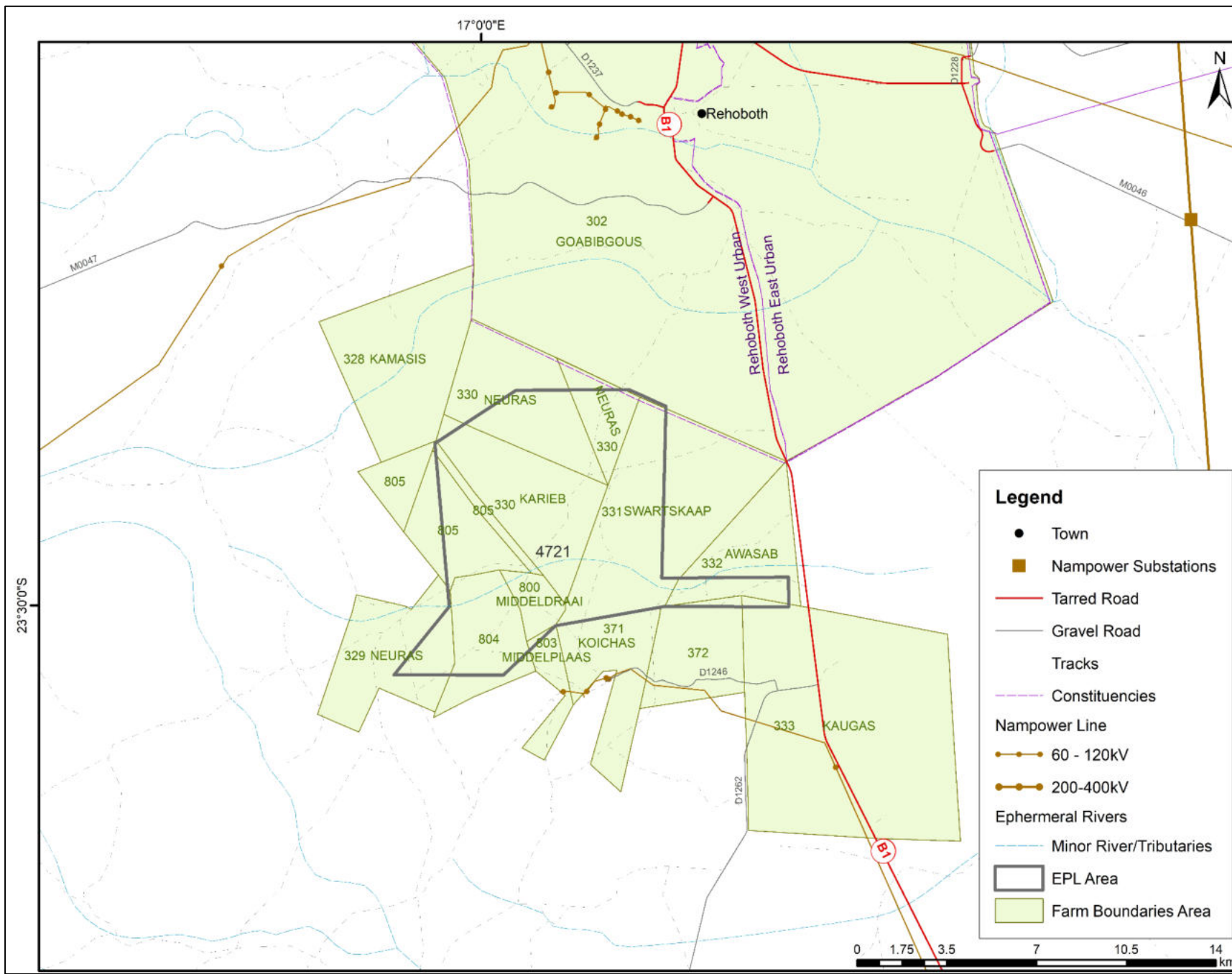


Figure 1.4: Farmlands covered by the EPL 4721 Area.

1.4 Project Motivation

The EPL 4721 is situated in a highly perspective area for copper, gold and dimension stones (granite) with possible platinum with less competing land uses. Known copper deposit occur at Swartmodder Mine situated to the north of the EPL 4721.

Based on the old mine workings / excavations found around the EPL area, both copper and gold are historically known to have been explored and mined at small-scale levels within the EPL area. Based on the limited exploration activities undertake to date, there is good probability for discovering economic minerals resources within the EPL 4721.

The ongoing and proposed exploration activities have very limited local community socioeconomic benefits. Key exploration benefits are only linked to the payment of the annual license rental fees to the Central Government and value addition to the potential underground mineral resources in the area which otherwise would not have been known if the exploration did not take place.

In an event of a discovery of economic minerals resources, the likely new mining project will have much greater local, regional and national socioeconomic benefits in terms of capital investments, license rental fees, royalties payable to Government, direct and indirect contracts and employment opportunities, export earnings, foreign direct investments and various taxes payable to the Government.

1.5 Approach, Alternatives, Key Issues and Methodology

1.5.1 Terms of Reference (ToR) and Approach

Risk-Based Solutions (RBS) was appointed by the Proponent to prepare this updated Scoping and Environmental Management Plan (EMP) based on the approved screening by the Environmental Commissioner in order to support the application for renewal of the Environmental Clearance Certificate (ECC) for the EPL No. 4721 with respect to the ongoing and proposed exploration activities.

The environmental assessment and management process reviewed the key components of the receiving environmental settings (physical, biological, socioeconomic and ecosystem services, function, use values and non-use) with respect to the ongoing and proposed exploration activities, identified the impacts and then assessed the likely impacts (positive and negative) on the receiving environment (Table 1.1).

The key deliverable comprises this updated Scoping and EMP Report as per the provisions of the confirmation of screening notice send to the Proponent by the Environmental Commissioner through email in terms of the assessment procedures (Section 35 (1)(a)(b) of the Environmental Management Act, No 7 of 2007).

The updated environmental report and the completed Application for Environmental Clearance Certificate (ECC) will be submitted to the client (Proponent) and the Office of the Environmental Commissioner, Department of Environmental Affairs and Forestry (DEAF), Ministry of Environment, Forestry and Tourism (MEFT) through the Mining Commissioner in Ministry of Mines and Energy (the Competent Authority) for review and issue of the Record of Decision (RD).

The environmental assessment processes has been 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 that have been applied are all in conformity to the national regulatory requirements, process and specifications in Namibia as required by Ministry of Mines and Energy (MME), Ministry of Environment, Forestry and Tourism (MEFT) and the client (Proponent).

This Scoping and EMP Report has been prepared in line with the January 2015 MEFT Environmental Assessment Reporting Guideline.

Table 1.1: Summary of the proposed / ongoing activities, alternatives and key issues considered during the Environmental Assessment (EA) process covering Scoping, EIA and EMP Processes.

PROPOSED / ONGOING PROJECT ACTIVITIES	ALTERNATIVES TO BE CONSIDERED	KEY ISSUES EVALUATED AND ASSESSED WITH ENVIRONMENTAL MANAGEMENT PLAN (EMP) / MITIGATION MEASURES DEVELOPED	
(i) Initial desktop exploration activities (review of existing information and all previous activities in order identify any potential target/s) (ii) Regional reconnaissance field-based activities such mapping and sampling to identify areas with potential targets (iii) Initial local field-based activities such as widely spaced mapping, sampling, surveying and possible drilling in order to determine the viability of any delineated targets (iv) Detailed local field-based activities such very detailed mapping, sampling, surveying and possible drilling in order to determine the feasibility of any delineated local target (v) Prefeasibility and feasibility studies to be implemented on a site-specific area if the local field-based studies prove positive	(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.	Potential land use conflicts / opportunities for coexistence between proposed / ongoing exploration and other existing land uses such as conservation, tourism and agriculture	
	(ii) Other Alternative Land Uses: Game Farming, Tourism and Agriculture (iii) Ecosystem Function (What the Ecosystem Does. (iv) Ecosystem Services.	Impacts on the Physical Environment Natural Environment such as air, noise, water, dust etc. Built Environment such as existing houses, roads, transport systems, Buildings, energy and water and other supporting infrastructure Socioeconomic, archaeological and Cultural impacts on the local societies and communities	
	(v) Use Values. (vi) Non-Use, or Passive Use. (vii) The No-Action Alternative	Impacts on the Biological Environment Flora Fauna Habitat Ecosystem functions, services, use values and non-Use or passive use	

1.5.2 Environmental Assessment Process and Steps

The environmental assessment process adopted 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. 1.5.

1.5.3 Assumptions and Limitations

The following assumptions and limitations underpin the approach adopted, overall outcomes and recommendations for this study:

- ❖ The proposed exploration activities as well as all the plans, maps, EPL Boundary / coordinates and appropriate data sets received from the Proponent, project partners, regulators, Competent Authorities and specialist assessments are assumed to be current and valid at the time of conducting the studies and compilation of this environmental report.
- ❖ The impact assessment outcomes, mitigation measures and recommendations provided in this report are valid for the entire duration of the proposed exploration / prospecting activities.
- ❖ A precautionary approach has been adopted in instances where baseline information was insufficient or unavailable or site-specific locations of the proposed project activities is not yet available, and.
- ❖ Mandatory timeframes as provided for in the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 and the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007) have been observed and will apply to the review and decision of this report by the Competent Authority and the Environmental Commissioner.

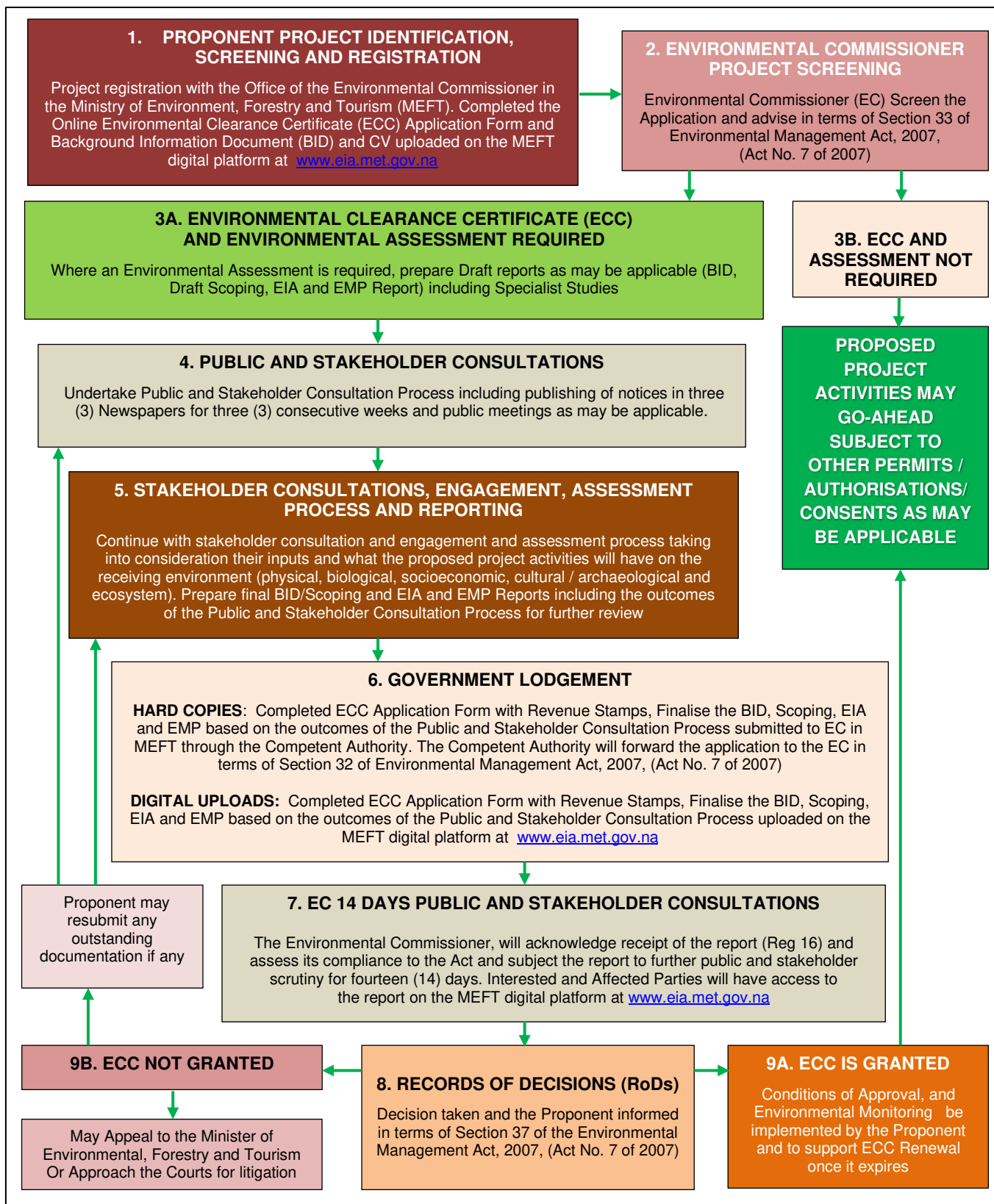


Figure 1.5: RBS Schematic presentation of Namibia's Environmental Assessment Procedure.

1.6 Structure of the Report

The following is the summary structure outline of this scoping and EMP report.

- ❖ **Section 1: Background** covering the proposed project location with available infrastructure and services.
- ❖ **Section 2: Project Description** covering the summary of the proposed project exploration activities.
- ❖ **Section 3: Regulatory Framework** covering the proposed exploration with respect to relevant legislation, regulations and permitting requirements.
- ❖ **Section 4: Receiving Environment** covering physical, biological and socioeconomic environments of the proposed project area.
- ❖ **Section 5: Impact Assessment** covering the likely positive and negative impacts the proposed project activities are likely to have on the receiving environment.
- ❖ **Section 6: Environmental Management Plan (EMP)** describing the detailed mitigation measures with respect to the identified likely impacts.
- ❖ **Section 7: Conclusions and Recommendations-** Summary of the findings and way forward.
- ❖ **SECTION 8: Annexes**

2. DESCRIPTION OF THE EXPLORATION

2.1 General Overview

The overall aim of the proposed project activities (exploration / prospecting programme) is to search for potential economic minerals resources as licensed within the EPL area. The scope of the required field-based support and logistical activities will depend on the scale of proposed exploration activities to be undertaken.

The proposed exploration activities will be supported by existing tracks and campsites / farmstead as well as existing accommodation in the area. In the absence of existing tracks, the field team will create such new tracks with the permission of the land owner/s and depending on the scale of exploration.

In the absence of existing suitable campsite / farmstead, temporary camp will be setup at suitable locations within the EPL area in line with the EMP provisions. The size of the exploration camp will be of very limited footprints during the exploration phase but may be expanded for the test mining and mine development phases in an event of a discovery of economic minerals resources.

2.2 Logistical Arrangements

Before any site visit, permission will be requested from the land owner/s and an access agreement could be negotiated with the land owner/s if the Proponent want to continue with further field-based activities such as detailed mapping, trenching or drilling activities as may be required.

It is the responsibility of the Proponent to negotiate access agreements with the land owners and to make sure that all security measures to protect the farmland and interests of the land owner/s are always observed and as may be agreed with the individual land owners.

Even if the mapping or drilling finds some indications of mineralisation, it takes many years (5 - 10 years or even more) to move an exploration / prospecting project to a mining stage and so many technical inputs including technology, markets, costs environmental liabilities and cost of services such water, roads and energy will need to form part of the project developmental stages, starting with the scoping, prefeasibility and then feasibility phases.

If a project is feasible, then the company will need to apply for a separate Mining License (ML) from the Government and a land owner agreement is required and mandatory before a Mining License is granted by Mining Commissioner. A Mining License application requires separate detailed site-specific studies of the local area of interest to have been conducted as part of the feasibility study.

Environmental Impact Assessment (EIA), Environmental Management Plan (EMP) and specialist studies such as water, fauna, flora, dust, noise for mining operations as well as linear structures such as water, roads and powerline form part of the feasibility study to be conducted before such a project can even be considered for review by the Government.

2.3 Initial Exploration (Desktop Work)

Initial desktop exploration activities (without field-work being conducted) lasting for up to six (6) months or more will include the following:

- (i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data.
- (ii) Purchase and analysis of existing Government high resolution magnetic and radiometric geophysical data.
- (iii) Purchase and analysis of existing Government aerial hyperspectral, and.

- (iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets.

2.4 Regional Reconnaissance Field-Based Exploration Activities

Regional reconnaissance field-based exploration activities lasting between six (6) months to year will involve the following:

- (i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis.
- (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.
- (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.
- (iv) Limited field-based support and logistical activities lasting between one (1) to two (2) days, and.
- (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.

2.5 Initial Local Field-Based Exploration Activities

Initial local field-based exploration activities lasting between 1 – 2 years will include the following:

- (i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities.
- (ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken.
- (iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above).
- (iv) Possible Trenching (Subject to the outcomes of i - iii above).
- (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), and.
- (vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets.

2.6 Detailed Local Field-Based Exploration Activities

Detailed local field-based exploration activities that can take many years will include the following:

- (i) Access preparation and related logistics to support activities.
- (ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities.
- (iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken.

- (iv) Ground geophysical survey, trenching, drilling, and sampling (Subject to the positive outcomes of i and ii above).

2.7 Prefeasibility and Feasibility Studies

The preparation of the prefeasibility and feasibility studies forms the final stages of the minerals exploration process and can take many years to complete and prove that a specific mineral deposit is viable for developing a mine.

A positive feasibility study outcome is required to support an application for a Mining License (ML). The following is summary of the activities that will form part of a prefeasibility and or feasibility study:

- (i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping.
- (ii) Detailed drilling and bulk sampling and testing for ore reserve calculations.
- (iii) Geotechnical studies for mine design.
- (iv) Mine planning and designs including all supporting infrastructures (water, energy, and access) and test mining activities.
- (v) EIA and EMP to support the ECC for mining operations, and.
- (vi) Preparation of feasibility report and application for Mining License if the feasibility study proves positive and supportive to develop a mining project.

3. LEGISLATIVE FRAMEWORK

3.1 Overview

There are four sources of law in Namibia: (1) statutes (2) common law (3) customary law and (4) international law. These four kinds of law are explained in more detail in the other factsheets in this series. The constitution is the supreme law of Namibia. All other laws must be in line with it. The most important legislative instruments and associated permits/licenses/authorisations/consents/compliances applicable to the proposed exploration activities include: Minerals exploration and mining, environmental management, land rights, water, atmospheric pollution prevention and labour as well as other indirect laws linked to the accessory services of exploration and possible test mining operations.

3.2 Key Applicable Legislation

3.2.1 Minerals Exploration and Mining Legislation

The national legislation governing minerals prospecting and mining activities in Namibia fall within the authority of the Ministry of Mines and Energy (MME) as the Competent Authority (CA) responsible for granting authorisations. The Minerals (Prospecting and Mining) Act (No 33 of 1992) is the most important legal instrument governing minerals prospecting and mining activities in Namibia. A new Bill, to replace the Minerals (Prospecting and Mining) Act (No 33 of 1992) is being prepared and puts more emphasis on good environmental management practices, local participation in the mining industry and promotes value addition as prescribed in the Minerals Policy of 2003. The Minerals (Prospecting and Mining) Act (No 33 of 1992) regulates reconnaissance, prospecting (exploration) and mining activities. The Mining Commissioner, appointed by the Minister, is responsible for implementing the provisions of this Act including reporting requirements, environmental obligations as well as the associated regulations such as the Health and Safety Regulations

3.2.2 Environmental Management Legislation

The Environmental Assessment (EA) process in Namibia is governed by the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007) in the Ministry of Environment, Forestry and Tourism (MEFT). The objectives of the Act and the Regulations are, among others, to promote the sustainable management of the environment and the use of natural resources to provide for a process of assessment and control of activities which may have significant effects on the environment. The Minister of Environment, Forestry and Tourism (is authorised to list activities which may only be undertaken if an environmental clearance certificate has been issued by the environmental commissioner, which activities include those relating to exploration and mining operations. In addition to the requirements for undertaking Environmental Assessment prior to the project implementation, the Environmental Management Act and the EIA Regulations also provide for obligations of a license holder to provide for project rehabilitation and closure plan. In the regulations, the definition of “rehabilitation and closure plan” is a plan which describes the process of rehabilitation of an activity at any stage of that activity up to and including closure stage.

3.2.3 Water Legislation

Water Act 54 of 1956 under the Minister of Agriculture, Water and Land Reform (MAWLR) provides for the control, conservation and use of water for domestic, agricultural, urban and industrial purposes. In terms of Section 6, there is no right of ownership in public water and its control and use is regulated and provided for in the Act. In accordance with the Act, the proposed exploration must ensure that mechanisms are implemented to prevent water pollution. Certain permits will also be required to abstract groundwater as well as for “water works”. The broad definition of water works will include the reservoir on site (as this is greater than 20,000m³), water treatment facilities and pipelines. Due to the water scarcity of the area, all water will be recycled (including domestic wastewater). The Act requires the license holder to have a wastewater discharge permit for discharge of effluent. The Water Act 54 of 1956 is due to be replaced by the Water Resources Management Act 24 of 2004 which is currently

being revised. The Water Resource Management Act 2004 *provides for the management, development, protection, conservation and use of water resources.*

3.2.4 Forest Regulations and Permit Requirements

All forms of trees and wood harvesting anywhere in Namibia, is governed by the Forest Act, 2001, (Act No. 12 of 2001). and its Regulations, 2015. The Act also governs activities which take place in classified forests, namely State Forests, Forestry Management Areas and Community Forests as well as non-classified forest areas. This Act is administered by the Directorate of Forestry (DoF) in the Ministry of Environment, Forestry and Tourism (MEFT).

3.2.5 Atmospheric Pollution Prevention Legislation

The Atmospheric Pollution Prevention Ordinance, 11 of 1976 falling under the Ministry of Health and Social Services (MHSS) provide for the prevention of the pollution of the atmosphere, and for matters incidental thereto. Part III of the Act sets out regulations pertaining to atmospheric pollution by smoke. While preventative measures for dust atmospheric pollution are outlined in Part IV and Part V outlines provisions for Atmospheric pollution by gases emitted by vehicles.

3.2.6 Labour, Health and Safety Legislations

The Labour Act, 1992, Act No. 6 of 1992 as amended in the Labour Act, 2007 (Act No. 11 of 2007), falling under the Ministry of Labour, Industrial Relations and Employment Creation (MLIREC) refers to severance allowances for employees on termination of a contract of employment in certain circumstances and health, safety, and welfare of employees. In terms of the Health Safety and Environment (HSE), the Labour Act, 2007 protects employees and every employer shall, among other things: provide a working environment that is safe, without risk to the health of employees, and that has adequate facilities and arrangements for the welfare of employees, provide and maintain plant, machinery and systems of work, and work processes, that are safe and without risk to the health of employees, and ensure that the use, handling, storage or transportation of hazardous materials or substances is safe and without risk to the health of employees. All hazardous substances shall have clear exposure limits and the employer shall provide medical surveillance, first-aid and emergency arrangements as fit for the operation.

3.2.7 Other Applicable National Legislations

Other Important legislative instruments applicable to the proposed exploration operations include the following (Table 3.1):

- ❖ Explosives Act 26 of 1956 (as amended in SA to April 1978) – Ministry of Home Affairs, Immigration, Safety and Security (MHAISS).
- ❖ National Heritage Act 27 of 2004 – Ministry of Education, Arts and Culture (MEAC).
- ❖ Petroleum Products and Energy Act 13 of 1990 – Ministry of Mines and Energy (MME).
- ❖ Nature Conservation Ordinance, No. 4 of 1975 – Ministry of Environment, Forestry and Tourism (MEFT).
- ❖ Forest Act 12 of 2001 – Ministry of Environment, Forestry and Tourism (MEFT).
- ❖ Hazardous Substances Ordinance 14 of 1974 – Ministry of Health and Social Services (MHSS), and.
- ❖ Public Health Act 36 of 1919 – Ministry of Health and Social Services (MHSS).

Table 3.1 summarises the key selected legislations relevant applicable to the proposed exploration.

Table 3.1: Legislation relevant to the proposed exploration operations.

LAW	SUMMARY DESCRIPTION
<p>Constitution of the Republic of Namibia, 1990</p>	<p>The Constitution is the supreme law in Namibia, providing for the establishment of the main organs of state (the Executive, the Legislature, and the Judiciary) as well as guaranteeing various fundamental rights and freedoms. Provisions relating to the environment are contained in Chapter 11, article 95, which is entitled "promotion of the Welfare of the People". This article states that the Republic of Namibia shall – "actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at ... maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilisation of living natural resources on a sustainable basis for all Namibians, both present and future. The Government shall provide measures against the dumping or recycling of foreign nuclear waste on Namibian territory."</p>
<p>Minerals (Prospecting and Mining) Act, 1992 Ministry of Mines and Energy (MME)</p>	<p>The Minerals Act governs minerals prospecting and mining. The Act <i>provides for the reconnaissance, prospecting, and mining for, and disposal of, and the exercise of control over minerals in Namibia. and to provide for matters incidental thereto. A new Minerals Bills is currently under preparation.</i></p>
<p>Environmental Management Act (2007) - Ministry of Environment, Forestry and Tourism (MEFT)</p>	<p>The purpose of the Act is <i>to give effect to Article 95(l) and 91(c) of the Namibian Constitution by establishing general principles for the management of the environment and natural resources. to promote the co-ordinated and integrated management of the environment. to give statutory effect to Namibia's Environmental Assessment Policy. to enable the Minister of Environment and Tourism to give effect to Namibia's obligations under international conventions.</i> In terms of the legislation it will be possible to exercise control over certain listed development activities and activities within defined sensitive areas. The listed activities in sensitive areas require an Environmental Assessment to be completed before a decision to permit development can be taken. The legislation describes the circumstances requiring Environmental Assessments. Activities listed as per the provisions of the Act will require Environmental Assessment unless the Ministry of Environment, Forestry and Tourism, in consultation with the relevant Competent Authority, determines otherwise and approves the exception.</p>
<p>Water Act 54 of 1956 Minister of Agriculture, Water and Land reform (MAWLR)</p>	<p>This Act provides for the control, conservation and use of water for domestic, agricultural, urban, and industrial purposes. In terms of Section 6, there is no right of ownership in public water and its control and use is regulated and provided for in the Act. In accordance with the Act, the proposed project must ensure that mechanisms are implemented to prevent water pollution. Certain permits will also be required to abstract groundwater (already obtained) as well as for "water works". The broad definition of water works will include the reservoir on Site (as this is greater than 20,000m³), water treatment facilities and pipelines. Due to the water scarcity of the area, all water will be recycled (including domestic wastewater) and the Mine will be operated on a zero-discharge philosophy. It will, therefore, not be necessary to obtain permits for discharge of effluent.</p> <p>Section 23 of the Act requires environment rehabilitation after closure of the Mine, particularly, in this instance to obviate groundwater pollution and potential pollution resulting from run-off. This Act is due to be replaced by the Water Resources Management Act 24 of 2004.</p>
<p><i>Forest Act 12 of 2001</i> - Minister of Environment, Forestry and Tourism (MEFT)</p>	<p>The Act provide for the establishment of a Forestry Council and the appointment of certain officials. to consolidate the laws relating to the management and use of forests and forest produce. to provide for the protection of the environment and the control and management of forest fires.</p> <p>Under Part IV Protection of the environment, Section 22(1) of the Act, it is unlawful for any person to: cut, destroy, or remove:</p> <p>(a) any vegetation which is on a sand dune or drifting sand or in a gully unless the cutting, destruction or removal is done for the purpose of stabilising the sand or gully or</p> <p>(b) any living tree, bush or shrub growing within 100m of a river, stream, or watercourse.</p> <p>Should either of the above be unavoidable, it will be necessary to obtain a permit from the Ministry. Protected tree species as listed in the Regulations shall not be cut, destroyed, or removed.</p>
<p>Hazardous Substance Ordinance 14 of 1974 Ministry of Health and Social Services</p>	<p>Provisions for hazardous waste are amended in this act as it provides <i>"for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances. to provide for the prohibition and control of the importation, sale, use, operation, application, modification, disposal or dumping of such substance. and to provide for matters connected therewith"</i></p>

Table 3.1: Cont.

<p>Agricultural (Commercial) Land Reform Act, 1995, Act No.6 of 1995 Ministry of Agriculture, Water and Land Reform (MAWLR)</p>	<p>This Act provide for the acquisition of agricultural land by the State for the purposes of land reform and for the allocation of such land to Namibian citizens who do not own or otherwise have the use of any or of adequate agricultural land, and foremost to those Namibian citizens who have been socially, economically or educationally disadvantaged by past discriminatory laws or practices. to vest in the State a preferent right to purchase agricultural land for the purposes of the Act. to provide for the compulsory acquisition of certain agricultural land by the State for the purposes of the Act. to regulate the acquisition of agricultural land by foreign nationals. to establish a Lands Tribunal and determine its jurisdiction. and to provide for matters connected therewith.</p>
<p>Explosives Act 26 of 1956 (as amended in SA to April 1978) - Ministry Home Affairs, Immigration, Safety and Security (MHAISS)</p>	<p>All explosive magazines are to be registered with the Ministry of Mines and Energy as accessory works. In addition, the magazines must be licensed as required by Section 22. The quantity of explosives and the way it is stored must be approved by an inspector. The inspector has powers to enter the premises at any time to conduct inspections regarding the nature of explosive, quantity and the way it is stored. At closure, all explosives are to be disposed of accordingly.</p>
<p>Atmospheric Pollution Prevention Ordinance 11 of 1976. Ministry of Health and Social Services (MHSS)</p>	<p>This regulation sets out principles for <i>the prevention of the pollution of the atmosphere and for matters incidental thereto</i>. Part III of the Act sets out regulations pertaining to atmospheric pollution by smoke. While preventative measures for dust atmospheric pollution are outlined in Part IV and Part V outlines provisions for Atmospheric pollution by gases emitted by vehicles.</p>
<p>The Nature Conservation Ordinance, Ordinance 4 of 1975, Ministry of Environment, Forestry and Tourism (MEFT)</p>	<p>During the Mine's activities, care must be taken to ensure that protected plant species and the eggs of protected and game bird species are not disturbed or destroyed. If such destruction or disturbance is inevitable, a permit must be obtained in this regard from the Minister of Environment, Forestry and Tourism. Should the Proponent operate a nursery to propagate indigenous plant species for rehabilitation purposes, a permit will be required. At this stage, however, it is envisaged that this type of activity will be contracted out to encourage small business development.</p>
<p>Labour Act, 1992, Act No. 6 of 1992 as amended in the Labour Act, 2007 (Act No. 11 of 2007 Ministry of Labour, Industrial Relations and Employment Creation (MLIREC)</p>	<p>The labour Act gives effect to the constitutional commitment of Article 95 (11), to promote and maintain the welfare of the people. This Act is aimed at establishing a <i>comprehensive labour law for all employees. to entrench fundamental labour rights and protections. to regulate basic terms and conditions of employment. to ensure the health, safety and welfare of employees</i> under which provisions are made in chapter 4. Chapter 5 of the act improvises on the <i>protection of employees from unfair labour practice</i>.</p>
<p>Petroleum Products and Energy Act 13 of 1990 Ministry of Mines and Energy (MME)</p>	<p>Any consumer installation as envisaged in this Act must be licensed. Appropriate consumer installation certificate will need to be obtained from the Ministry for each fuel installation. The construction of the installation must be designed in such a manner as to prevent environmental contamination.</p> <p>Any certificate holder or other person in control of activities related to any petroleum product is obliged to report any major petroleum product spill (defined as a spill of more than 200ℓ per spill) to the Minister. Such person is also obliged to take all steps as may be necessary in accordance with good petroleum industry practices to clean up the spill. Should this obligation not be met, the Minister is empowered to take steps to clean up the spill and to recover the costs thereof from the person.</p> <p>General conditions apply to all certificates issued. These include conditions relating to petroleum spills and the abandonment of the Site. The regulation further provides that the Minister may impose special conditions relating to the preparation and assessment of environmental assessments and the safe disposal of petroleum products.</p>
<p>National Heritage Act 27 of 2004 Ministry of Education, Arts and Culture (MEAC)</p>	<p>This Act provides provisions for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. The proposed activities will ensure that if any archaeological or paleontological objects, as described in the Act, are found during the implementation of the activities, such a find shall be reported to the Ministry immediately. If necessary, the relevant permits must be obtained before disturbing or destroying any heritage</p>

3.3 Key Regulators / Competent Authorities

Government agencies with permits responsibilities over the proposed project activities are shown in Tables 3.2 and 3.3. Table 3.3 shows the relevant permits / licenses required with respect to the proposed minerals exploration activities.

Table 3.2: Government agencies regulating environmental protection in Namibia.

AUTHORITY	TYPE OF AUTHORISATION
Office of the Environmental Commissioner (OEC), Ministry of Environment, Forestry and Tourism	Issue of Environmental Clearance Certificate (ECC) based on the review of the Environmental Assessments (EA) Reports prepared in accordance with the Environmental Management Act (2007) and the Environmental Impact Assessment Regulations, 2012
Directorate of Forestry Ministry of Environment, Forestry and Tourism	<p>Issues the following permits under the Forest Act (Act 12 of 2001) and the Regulations, 2015:</p> <ul style="list-style-type: none"> ❖ A Harvesting Permit is required for any tree cutting and/or harvesting of wood in an area greater than 15 hectares per annum as stated under Section 22 (1), 23 (1), 24 (2and3) and 33 (1and2) of the Forest Act (Act 12 of 2001). The permit is issued by a Licensing officer, and stipulates conditions of the harvesting on the reverse side of the permit. Inspection of an area to be harvested is done before the permit is issued, and when an application for renewal is made every 3 months. ❖ A Transport Permit is required to convey any wood or wood products (e.g., droppers, planks, charcoal, and firewood). It is obtainable from any Forestry Office, and is valid for 7 days. ❖ An Export Permit is required to send any wood or wood products outside Namibia. It is obtainable from any Forestry Office, and is valid for 7 days. ❖ A Marketing permit is required to enable the producer to sell his/her products to any other party. The permit is valid for 3 months in commercial areas while in communal areas the permit is valid for 1 month only. <p>The National Botanical Research Institute's (NBRI) mandate is to study the flora and vegetation of Namibia, to promote the understanding, conservation and sustainable use of Namibia's plants for the benefit of all.</p>
Ministry of Mines and Energy (MME)	Competent Authority overseeing all matters related to petroleum exploration and production activities in Namibia. MME is responsible for issuing of all types of Minerals Licenses / Authorisations.
Ministry of Agriculture, Water and Land Reform	The Directorate of Resource Management within the Department of Water Affairs (DWA) at the MAWLR is currently the lead agency responsible for management of surface and groundwater utilisation through the issuing of abstraction permits and waste water disposal permits. DWA is also the Government agency responsible for water quality monitoring and reporting.

Table 3.3: Summary of the permit register applicable to the proposed minerals exploration activities.

ACTIVITY	APPLICABLE LEGISLATION	PERMITTING AUTHORITY	ASSESSMENT RESULTS
Exclusive Prospecting License (EPL)	Petroleum (Exploration and Production) Act 1991 (Act 2 of 1991) As Amended	Ministry of Mines and Energy (MME)	Issued by MME
Environmental Clearance Certificate (ECC)	Environmental Management Act (2007) and the Environmental Impact Assessment Regulations, 2012	Ministry of Environment, Forestry and Tourism (MEFT)	Proponent to Apply for ECC for mineral exploration activities
Land rights covering the proposed project location	Agricultural (Commercial) Land Reform Act, Act 6 of 1995	Private Commercial Farmland	Proposed exploration does not require any Lease Agreement. Access Agreements and Consents shall always be concluded with individual land owners as applicable
Abstraction of water	Water Resources Management Act, 2004 (No. 284 of 2004).	Ministry of Agriculture, Water and Land Reform (MAWLR)	Freshwater Abstraction and Waste Water Discharge Permits to be Applied for once required.
Discharge of effluents or construction of effluent facility			
Removal, disturbances, or destruction of bird eggs	Nature Conservation Ordinance 4, 1975.	Ministry of Environment, Forestry and Tourism (MEFT)	No removals of protected species or mature trees anticipated during the early stages of exploration. Land clearance might be required during the trenching and drilling operation that might form part of the prefeasibility and feasibility stages and if economic resources are discovered and the Proponent decide to apply for a Mining License. The creation of new access shall be undertaken with the consent of the land owners and the physical land clearance must always be done in line with the provisions of the Forest Act, 2001, Act No. 12 of 2001 and the Regulations 2015
Removal, disturbance of protected plants.			
Removal, harvesting, destruction of indigenous trees, bushes, or plants	Forest Act, 2001, Act No. 12 of 2001 and Regulations (2015)		

3.4 International and Regional Treaties and Protocols

Article 144 of the Namibian Constitution provides for the enabling mechanism to ensure that all international treaties and protocols are ratified. All ratified treaties and protocols are enforceable within Namibia by the Namibian courts and these include the following:

- ❖ The Paris Agreement, 2016.
- ❖ Convention on Biological Diversity, 1992.
- ❖ Vienna Convention for the Protection of the Ozone Layer, 1985.
- ❖ Montreal Protocol on Substances that Deplete the Ozone Layer, 1987.

- ❖ United Nations Framework Convention on Climate Change, 1992.
- ❖ Kyoto Protocol on the Framework Convention on Climate Change, 1998.
- ❖ Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal, 1989.
- ❖ World Heritage Convention, 1972.
- ❖ Convention to Combat Desertification, 1994. and
- ❖ Stockholm Convention of Persistent Organic Pollutants, 2001.
- ❖ Southern Africa Development Community (SADC) Protocol on Mining, and.
- ❖ Southern Africa Development Community (SADC) Protocol on Energy.

3.5 Standards and Guidelines

Industrial effluent likely to be generated by the proposed activities must comply with provisions of the Government Gazette No 217 dated 5 April 1962 (Table 3.4) while the drinking water quality comparative guideline values are shown in Table 3.5. The only key missing components to the regulatory frameworks in Namibia are the standards, and guidelines with respect to gaseous, liquid, and solid emissions. However, in the absence of national gaseous, liquid, and solid emission limits for Namibia, the proposed project shall target the Multilateral Investment Guarantee Agency (MIGA) gaseous effluent emission level and liquid effluent emission levels (Table 3.6). Noise abatement measures must target to achieve either the levels shown in Table 3.7 or a maximum increase in background levels of 3 dB (A) at the nearest receptor location off-site (MIGA guidelines).

Table 3.4: R553 Regional Standards for Industrial Effluent, in Government Gazette No 217 dated 5 April 1962.

Colour, odour and taste	The effluent shall contain no substance in concentrations capable of producing colour, odour or taste	
pH	Between 5.5 and 9.5	
Dissolved oxygen	At least 75% saturation	
Typical faecal coli	No typical faecal coli per 100 ml	
Temperature	Not to exceed 35 °C	
Chemical demand oxygen	Not to exceed 75 mg/l after applying a correction for chloride in the method	
Oxygen absorbed	Not to exceed 10 mg/l	
Total dissolved solids (TDS)	The TDS shall not have been increased by more than 500 mg/l above that of the intake water	
Suspended solids	Not to exceed 25 mg/l	
Sodium (Na)	The Na level shall not have been increased by more than 50 mg/l above that of the intake water	
Soap, oil and grease	Not to exceed 2.5 mg/l	
Other constituents	Residual chlorine	0,1 mg/l as Cl
	Free and saline ammonia	10 mg/l as N
	Arsenic	0,5 mg/l as As
	Boron	1,0 mg/l as B
	Hexavalent Cr	0,05 mg/l as Cr
	Total chromium	0,5 mg/l as Cr
	Copper	1,0 mg/l as Cu
	Phenolic compounds	0,1 mg/l as phenol
	Lead	1,0 mg/l as Pb
	Cyanide and related compounds	0,5 mg/l as CN
	Sulphides	1,0 mg/l as S
	Fluorine	1,0 mg/l as F
	Zinc	5,0 mg/l as Zn

Table 3.5: Comparison of selected guideline values for drinking water quality (after Department of Water Affairs, 2001).

Parameter and Expression of the results			WHO Guidelines for Drinking-Water Quality 2 nd edition 1993		Proposed Council Directive of 28 April 1995 (95/C/13-1/03) EEC		Council Directive of 15 July 1980 relating to the quality intended for human consumption 80/778/EEC		U.S. EPA Drinking water Standards and Health Advisories Table December 1995		Namibia, Department of Water Affairs Guidelines for the evaluation of drinking-water for human consumption with reference to chemical, physical and bacteriological quality July 1991			
			Guideline Value (GV)	Proposed Parameter Value	Guide Level (GL)	Maximum Admissible Concentration (MAC)	Maximum Contaminant Level (MCL)	Group A Excellent Quality	Group B Good Quality	Group C Low Health Risk	Group D Unsuitable			
Temperature	t	°C	-	-	12	25	-	-	-	-	-	-	-	
Hydrogen ion concentration	pH, 25° C	-	R <8.0	6.5 to 9.5	6.5 to 8.5	10	-	-	6.0 to 9.0	5.5 to 9.5	4.0 to 11.0	<4.0 to >11.0		
Electronic conductivity	EC, 25° C	mS/m	-	280	45	-	-	-	150	300	400	>400		
Total dissolved solids	TDS	mg/l	R 1000	-	-	1500	-	-	-	-	-	-		
Total Hardness	CaCO ₃	mg/l	-	-	-	-	-	-	300	650	1300	>1300		
Aluminium	Al	µ g/l	R 200	200	50	200	S	50-200	150	500	1000	>1000		
Ammonia	NH ₄ ⁺	mg/l	R 1.5	0.5	0.05	0.5	-	-	1.5	2.5	5.0	>5.0		
	N	mg/l	-	1.0	0.04	0.4	-	-	1.0	2.0	4.0	>4.0		
Antimony	Sb	µ g/l	P 5	3	-	10	C	6	50	100	200	>200		
Arsenic	As	µ g/l	10	10	-	50	C	50	100	300	600	>600		
Barium	Ba	µ g/l	P 700	-	100	-	C	2000	500	1000	2000	>2000		
Beryllium	Be	µ g/l	-	-	-	-	C	4	2	5	10	>10		
Bismuth	Bi	µ g/l	-	-	-	-	-	-	250	500	1000	>1000		
Boron	B	µ g/l	300	300	1000	-	-	-	500	2000	4000	>4000		
Bromate	BrO ₃ ⁻	µ g/l	-	10	-	-	P	10	-	-	-	-		
Bromine	Br	µ g/l	-	-	-	-	-	-	1000	3000	6000	>6000		
Cadmium	Cd	µ g/l	3	5	-	5	C	5	10	20	40	>40		
Calcium	Ca	mg/l	-	-	100	-	-	-	150	200	400	>400		
	CaCO ₃	mg/l	-	-	250	-	-	-	375	500	1000	>1000		
Cerium	Ce	µ g/l	-	-	-	-	-	-	1000	2000	4000	>4000		
Chloride	Cl ⁻	mg/l	R 250	-	25	-	S	250	250	600	1200	>1200		
Chromium	Cr	µ g/l	P 50	50	-	50	C	100	100	200	400	>400		
Cobalt		µ g/l	-	-	-	-	-	-	250	500	1000	>1000		
Copper after 12 hours in pipe	Cu	µ g/l	P 2000	2	100	-	C	TT##	500	1000	2000	>2000		
		µ g/l	-	-	3000 ¹	-	S	1000	-	-	-	-		
Cyanide	CN ⁻	µ g/l	70	50	-	50	C	200	200	300	600	>600		
Fluoride	F ⁻	mg/l	1.5	1.5	-	at 8 to 12 °C: 1.5	C	4	1.5	2.0	3.0	>3.0		
		mg/l	-	-	-	at 25 to 30 °C: 0.7	P,S	2	-	-	-	-		
Gold	Au	µ g/l	-	-	-	-	-	-	2	5	10	>10		
Hydrogen sulphide	H ₂ S	µ g/l	R 50	-	-	undetectable	-	-	100	300	600	>600		
Iodine	I	µ g/l	-	-	-	-	-	-	500	1000	2000	>2000		
Iron	Fe	µ g/l	R 300	200	50	200	S	300	100	1000	2000	>2000		
Lead	Pb	µ g/l	10	10	-	50	C	TT#	50	100	200	>200		
Lithium	Li	µ g/l	-	-	-	-	-	-	2500	5000	10000	>10000		
Magnesium	Mg	mg/l	-	-	30	50	-	-	70	100	200	>200		
	CaCO ₃	mg/l	-	-	7	12	-	-	290	420	840	>840		
Manganese	Mn	µ g/l	P 500	50	20	50	S	50	50	1000	2000	>2000		
Mercury	Hg	µ g/l	1	1	-	1	C	2	5	10	20	>20		
Molybdenum	Mo	µ g/l	70	-	-	-	-	-	50	100	200	>200		
Nickel	Ni	µ g/l	20	20	-	50	-	-	250	500	1000	>1000		
Nitrate*	NO ₃ ⁻	mg/l	P 50	50	25	50	-	45	45	90	180	>180		
	N	mg/l	-	-	5	11	C	10	10	20	40	>40		
Nitrite*	NO ₂ ⁻	mg/l	3	0.1	-	0.1	-	3	-	-	-	-		
	N	mg/l	-	-	-	-	C	1	-	-	-	-		
Oxygen, dissolved	O ₂	% sat.	-	50	-	-	-	-	-	-	-	-		
Phosphorus	P ₂ O ₅	µ g/l	-	-	400	5000	-	-	-	-	-	-		
	PO ₄ ³⁻	µ g/l	-	-	300	3350	-	-	-	-	-	-		
Potassium	K	mg/l	-	-	10	12	-	-	200	400	800	>800		
Selenium	Se	µ g/l	10	10	-	10	C	50	20	50	100	>100		
Silver	Ag	µ g/l	-	-	-	10	S	100	20	50	100	>100		
Sodium	Na	mg/l	R 200	-	20	175	-	-	100	400	800	>800		
Sulphate	SO ₄ ²⁻	mg/l	R 250	250	25	250	S	250	200	600	1200	>1200		
Tellurium	Te	µ g/l	-	-	-	-	-	-	2	5	10	>10		
Thallium	Tl	µ g/l	-	-	-	-	C	2	5	10	20	>20		
Tin	Sn	µ g/l	-	-	-	-	-	-	100	200	400	>400		
Titanium	Ti	µ g/l	-	-	-	-	-	-	100	500	1000	>1000		
Tungsten	W	µ g/l	-	-	-	-	-	-	100	500	1000	>1000		
Uranium	U	µ g/l	-	-	-	-	P	20	1000	4000	8000	>8000		
Vanadium	V	µ g/l	-	-	-	-	-	-	250	500	1000	>1000		
Zinc after 12 hours in pipe	Zn	µ g/l	R 3000	-	100	-	S	5000	1000	5000	10000	>10000		
		µ g/l	-	-	5000	-	-	-	-	-	-	-		

P: Provisional
R: May give reason to complaints from consumers
C: Current. P: Proposed. S: Secondary.
T#: Treatment technique in lieu of numeric MCL.
TT##: treatment technique triggered at action level of 1300 µ g/l

Table 3.6: Liquid effluent emission levels (MIGA /IFC).

Pollutant	Max. Value
pH	6-9
Total suspended solids	50 mg/l
Total metals	10 mg/l
Phosphorous (P)	5 mg/l
Fluoride (F)	20 mg/l
Cadmium (Cd)	0.1 mg/l

Table 3.7: Noise emission levels (MIGA /IFC).

	Maximum Allowable Leq (hourly), in dB(A)	
	Day time (07:00 – 22:00)	Night time (22:00 – 07:00)
Receptor		
Residential, institutional, educational	55	45
Industrial, commercial	70	70

3.6 Recommendations on Permitting Requirements

It is hereby recommended that the Proponent must follow the provisions of all relevant national regulatory throughout the proposed project lifecycle and must obtain the following permits/authorisations as maybe applicable / required as the proposed project develops:

- (i) Valid EPL as may be applicable from Department of Mines in the MME.
- (ii) Valid ECC from the Department of Environmental Affairs in the MEFT.
- (iii) The Proponent shall apply for a fresh water abstraction and waste water discharge permits from the Department of Water Affairs (DWA) in the MAWLR before drilling a water borehole and discharge wastewater into the environment respectively, and.
- (iv) All other permits as may be applicable for the proposed exploration operations.

4. SUMMARY OF NATURAL ENVIRONMENT

4.1 Regional Climate

Hardap Region is located in a semi-arid area. Throughout the year there is almost no rainfall, however, could vary from 50mm to 300mm decreasing from the east towards the west. The region has vast differences in temperature, which can drop below freezing point in winter and increase to above 40°C in summer. The average annual temperature is 21.8°C. The warmest month of the year is December, with an average of 26.0 °C. The driest month is July and rainfall reaches its peak, with an average of 65mm in February (climate data.org).

In the absence of a weather station in the area climate data of which is the nearest town Tsumispark, has been used. Tsumispark has a desert climate and during the year, there is virtually no rainfall in a year, the rainfall is 242 mm. The average annual temperature is 20.9 °C where the warmest month of the year is December, with an average temperature of 26.0 °C. July is the coldest month of the year (Fig. 4.1 and climate data.org).

The prevailing wind is in the south-eastern direction, with the speed averaging to approximately 1.6 meters per second (mps) as shown in Fig. 4.2.

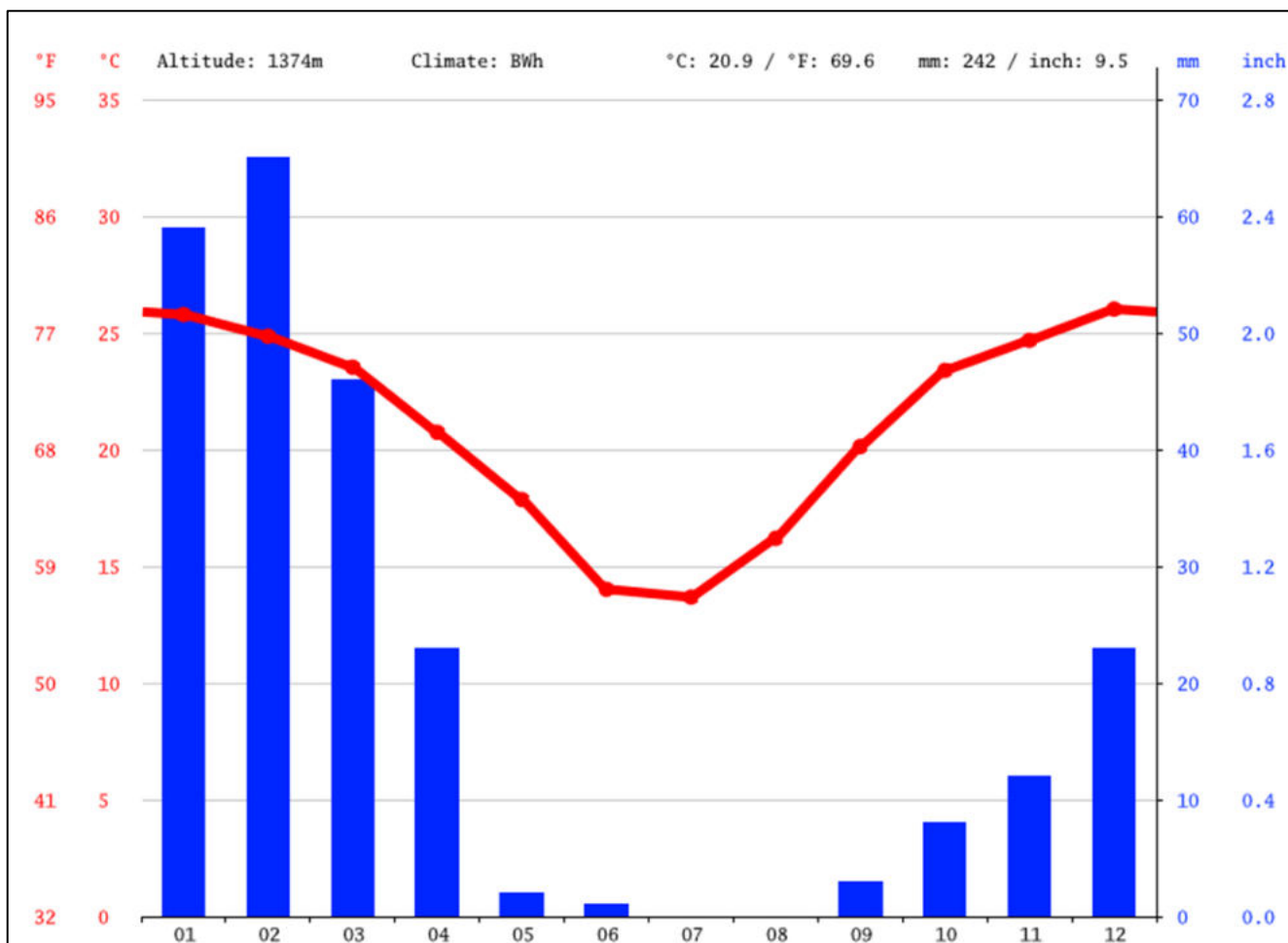


Figure 4.1: Average climate of Tsumispark (Blue bars indicate the average rainfall patterns and red line indicates temperature variation over the year (Source: climate data.org).

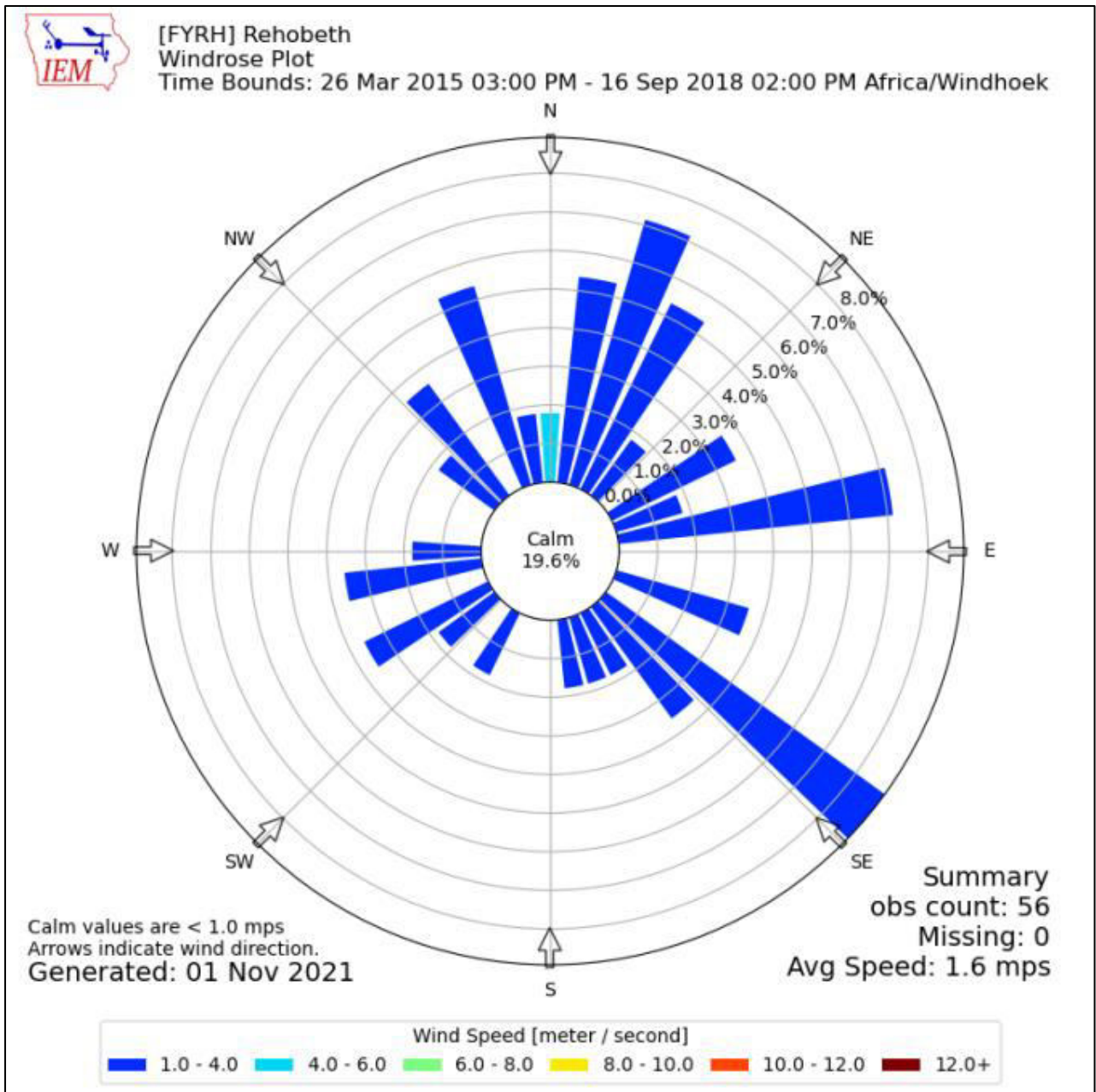


Figure 4.2: Average wind speed in Rehoboth situated, north of the EPL 4721 area (IEM, 2021).

4.2 Topography and Land Use

4.2.1 Topographic Setting

The general topography is very rugged and comprises topographic high areas characterised by dendritic ephemeral rivers network linked to the local major Ephemeral Rivers. Ephemeral Rivers are key habitats and are a vital link to the local ecosystems. Topography around the EPL area average around 1350 mams to 1400mams (Fig. 4.3).

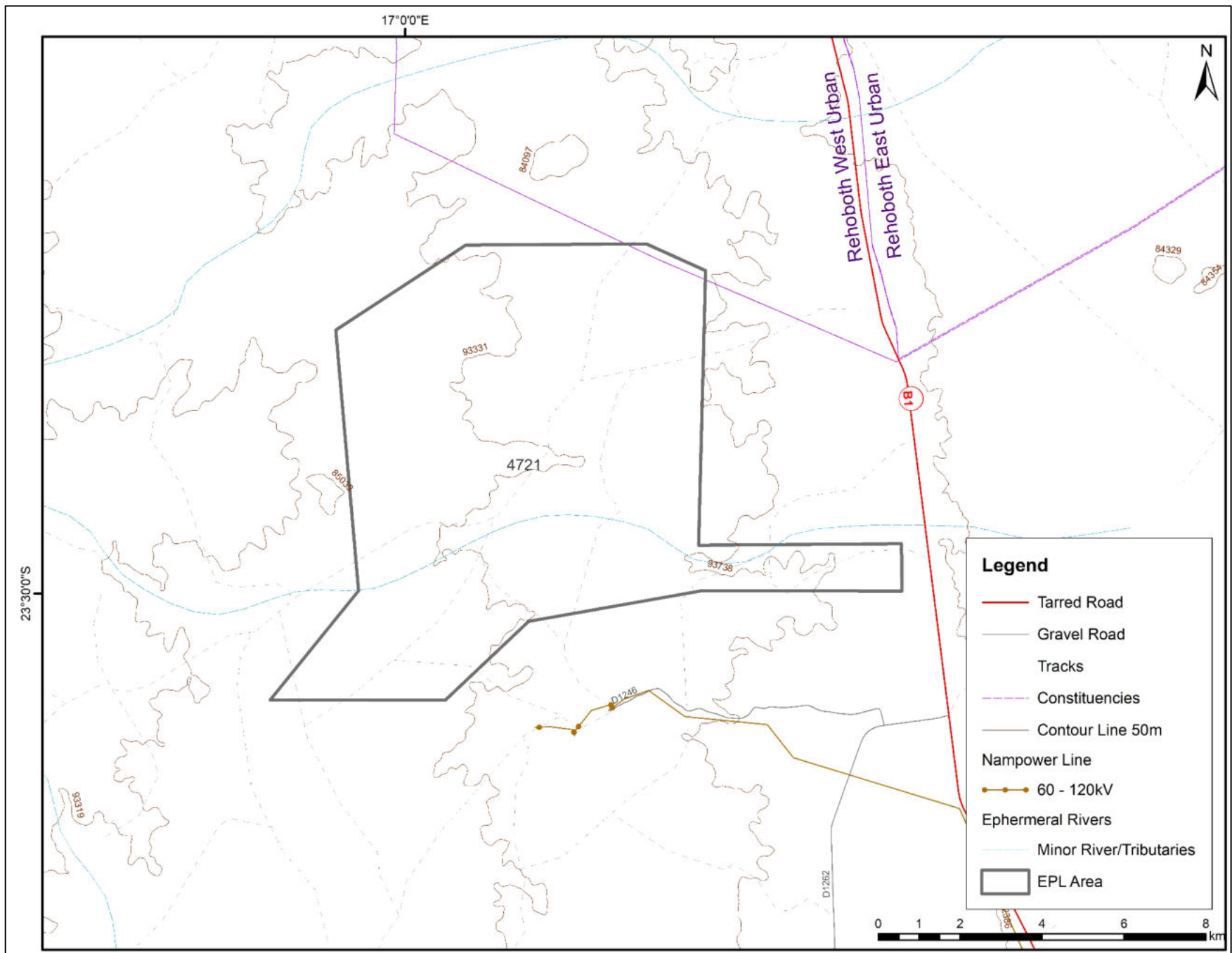


Figure 4.3: General topographic settings around the EPL 4721 area.

4.2.2 Regional and Local Land Use

4.2.2.1 Overview

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 (Fig. 4.4). Other land use activities found in the general surrounding areas includes: agriculture, minerals exploration and growing tourism activities.

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.

4.2.2.2 Agriculture

As an important cattle, game, and small stock (goats and sheep) communal farming area and consequently a source of employment and livelihood as well as renewed interest from a tourism point of view, the importance of the local area is invaluable. The surrounding EPL area falls within the long-established commercial and resettlement farming communities but highly vulnerable to climate change due to its arid environment, recurrent drought, and desertification.

During prolonged drought periods, the situation has forced pastoral farmers to find temporary homage between these mountains as they still contain grazing grass during drought. The farmers are further even forced to climb between the rocks and hills to harvest grass for their animals if it becomes difficult for the animals to climb the mountains.

The carrying capacity for the general area is 10-20kg/ha (Mendelsohn et al. 2002) or 12-15LAU/ha (van der Merwe 1983) and the risk of farming is viewed as relatively high. Small stock farming is the dominant farming activity in the local area with between 70-80% of stock farmed with being sheep and 20-30% goats and cattle, respectively (van der Merwe 1983). The stock density is estimated at <3sheep/km² (1.5% of total sheep in Namibia) and <1cattle/km² (1.3% of total cattle in Namibia) (van der Merwe 1983).

4.2.2.3 Conservation and Tourism

There are numerous existing tourism ventures in the area with the tourism potential viewed as relatively high (Mendelsohn et al. 2002).

The land use of the local area dominated by commercial cattle and small stock agriculture, conservation, tourism and hospitality centred around game farming, and minerals exploration and mining. The game farms are also important conservation areas for endemic and protected flora and act as sanctuaries for endangered faunal species.

The game farms offer visitors the opportunity to be close to nature with a variety of tailor-made tourism products such game viewing, trails and hunting activities. Bush thickening or encroachment is viewed as an economic problem in the general area. The EPL area is not part of the communal or commercial conservancy system.

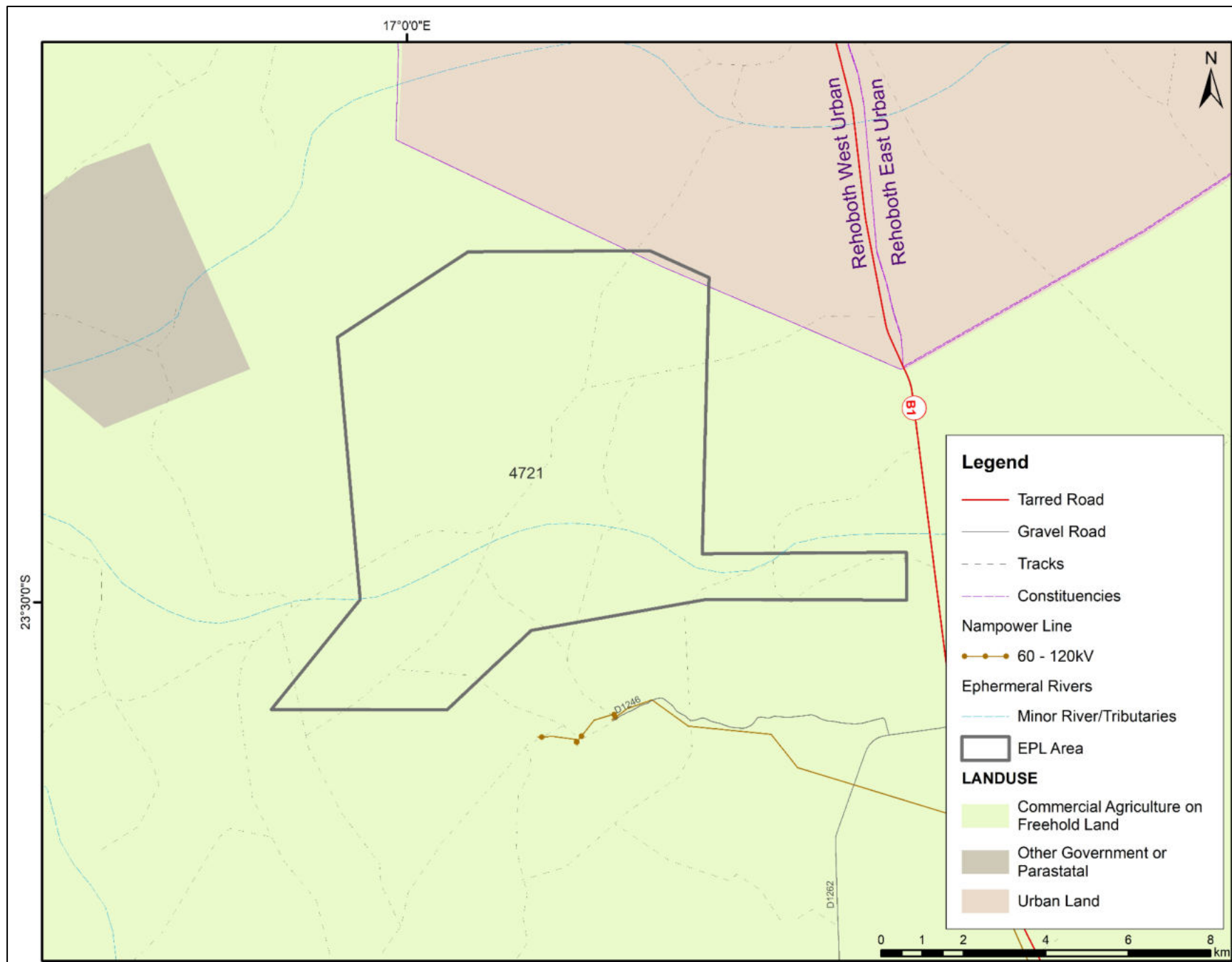


Figure 4.4: Overview of the local land use and ownership.

4.3 Fauna and Flora Diversity

4.3.1 General Biodiversity Overview

It is estimated that at least 77 reptile, 9 amphibian, 73 mammal and 209 bird species (breeding residents) are known to or expected to occur in the general area of which a high proportion are endemics. The EPL area falls within the greater Kalahari Biome characterised by Acacia woodlands and classified by Giess (1971) as Mixed Tree & Shrub Savannah (Southern Kalahari). The local vegetation cover comprises Nama-Karoo and Acacia Hereroensis (Fig. 4.5).

4.3.2 Reptiles

The 77 species expected to occur in the general area consist of at least 34 snakes (3 Blind snakes, 2 Thread snakes, 1 Python, 1 Burrowing Asp, 2 Quill Snouted and 25 typical snakes) of which 9 species (26.5%) are endemic and 1 species vulnerable/protected game, 3 tortoises (100% vulnerable and protected game), 1 terrapin, 2 worm lizard, 18 lizards of which 6 species classified as endemic (33.3% endemic), 2 plated lizards, 1 girdled lizard (endemic), 1 monitor (vulnerable/protected game), 3 agamas (1 endemic), 2 chameleon and 10 geckos of which 8 species classified as endemic (i.e. 80% endemic).

Endemic reptile species known and/or expected to occur in the general area make up 26.5% of the reptiles from the general area and although not as high as endemism elsewhere – for example the western escarpment areas of Namibia – still makes up a large portion of the reptiles. The reptiles of greatest concern are probably the tortoises – *Stigmochelys (Geochelone) pardalis*, *Psammobates oculiferus* and *Psammobates tentorius veroxii* which are often consumed by humans; *Python natalensis* which are indiscriminately killed throughout their range and *Varanus albigularis* as well as the various *Pachydactylus* species geckos of which 80% are viewed as endemic species. Other important species would be the 3 Blind snakes (*Rhinotyphlops* species of which 2 species are endemic to the area) and 2 Thread snakes (*Leptyphlops* species of which 1 species is endemic species) which could be associated with the sandier soils.

4.3.3 Amphibians

At least 9 species of amphibians can occur in suitable habitat in the general area. The area is under represented, with 2 toads and 1 species each for kassina, rubber, puddle, caco, bullfrog, sand and platanna known and/or expected (i.e. potentially could be found in the area) to occur in the area. Of these, 2 species are endemic (*Poyntonophrynus (Bufo) hoeschi* and *Phrynomantis annectens*) (Griffin 1998b) and 1 species classified as near threatened due to habitat loss and development (*Pyxicephalus adspersus*) (Du Preez and Carruthers 2009) – i.e. 33.3% of amphibians of conservation value from the general area. *Pyxicephalus adspersus* is more common in northern Namibia where their numbers are also declining due to overutilization as food by humans.

The most important species are the endemic *Poyntonophrynus (Bufo) hoeschi* and *Phrynomantis annectens* although they are widespread in Namibia and not exclusively associated with the area in particular. Temporary pools in the ephemeral local Ephemeral Rivers are viewed as potential amphibian habitat in the general area. The minor ephemeral which flows through the EPL area could also serve as potential habitat after rain showers in the immediate area. Other potential habitats in the area include the local farm reservoirs and earth dams although the latter are also dependant on localised showers and temporary of nature.

Of the 9 species of amphibians expected to occur in the general area, 33.3% (3 species) are of conservation value with 2 species being endemic (*Poyntonophrynus (Bufo) hoeschi* and *Phrynomantis annectens*) (Griffin 1998b) and 1 species (*Pyxicephalus adspersus*) viewed as near threatened (Du Preez and Carruthers 2009). The importance of the local ephemeral Rivers, which falls within the EPL area, for amphibians after localised showers is currently unknown.

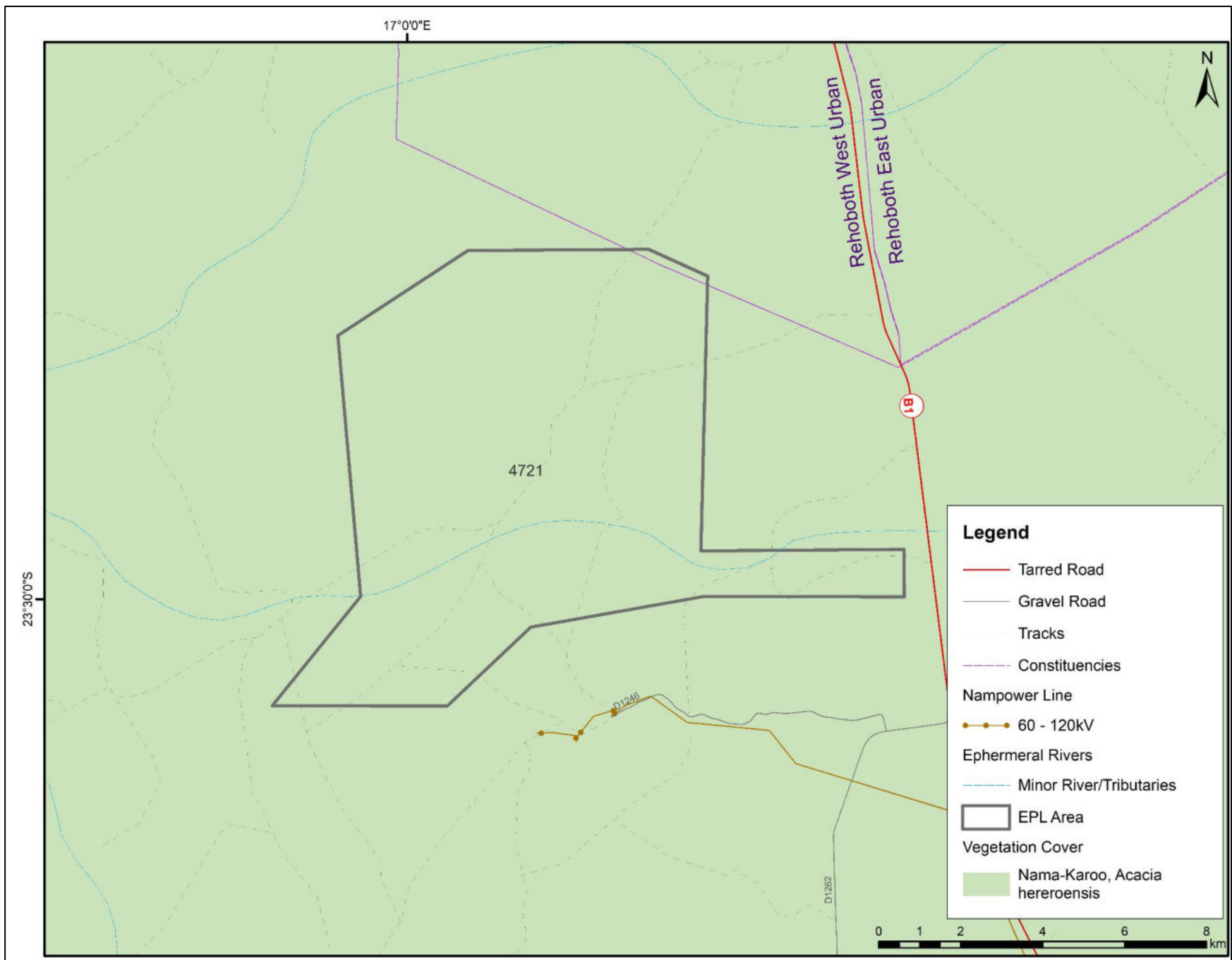


Figure 4.5: General overview of the vegetation map of the EPL area.

4.3.4 Mammals

Of the 73 species of mammals expected to occur in the general surrounding EPL area, 11% are endemic and 38% are classified under international conservation legislation. At most important groups are rodents (34%-16% endemic), carnivores (23%-6% endemic) and bats (15% - 9% endemic). The most important species from the general area, other than the endemic species, are probably all those classified as rare (e.g., Namibian Wing-gland Bat, Hedgehog and Black-footed Cat), endangered (Brown Hyena and Hartmann's Mountain Zebra) and vulnerable (e.g., Pangolin) under international legislation as well as the Black-footed Cat which as a carnivore suffers from indiscriminate persecution throughout its range.

Mammals, especially small mammals (rodents and bats) and carnivores are well represented in the area. The little-known bats are probably underrepresented in the area due to a lack of surveying form the area. Carnivores are often also indiscriminately killed especially in a rural sheep farming community such as that surrounding areas with the Black-footed Cat probably one of the most threatened carnivore species from the area.

4.3.5 Birds

The high proportion of endemics species of about 10 of the 14 endemics to Namibia (i.e., 71% of all endemics species) are expected to occur in the general surrounding EPL area and underscore the importance of this area. Furthermore 21% are classified as southern African endemics bird species (or 6% of all the birds expected) and 79% are classified as southern African near-endemics species (or 23% of all the birds expected). The most important species known/expected, although not exclusively associated with the EPL area are viewed as Monteiros and Damara Hornbills, Rüppells Parrot, Rosy-faced Lovebird and Rockrunner, all of which breed in the general area, but not exclusively associated with the area.

4.3.6 Trees/shrubs

It is estimated that at least 60-82 species of larger trees and shrubs (>1m) – Coats Palgrave 1983 [81 sp.], Curtis and Mannheimer 2005 [65 sp.], Mannheimer and Curtis 2009 [82 sp.], Van Wyk and Van Wyk 1997 [60 sp.] – occur in the general EPL and surrounding areas.

Twenty-six (31.7%) species of larger trees and shrubs have some kind of protected status in the general area. Five species (6.1%) are endemic, 3 species (3.7%) near-endemic, 15 species (18.3%) protected by Forestry laws, 3 species (3.7%) protected by Nature Conservation laws with 3 species (3.7%) classified as CITES II species.

Commiphora dinteri (endemic), *Cyphostemma bainesii* (endemic under the Nature Conservation Ordinance No. 4 of 1975), *Cyphostemma currorii* (Nature Conservation Ordinance No. 4 of 1975) and *Heteromorpha papillosa* (endemic) are probably the trees/shrubs most sensitive that are expected to occur in the general area.

4.3.7 Grass

It is estimated that up to 100 grasses – 10 to 89 species – (Burke 2007 [10 sp.], Van Rooyen 2001 [35 sp.], Müller 2007 [89 sp.], Müller 1984 [38 sp.], Van Oudshoorn 1999 [50 sp.]) occur in the general EPL and surrounding area. Up to 100 grasses are expected in the general area of which 4 species are viewed as endemic (*Eragrostis omahekensis*, *Eragrostis scopelophila*, *Pennisetum foermeranum* and *Setaria finite*). *Pennisetum foermeranum* is associated with rocky mountainous terrain and consequently only expected in such suitable habitat. *Eragrostis omahekensis* is virtually only found on disturbed soils – e.g., close to watering points – while *Eragrostis scopelophila* is associated with mountainous areas under trees and shrubs. The endemic *Setaria finite* is associated with drainage lines in the general area; never very common and probably the grass species most likely to be affected most by development in the area.

4.3.8 Other Flora Species

Aloes are protected throughout Namibia with 2 other aloe species not included in the above-mentioned table, but which also occur in the general area, also viewed as important and include Aloe hereroensis and A. zebrina (Rothmann 2004).

Many endemic Commiphora species are found throughout Namibia with Steyn (2003) indicating that Commiphora angolensis and C. Crenato-serrata potentially also occurring in the general area.

Other species with commercial potential that could occur in the general area include Harpagophytum procumbens (Devil's claw) – harvested for medicinal purposes and often over-exploited – Citrullus lanatus (Tsamma melon) – associated with sandy soils and Terfezia pfeilii (N'abba or Kalahari truffle) which potentially has a huge economic benefit (Mendelsohn et al. 2002, Mannheimer and Jacobson 1998).

4.3.9 Habitats, Fauna and Flora Conclusions

All developments have potential negative environmental consequences, identifying the most important faunal and flora species including high risk habitats beforehand, coupled with environmentally acceptable mitigating factors, lessens the overall impact of such development. The following is the summary of the key habitats that have been identified:

- ❖ **Hills / topographically high areas:** Rocky areas generally have high biodiversity and consequently viewed as important habitat for all vertebrate fauna and flora.
- ❖ **Ephemeral drainage lines:** The various ephemeral drainage lines are important habitat to larger trees, especially Acacia erioloba (protected), Euclea pseudebenus (protected), Faidherbia albida (protected) and Ziziphus mucronata (protected), and.
- ❖ **Plains / Topographically low area:** Topographically low areas are also important habitats with *Acacia erioloba*, *Albizia anthelmintica* and *Boscia albitrunca* being found in these areas.

There are various anthropomorphic activities throughout the general EPL area such as existing roads and tracks, land infrastructure and previous excavations activities, etc., and the proposed mineral exploration would have a limited footprint and not be expected to affect the whole EPL area and associated unique amphibians, mammals, reptiles, and flora species negatively. The implementation and monitoring of the mitigation measures as detailed in the EMP Report is likely to lessen the extent of the likely negative impacts.

4.4 Summary of the Socioeconomic Settings

4.4.1 Overview

The Hardap Region comprises the following Constituencies: Aranos, Daweb, Gibeon, Mariental Rural, Mariental Urban, Rehoboth Rural, Rehoboth Urban East and Rehoboth Urban West. The EPL 4721 falls within the Rehoboth Rural Constituency.

Rehoboth Rural constituency had a population of 7,288 in last census undertaken way back in 2011, down from 7,524 compared the census of 2001. Among the settlements in Rehoboth Rural are Klein Aub, Khauxas, and Schlip. As of 2020, the constituency had 4,701 registered voters.

The following is summary of the selected regional and local socioeconomic setting of the Hardap Region, partly covered by the EPL area (National Statistics Agency (NSA) (2016 and 2013):

- ❖ The population of the Hardap Regions is 87186 (2016) with population growth of 1.8 compared to 2011 census data.
- ❖ The exploration area is located in the sparsely populated privately owned commercial farmland.

- ❖ Unemployment rates in Hardap Region is below the national average of 36.9%. Unemployment in Hardap Region stands at 35.2%.
- ❖ The leading main source of income in Hardap Region is wages and salaries (64.2%).
- ❖ The health-care facilities in Hardap Region experience lack of qualified registered nurses and medical doctors.
- ❖ The infrastructure and service provision in the area of proposed project is limited.
- ❖ 17.4% of households in Hardap Region are more than 40km away.
- ❖ About 13% in Hardap Region are more than 50km away to nearest primary school. In comparison to the average in Namibia, there are only 3.6% such households.
- ❖ The crime rates in Hardap are relatively high. Most committed crimes in Hardap Region in 2012/13 were assault, theft, crimen injuria, malicious damage to property.
- ❖ The physical features, characterised by semi-arid adapted biomes, make the land largely unsuitable for agriculture activities and human settlement. People in this area mainly practice small-stock farming with sheep, goats and cattle.
- ❖ The area boasts a well-developed infrastructure base for tourism and has great potential based on the high landscape value linked on the Kalahari Dune Belt.
- ❖ The greatest limiting factors for economic activities are the arid climate and an overall shortage of water, poor soils and rangeland productivity. poor skills base, and.
- ❖ Overall economic growth and development in the project area is slow and thus a capital investment could spin-off the economic development of the surrounding settlements area in the area.

4.4.2 Socioeconomic Conclusions and Recommendations

The development of this project will have very limited socioeconomic contributions to the local area or the Hardap Region. There will be no employment created during the exploration phase. However, if there is a discovery of economic minerals resources that could led to the development of a viable mining project in area this could create limited job opportunities and bring added local benefits and contribute to the national economy through taxes, royalty, and direct investment. The following is the summary of the key actions that the Proponent shall implement as part of enhancing the socioeconomic impacts of the proposed project:

- ❖ Stipulate that local resident should be employed for temporary unskilled/skilled and where possible in permanent unskilled/skilled positions as they would reinvest in the local economy. However, due to low skills levels of the local population, it is likely that most skilled positions would be filled with people from outside the area.
- ❖ The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
- ❖ Ensure that contractors adhere to Namibian Affirmative Action, Labour and Social Security, Health and Safety laws.
- ❖ The local authorities, community organisations and community leaders shall be informed on final decisions regarding the project and the potential job opportunities for local people.

- ❖ Stipulate a preference for local contractors in the tender policy. The procurement of services and goods from local entrepreneurs and the engagement of local businesses people should be favoured and promoted provided that it is financially and practically feasible.
- ❖ Undertake a skills audit, develop a database of local businesses that qualify as potential service providers and invite them to the tender process.
- ❖ Scrutinise tender proposals to ensure that minimum wages were included in the costing.
- ❖ Project offers experience and on job skills development, particularly for low or semi-skilled workers. This would raise the workers experience and skills to secure jobs in future.
- ❖ Promising employees could be identified and training and skills development programme could be initiated.
- ❖ The project could organise business partnerships with local entrepreneurs or small SMEs.
- ❖ Service providers to provide opportunities for skills transfer, and.
- ❖ Provide opportunities for re-skilling of employees beyond the project closure.

4.5 Ground Components

4.5.1 Regional and Local Geology

The regional geology of the EPL Area fall within the Rehoboth and Sinclair Sequences. Rehoboth Sequence is limited to the area along the southern margin of the Damara Orogen. It overlies the Elim Formation unconformably and is intruded by granitic and basic rocks ranging from approximately 1, 670 to 1, 420 million years in age. The Marienhof Formation most likely to be at the base is followed unconformably by the Billstein Formation. The Gaub Valley Formation occurs further west and is not in contact with either of the other units (Schalk, 1988). According to Schalk, (1988), the Marienhof Formation consists of greyish quartzite and sericitic quartzite which alternate with layers and zones of quartz-sericite phyllite, amygdaloidal basic lava, acid volcanic rocks and rudaceous metasediments that range from coarse boulder conglomerate to gravel-bearing quartzite. In the Billstein Formation, grey quartzite and sericitic phyllite are the dominant rock types. Conglomerate is also present as well as numerous layers of basic lava and some quartz porphyry. Much of the Billstein Formation occurs in thrust wedges of Damaran age and in nappes overlying Damaran rocks (Schalk, 1988).

Locally, characteristic brown quartzite is the main rock type in the Guab Valley Formation but with it are intercalated ferruginous quartzite with heavy mineral laminae, phyllite, thick conglomerates, brownish limestone, calcareous phyllite and many layers of sheared acid and basic igneous rocks (Fig. 4.6). The formation is intruded by a conspicuous basic dyke swarm (Schalk, 1988). Both phyllites and basic lavas in the Marienhof Formation show copper staining on bedding-parallel shear planes and probably warrant careful attention (Mineral Resources of Namibia (1992). Gold may also be present in shear zones. Heavy mineral laminae in the Gaub Valley quartzites suggest that the associated basal conglomerates may be loci for placer mineralisation.

Locally, Sinclair intrusive rocks are found within the proposed EPL Area with much of the eastern part of the EPL area covered by extensive Kalahari Group (Fig. 4.6). The Kalahari Group is a stratigraphic group consists of a fairly monotonous sequence of red sandstone which ranges in thickness from less than 50 metres to greater than 275 metres. The thickest development occurs within a broad NE – SW trending pre-Kalahari valley. The base of the Kalahari Group is locally marked by a conglomeratic zone consisting of angular blocks sandstone, siltstone or dolerite in a red sandstone matrix. The Kalahari-Karoo contact is usually well defined except where the underlying Karoo rock is weathered sandstone. Loose Kalahari Desert Sands forming longitudinal dune belt which are vegetated in some place dominate the eastern landscape of the EPL area. Calcretes and gravel with silty-clays sands can be found in topographically low laying areas.

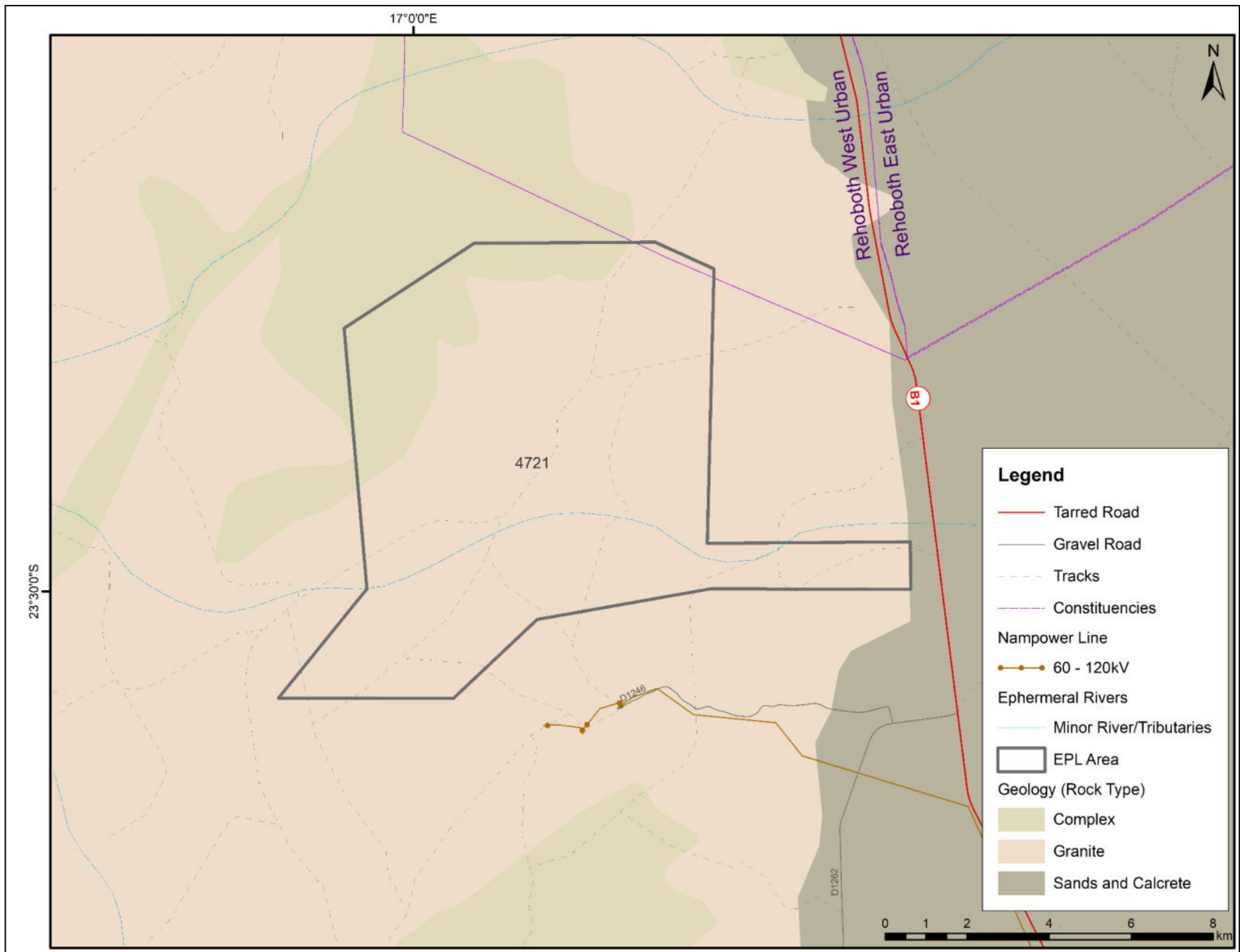


Figure 4.6: General geology of the EPL 4721 area.

4.6 Water

4.6.1 Overview

According to the Department of Water Affairs and Forestry, (2001) and the regional and local geology, the EPL 4721 falls within an area with very limited economic groundwater water resources (aquifers) (Fig. 4.7). 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.

4.6.2 Sources of Water Supply

The source of water supply for the proposed exploration and in particular the proposed drilling of exploration boreholes if need arises to drill, will be from existing groundwater resources. The Proponent must obtain permission from the land owner before using water from any existing local boreholes and infrastructures.

If there is a need to drilling a water borehole to support the proposed exploration programme, the Proponent must obtain permission from the land owner and Department of Water Affairs in the MAWLR.

In an event of discovery of economic minerals resources, the sources of water supply for the mining related operations will be supplied from groundwater resources if proven to be available following a detailed hydrogeological and groundwater modelling study that must be undertaken as part of the EIA supporting the feasibility study.

Currently, potential available groundwater resources in the area will not be sufficient to support any new larger-scale mining related operation within the EPL 4721.

However, some parts of the EPL area are covered by local fractured, fissured, karstified and porous rocks that seems to have localised moderate groundwater potential.

4.6.3 Water Vulnerability Assessments and Recommendations

Possible pathways that will aid groundwater vulnerability in this area are mainly fractured zones and faults that outcrop on the surface without impermeable infillings as well as unconfined shallow aquifers (Fig. 4.7). The general EPL area has limited groundwater resources that are likely to be vulnerable to pollution.

The overall water be vulnerability to pollution as a result of the proposed exploration as well as other existing activities is moderate.

The general area has a number of Ephemeral River Channels which could be potential pathways for pollution migration especially during the rainy season from November to March. Discharge of liquid or solid wastes including waste water, chemical, fuels or oils into any public stream is prohibited and the Proponent must implement the provisions of the EMP on water and waste management as detailed in EMP Report.

It is hereby recommended that a detailed site-specific hydrogeological specialist study including groundwater modelling, water sampling and testing must be undertaken as part of the EIA and EMP that may be implemented to support the feasibility study for any viable mining project that may be development within the EPL area, if economic resources are discovered.

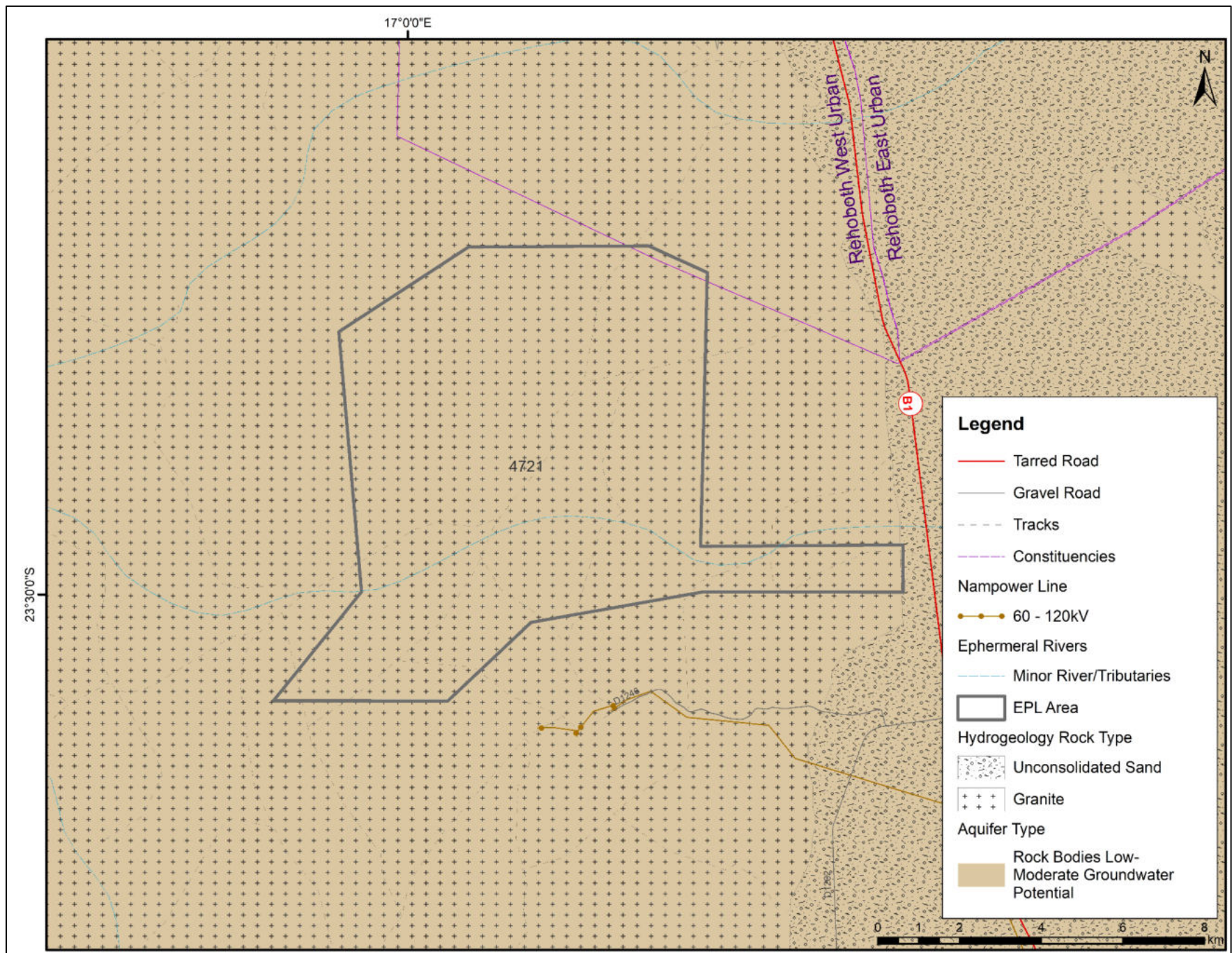


Figure 4.7: Surface and groundwater systems around the EPL 4721 area.

4.7 Archaeology

4.7.1 Regional Archaeological Setting

According to Kinahan (2011), modern humans and their ancestors have lived in Namibia for more than one million years. Namibia has a relatively complete sequence covering the mid-Pleistocene to Recent Holocene period, represented by thousands of archaeological sites mainly concentrated in the central highlands, escarpment and Namib Desert.

The Recent Holocene archaeological sequence in Namibia, i.e., the last 5 000 years, is of particular importance because it provides the background evidence for the development and recent history of the indigenous peoples of Namibia before the advent of written historical records during the colonial era. Many archaeological sites from this period are of great significance to the understanding of Namibian history, and some are considered to be of global importance to our understanding of the African past.

The EPL area falls within a mixture of granitic and surficial (calcrete and sand) terrain areas. The granitic or hard rock terrains has the potential to preserve archaeological remains that could be linked to early human settlements in the area.

4.7.2 Archaeological Conclusions

The central and eastern half of the EPL 4721 area is likely to hold sensitive archaeological sites that may be directly impacted by the proposed exploration activities in the event that archaeological field survey is not carried out.

In the unlikely event that heritage traces are exposed during field-based exploration activities, the expected nature of impact would be in the form of direct physical disturbance or destruction.

4.7.3 Recommendations

It is likely that the area covered by the EPL 4721 holds important archaeological potential as indicated in Fig. 4.2. The expectation for the whole EPL area is therefore:

- (i) A high likelihood of Holocene age archaeological sites, including rock art, associated with outcropping granite.
- (ii) A high likelihood of late precolonial settlement sites throughout the entire tenement, especially in the vicinity of springs and seepages, and.
- (iii) A high likelihood of early colonial settlement remains relating to the historical occupation of the local areas.

The following is the summary of the recommended actions to be implemented by the Proponent:

- (i) Contractors working on the site should be made aware that under the National Heritage Act any items protected under the definition of heritage found in the course of development should be reported to the National Heritage Council.
- (ii) The provisions of the EMP must be implemented and always monitored to protect potential archaeological sites that may occur in the local area, and.
- (iii) Detailed field survey should be carried out when the Proponent / licence holder has identified specific targets for detailed exploration such as trenching or drilling, or before any form of site-specific invasive exploration activities commences.

4.8 Public Consultations and Engagement

4.8.1 Overview

Public consultation and engagement process has been part of the environmental assessment process for this project. Public notices were published in the local newspapers (Fig. 4.8). Through the newspaper advertisements as shown in Fig. 4.8 the public were invited to submit written comments / inputs / objections with respect to the proposed minerals exploration programme by Stoneheart Investments (Pty) Ltd. A stakeholder register was opened and despite telephonic inquiries with respect to contracts and employment opportunities, no written comments / inputs / objections were received during the months April, May and June.

PUBLIC NOTICE FOR APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE
GUNTHER HEINRICH MUNGUNDA EPL No. 4721, REHOBOTH RURAL DISTRICT, HARDAP REGION

Gunther Heinrich Mungunda (the Proponent) holds mineral rights under the Exclusive Prospecting Licence (EPL) No. 4721. The EPL was granted on the 10/04/2011 and expired on the 09/09/2014. A renewal application has been submitted and currently pending. The proponent intend to continue prospecting for base and rare metals, dimension stone, industrial minerals, non-nuclear fuels minerals, precious metals and precious stones associated with the various basement and Damara Rocks found within the EPL area. As the EPL is situated just to the south of the Swartmodder Copper Mine and Gold is known to have been mined in the EPL area, the Proponent is prioritising on the search for economic copper and gold deposits as well as associated metals and stones. The proponent is required to undertake Environmental Assessment comprising Scoping and Environmental Management Plan (EMP) for the proposed exploration programme in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). In fulfilment of the environmental requirements, the proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultants and led by Dr. Sindila Mwiya as the EAP to undertake the Scoping and EMP in order to support the application for Environmental Clearance Certificate. All interested and affected parties are hereby invited to register and submit writer comments / Objections/ feedback with respect to the proposed exploration programme.

REGISTER BY EMAIL OR FAX TO: frontdesk@rbs.com.na or Send Fax To: 061-306059. REGISTRATION / OBJECTION/ COMMENTS / INPUTS DEADLINE IS FRIDAY 22nd APRIL 2016

REHOBOTH TOWN
To Klein Aub
Swartmodder Copper Mine
EPL 4721
To Mariental

Risk-Based Solutions (RBS) CC - We are Delivering the Solutions
For More Information Please Contact Dr. Sindila Mwiya (PhD, PG Cert, MPhil, BEng (Hons), FGN, CEng, Pr Eng) (EAP), Tel: 061-306058; Fax: 061-306059; Cell: 081277-2546, Global Office at URL: www.rbs.com.na

FRIDAY 1 APRIL 2016
NATIONAL

The Director's Event
A Customised Performance and Induction Program
Venue: Namibia Institute of Public Administration and Management (NIPAM)
Contact: jg@eljolainvestments.com, +264-81-718-0881.
Registration closes 13 April 2016

WHO SHOULD ATTEND
Company Directors, CEO's, Company Secretaries and aspiring directors

All large items locally purchased on EMP

Figure 4.8: Example of the public notice that was published in the local newspapers during the months April, May and June 2016 as part of the public and stakeholder consultation process.

5. IMPACT ASSESSMENT AND RESULTS

5.1 Impact Assessment Procedure

The Environmental Assessment process that has been undertaken with respect to the proposed exploration programme for the EPL No. 4721 has been conducted in accordance with the provisions of the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007).

5.2 Alternatives and Ecosystem Assessments

The following alternatives have been considered:

- (i) **EPL Location:** A number of potential economic minerals deposits are known to exist in the general area and linked to the regional geology of the EPL area. The Proponent intend to explore / prospect for all the licensed minerals groups likely to be associated with the regional and local geology. The minerals occurrences are site-specific and related to the regional and local geology of a specific area to which there are no alternatives sites to consider with respect to the license location. The only other alternative is the no-action option (no exploration activities are implemented in a specific area).
- (ii) **The No-Action Alternative** - A comparative assessment of the environmental impacts of the 'no-action' alternative (a future in which the proposed exploration activities do not take place) has been undertake. An assessment of the environmental impacts of a future, in which the proposed exploration and possible discovery of economic minerals resources does not take place, may be good for the receiving environment because there will be no negative environmental impacts due to the proposed minerals exploration or possible mining operation that may take place in the EPL area.

The environmental benefits will include:

- ❖ No negative impacts as a result of no mineral exploration taking place, and.
- ❖ Potential future mining related negative environmental impact on the receiving environment.

However, it is important to understand that even if the proposed exploration activities do not take place, to which the likely negative environmental impacts are likely to be low and localised, the other current and future land uses such as agriculture and tourism will still have some negative impacts on the receiving environment. The likely negative environmental impacts of the other current and future land use that may still happen in the absence of the proposed minerals exploration activities includes:

- ❖ Land degradation due to drought and Climate Change.
- ❖ Overgrazing / over stocking beyond the land carrying capacity.
- ❖ Poor land management practices,
- ❖ Wildfires, and.
- ❖ Erosion and overgrazing.

Furthermore, it is important to understand what benefits might be lost if the proposed exploration activities do not take place. Key loses that may never be realised if the proposed project activities do not go-ahead include: Loss of potential added value to the unknown underground minerals resources that maybe found within the EPL No. 4721, socioeconomic benefits derived from current and future exploration, direct and indirect contracts and

employment opportunities, export earnings, foreign direct investments, license rental fees, royalties, and various other taxes payable to the Government.

- (iii) **Other Alternative Land Uses:** The EPL area fall within the well-known commercial agricultural land uses area dominated by cattle, game, and small stock farming activities. The growing game farming is also making tourism a vital socioeconomic opportunity in the general area. Minerals exploration and mining activities are well known land use options in Namibia and the surrounding EPL area. Due to the limited scope of the proposed exploration and the implementation of the EMP, it is likely that the proposed exploration can coexist with the current and potential future land uses within the general area.
- (iv) **Potential Land Use Conflicts:** Considering the current land use practices (agriculture and tourism) as well as potential other land uses including minerals exploration, it is likely that potential economic derivatives from any positive exploration outcomes leading to the development of a mine in the general area can still co-exist with the existing and potential future land use options of the general area. However, much more detailed assessments of any likely visual and other socioeconomic impacts will need to be included in the EIA that must be undertaken as part of the prefeasibility and feasibility studies if economic minerals resources are discovered. The use of thematic mapping and delineation of various land use zones for specific uses such as agriculture, conservation, mining, or tourism etc, within the EPL area will greatly improve the multiple land use practices and promote coexistence for all the possible land use options.
- (v) **Ecosystem Function (What the Ecosystem Does):** Ecosystem functions such as wildlife habitats, carbon cycling or the trapping of nutrients and characterised by the physical, chemical, and biological processes or attributes that contribute to the self-maintenance of an ecosystem in this area are vital components of the receiving environment. However, the proposed exploration activities will not affect the ecosystem function due to the limited scope of the proposed activities because the ecosystem of this EPL area is part of the larger local and regional ecosystems which are all interlinked.
- (vi) **Ecosystem Services:** Food chain, harvesting of animals or plants, and the provision of clean water or scenic views are some of the local ecosystem services associated with the EPL area. However, the proposed exploration activities will not affect the ecosystem services due to the limited scope and area of coverage of the proposed activities because the ecosystem of this EPL area is part of the larger local and regional ecosystems which are all interlinked.
- (vii) **Use Values:** The EPL area has direct values for other land uses such as agriculture, conservation and tourism as well as indirect values which includes: Watching a television show about the general area and its wildlife, food chain linkages that sustains the complex life within this area and bequest value for future generations to enjoy. The proposed exploration activities will not destroy the current use values due to the limited scope of the proposed activities as well as the adherence to the provisions of the EMP as detailed in the EMP report, and.
- (viii) **Non-Use or Passive Use:** The EPL area has an existence value that is not linked to the direct use / benefits to current or future generations. The proposed exploration activities will not affect the ecosystem current or future none or passive uses due to the limited scope of the proposed activities that will leave much of the EPL area untouched because the ecosystem of this EPL area is part of the larger local and regional ecosystems which are all interlinked.

5.3 Key Issues Considered in the Assessment Process

5.3.1 Sources of Impacts (Proposed Project Activities)

The proposed exploration activities covering initial desktop exploration activities (no field-work undertaken, regional reconnaissance, initial local field-based activities, detailed local field-based

activities, prefeasibility and feasibility studies related activities are the key sources both negative and positive impacts on the receiving environment.

5.3.2 Summary of Receptors Likely to be Negative Impacted

Based on the findings of this report, the following is the summary of the key environmental receptors that are may be negatively impacted by the proposed activities:

- ❖ **Physical environment:** Water quality, physical infrastructure and resources, air quality, noise and dust, landscape and topography, soil quality and, Climate change influences.
- ❖ **Biological environment:** Habitat, protected areas and resources, flora, fauna, and ecosystem functions, services, use values and non-use or passive use, and.
- ❖ **Socioeconomic, cultural and archaeological environment:** Local, regional and national socioeconomic settings, commercial and subsistence agriculture, community protection areas tourism and recreation cultural, biological and archaeological resources.

5.4 Impact Assessment Methodology

5.4.1 Impact Definition

In this report, a natural and/or human environmental impact is defined as: “Change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation’s environmental aspects.” (ISO 14001).

All proposed project activities (routine and non-routine) were considered during the Scoping, EIA and EMP Phases in terms of their potential to:

- ❖ Interact with the existing environment (physical, biological and social elements), and.
- ❖ Breach relevant national legislation, relevant international legislation, standards and guidelines, and corporate environmental policy and management systems.

Where a project activity and receptor were considered to have the potential to interact, the impact has been defined and ranked according to its significance. Table 5.1 provides the definition of different categories of impacts identified and used in this report.

This report has assessed the potential impacts resulting from routine Project activities, assuming that the Project activities that may cause an impact that will occur but the impact itself will be dependent on the likelihood (Probability) (Table 5.1).

Correct control measures through the implementation of the EMP and monitoring thereof, often reduce any negative significant impacts on the receiving environment as the results of the project activities. The assessment therefore, has focussed on the measures aimed at preventing the occurrence of an impact as well as mitigation measures that may be employed.

Table 5.1: Definition of impact categories used in this report.

Nature of Impact	Adverse	Considered to represent an adverse change from the baseline, or to introduce a new undesirable factor.
	Beneficial	Considered to represent an improvement to the baseline or to introduce a new desirable factor.
Type of Impact	Direct	Results from a direct interaction between a planned or unplanned Project activity and the receiving environment.
	Indirect	Results from the Project but at a later time or at a removed distance or which may occur as a secondary effect of a direct impact.
	Cumulative	Results from (i) interactions between separate Project-related residual impacts. and (ii) interactions between Project-related residual impacts in combination with impacts from other projects and their associated activities. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.
Duration of Impact	Short-term	Predicted to last only for a limited period but will cease on completion of the activity, or as a result of mitigation/reinstatement measures and natural recovery typically within a year of the project completion.
	Medium-	Predicted to last only for a medium period after the Project finishing, typically one to five years.
	Long-term	Continues over an extended period, typically more than five years after the Project's completion.
	Permanent	Occurs during the development of the Project and causes a permanent change in the affected receptor or resource that endures substantially beyond the Project lifetime.
Scale of Impact	Local	Affects locally important environmental resources or is restricted to a single habitat/biotope, a single community.
	Regional	Affects nationally important environmental resources, or an area that is nationally important/protected or has macro-economic consequences.
	National	Affects nationally important environmental resources, or an area that is nationally important/protected or has macro-economic consequences.
	International	Affects internationally important resources such as areas protected by international Conventions
	Transboundary	Impacts experienced in one country as a result of activities in another.
Probability	Negligible	Possibility negligible
	Improbable	Possibility very low
	Probable	Distinct possibility
	Highly Probable	Most likely
	Definite	Impact will occur regardless of preventive measures

5.4.2 Knowledge-Based Impact Assessment Process

5.4.2.1 Characterisation of the Impact Assessment Inputs Variables

The impact assessment process for the proposed minerals exploration took into consideration the interactions of the proposed activities with respect to the Knowledge-Based System Model Methodology (KBSMM) characterised climatic, environmental, and ground model datasets of the receiving environment (physical, biological, socioeconomic and ecosystem services and functions).

The influence assessment of the characterised components of the environment has been based on a Knowledge-Based System Model Methodology (KBSMM), a PhD research-based and industry tested / validated Artificial Intelligent (AI) framework developed by Dr Sindila Mwiya.

The KBSMM model inputs variables covered characterised climatic, environmental, and ground model datasets. Source-Pathway-Receptor risk assessment approach was used to determine or validate the influence (impact assessment), and ultimate likely harm that may be linked to the various phased activities of each of the various stages of the proposed minerals exploration implementation process (Fig. 5.1).

5.4.2.2 Climatic Data Sets/Components Inputs

The climatic data sets that have been used in the regional and local site-specific assessment process comprised precipitation, temperature, evapotranspiration and wind data sets. The following is summary explanation of the roles that climatic data sets may have on the proposed minerals exploration implementation process (Fig. 5.1):

- ❖ Temperature: Temperature had a direct influence on the fluids that may influence the operation of the site by supporting evapotranspiration. It also has an influence on the planning, operation and implementation of the various project activities.
- ❖ Rainfall: Rainfall is one of the data sets used in the water balance assessments with respect to potential fluid production and flash flood occurrences. The data sets had some influence on mobilisation pollutants that may be associated with the proposed project activities.
- ❖ Evapotranspiration: This combined effect of evaporation and transpiration is important in water balance assessments with direct influences on the implementation of the various project activities, and.
- ❖ Wind Direction and Speed: The direction and speed of the prevailing winds may be critical to the site operations and determination of the optimum operational requirements. The data had a direct influence on the site operations including dust and noise management.

5.4.2.3 Environmental Data Sets/Components Inputs

The regional or local environmental data sets used in this project comprise:

- ❖ Economic activities (Proposed minerals exploration) and coordination support available in the area or area.
- ❖ Types and amounts of waste likely to be generated.
- ❖ Likely contaminants from the activities.
- ❖ Ecological, habitats and ecosystems including fauna and flora.
- ❖ Community considerations such, land ownership, social, health and safety, and.
- ❖ Archaeological, cultural and political issues.

The following is summary explanation of the role of the environmental data sets may have on the proposed minerals exploration implementation process (Fig. 5.2):

- ❖ Economic activities and logistic support: The types of economic activities and logistical support services and infrastructure for the proposed activities are a key source of impact component of the environmental data sets in the determination of the likely impacts on the receptors, and.
- ❖ The likely Types and amount of waste: Understanding the characteristics of the liquid and solid waste streams be handled is vital in the evaluation of the hazard exposure in terms of the overall risk assessment to the receptors.

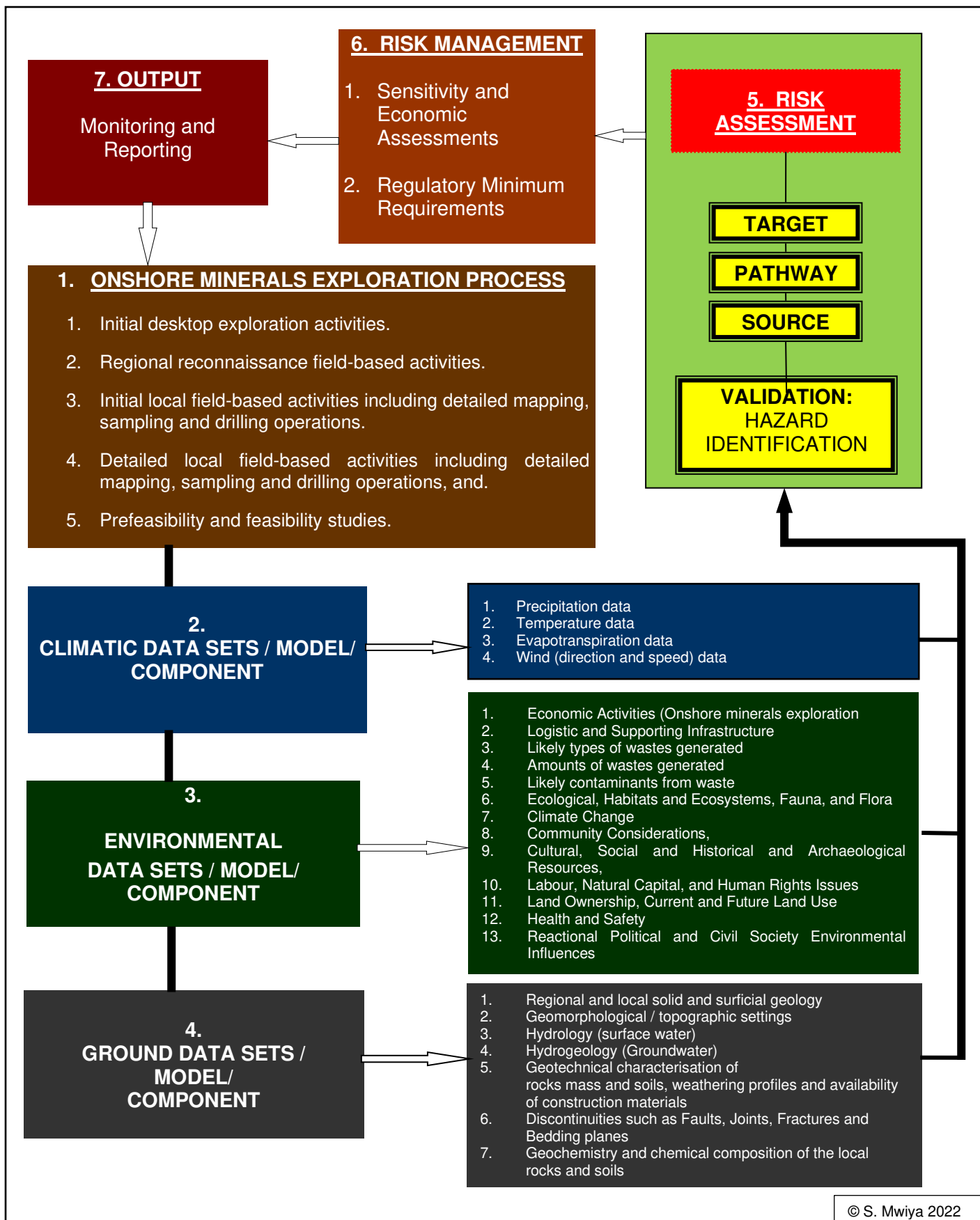


Figure 5.1: Detailed outline of the technical methodology based on a complete looped Knowledge-Based System Model Methodology (KBSMM) used in the impact assessment, risk assessment and determination of the monitoring and reporting strategy. The system model methodology has a built-in looping that allows for the evaluation of a phased onshore minerals exploration process project lifecycle.

- ❖ Likely contaminants: The state (solid, gas, liquid, or vapour) of any likely contaminants that may be associated with the proposed phased onshore minerals exploration activities play a major role in the determination of the likely harm, mitigation, monitoring and reporting strategies.
- ❖ Ecological, habitats, ecosystems, fauna, flora, and local, regional or global Climate Change influences: At national, regional and local levels, there are a number of unique and protected habitats, ecosystems, fauna and flora and highly vital as they support other sectors of the national economy such as tourism, agriculture, food security and services. Understanding the likely level of sensitivity of the regional or local areas is highly important to the successful determination of the likely impacts and harm, development mitigation measures, monitoring and reporting strategy to be implemented for the proposed phased onshore minerals exploration process, and.
- ❖ Community considerations: Local community issues and acceptability of the proposed activities by the local community is of vital importance. Other key components of the community considerations include: Land ownership (State land / Communal or Private), land use, local social settings, labour, natural capital, human rights, public and workers health and safety, archaeological, cultural, political, and civil society influences.

As part of the data collection, evaluation, influence and risk assessment process of the proposed phased onshore minerals exploration, determination of the mitigation measures, monitoring and reporting strategies, specialist assessments conducted as part of the EIA process provided vital recommendations incorporated in this report.

5.4.2.4 Ground Data Sets/Components Inputs

The ground data sets covered regional/local solid and surficial geology, geomorphological / topographic settings, hydrology (surface water), hydrogeology groundwater), geotechnical and geochemical characterisation of rocks and soils, weathering profiles and availability of construction materials, and discontinuities such as faults, joints, fractures, and bedding planes of the drilled sites (Fig. 5.1). The geology (solid and superficial) and water (surface and groundwater resources are all targets that may be influenced (impacted) by the various activities of the proposed phased minerals exploration process implementation. Other ground components which include the local terrain (geomorphology and topographic features), discontinuities, geotechnical as well as geochemical /mineralogy will aid the influence of sources in causing or minimising the impacts to be controlled through mitigations (Fig. 5.1). Regional/local solid and surficial geology, geomorphological and topographic settings also linked directly to the availability of local construction and operational materials in support of the proposed phased minerals exploration process project implementation lifecycle (Fig. 5.1).

5.4.2.5 Source-Pathway-Receptor Risk Assessment, Harm and Monitoring

To evaluate the level of influence (impact), risk, and harm that the proposed onshore phased minerals exploration process implementation, the assessment process was focused on the sources, pathways, and targets / receptor chains (Fig. 5.2). It is important to note that in the absence of any of the interlinked three (3) components (sources, pathways, or targets/ receptor) there is no harm or risk to mitigate, monitor or manage (Figs. 5.2 and 5.3).

The risk source/s refers to knowledge - based identified potential hazards that may be present and can cause harm to the exposed target/s / receptors (Fig. 5.3). The risk pathway refers to the route direct or indirect through which the risk source/s may be transferred and exposed to a target/s of concern. The risk target/s or receptor/s refers to the destination (area point of exposure) at which the source/s may cause harm. The characterisation of source/s, pathway/s and target/s chain has been undertaken for climatic, environmental and ground model data components with respect to the proposed phased onshore minerals exploration process.

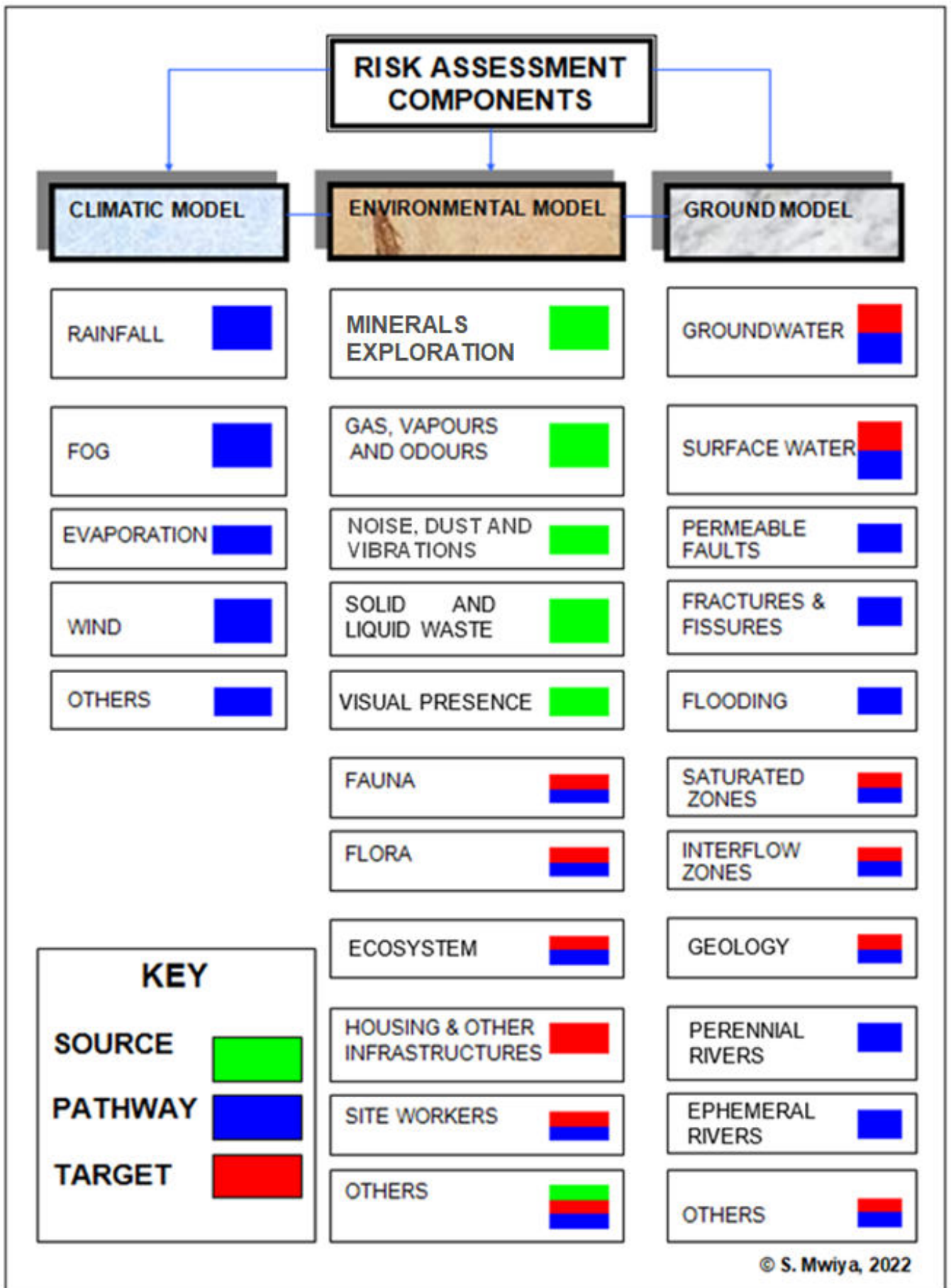


Figure 5.2: A Knowledge-Based System Model Methodology (KBSMM) source-pathways-target characterised interactive risk assessment system output field-based and tested / validated Artificial Intelligent (AI) framework windows for onshore phased minerals exploration process implementation project lifecycle.

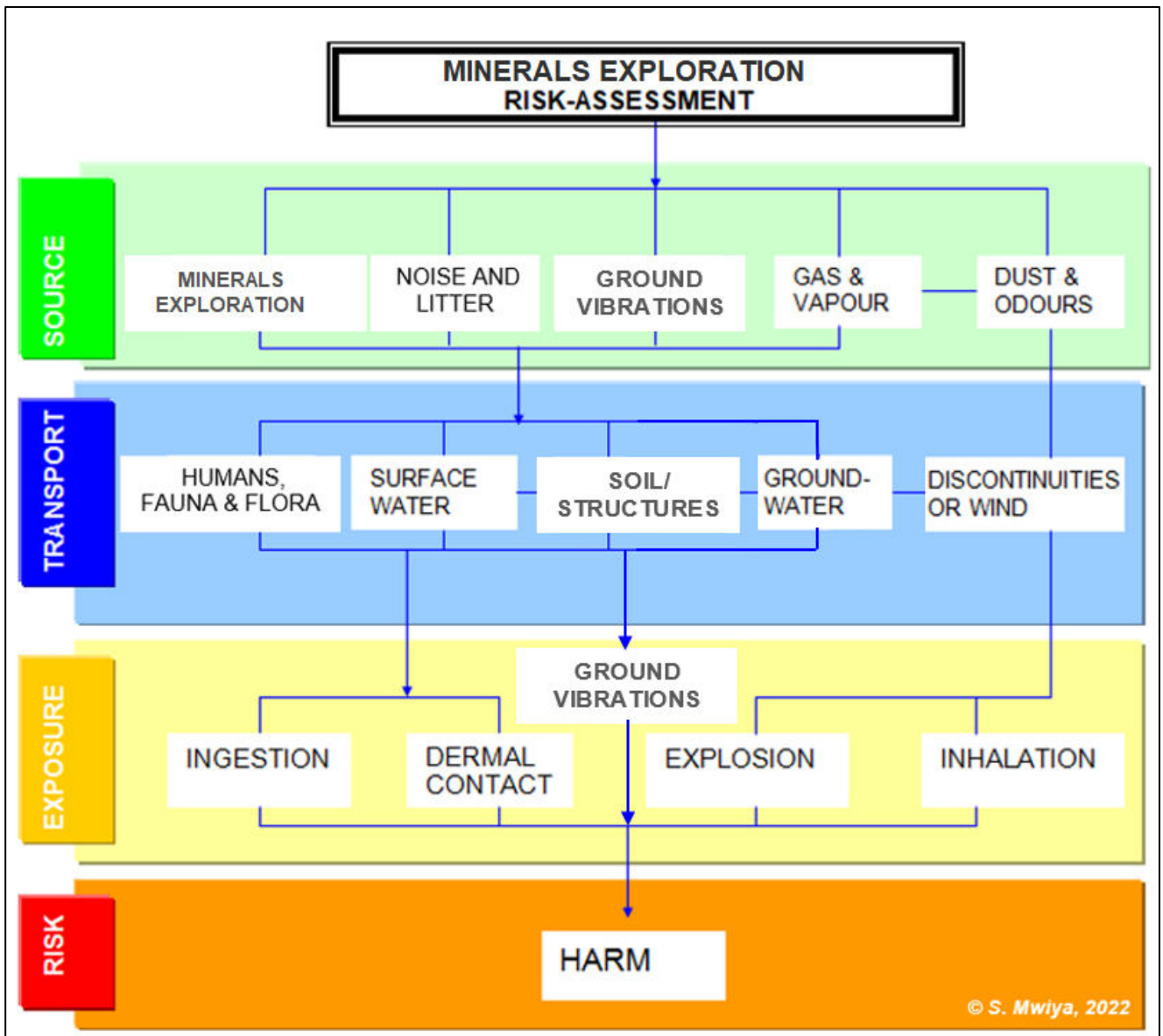


Figure 5.3: A Knowledge-Based System Model Methodology (KBSMM) characterised system output research-based and tested / validated Artificial Intelligent (AI) framework risk consequences (harm) pathways to the receiving target/receptors windows for onshore phased minerals exploration process project implementation lifecycle.

5.4.2.6 Individual Components Impact Assessment Criteria

Based on the Terms of Reference and individual components impact assessment outputs of the KBSMM for the proposed phased minerals exploration process and the lessons learned (created knowledge-base) from the previous phased minerals exploration processes operations undertaken and tested since 1999 when the KBSMM was developed, all key components of the receiving environment were identified and assessed with respect to the overall proposed activities and likely significant impacts on the receiving environment with the aim of developing appropriate mitigation measures as detailed in the EMP Report.

5.4.3 Overall Component and Significant Impact Assessment

5.4.3.1 Overall Component Impact Assessment

The overall component impact assessment and evaluation process has been undertaken by considering the activities of the proposed phased minerals exploration process operations as the overall source of impact (Figs. 5.1-5.3). As illustrated in Figs. 5.1-5.3, the receiving environment has

been considered as the receptor / target that may be impacted positively or negatively by the activities of the proposed phased minerals exploration process.

The characterised components of the receiving environment encompassed the following:

- ❖ Physical Conditions / Natural Environment – Air, noise, water, green space, climate change, built environment – houses, roads, transport systems, buildings, infrastructure, etc.
- ❖ Biological Conditions: fauna, flora, habitats, and ecosystem - services, function, use values and non-use etc., and.
- ❖ Socioeconomic Conditions: Social, economic, labour, gender, human rights, natural and social capital, archaeological, cultural resources, and cultural issues

In evaluating the individual degree of potential negative impacts, the following factors have been taken into consideration:

- ❖ Impact Severity: The severity of an impact is a function of a range of consideration, and.
- ❖ Likelihood of Occurrence (Probability): How likely is the impact to occur?

In evaluating the severity of potential negative environmental impacts, the following factors have been taken into consideration:

- ❖ Receptor/ Resource Characteristics: The nature, importance, and sensitivity to change of the receptors / target or resources that could be affected.
- ❖ Impact Magnitude: The magnitude of the change that is induced.
- ❖ Impact Duration: The time period over which the impact is expected to last.
- ❖ Impact Extent: The geographical extent of the induced change, and.
- ❖ Regulations, Standards and Guidelines: The status of the impact in relation to regulations (eg. discharge limits), standards (eg. environmental quality criteria) and guidelines.

The overall impact severity has been categorised using a subjective scale as shown in Table 5.2 for magnitude, Table 5.3 for duration and Table 5.4 for extent.

Table 5.2: Scored on a scale from 0 to 5 for impact magnitude.

SCALE (-) or (+)	DESCRIPTION
0	no observable effect
1	low effect
2	tolerable effect
3	medium high effect
4	high effect
5	very high effect (devastation)

Table 5.3: Scored time over which the impact is expected to last.

SCALE (-) or (+)	DESCRIPTION
T	Temporary
P	Permanent

Table 5.4: Scored geographical extent of the induced change.

SCALE (-) or (+)	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

The likelihood (probability) of the pre-identified events occurring has been ascribed using a qualitative scale of probability categories (in increasing order of likelihood) as shown in Table 5.5. Likelihood of an impact occurring is estimated on the basis of experience (existing knowledge-base) and/ or evidence that such an outcome has previously occurred. Impacts resulting from routine/planned events are classified under category (E).

Table 5.5: Summary of the qualitative scale of probability categories (in increasing order of likelihood).

SCALE (-) or (+)	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 (e.g., 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 occur several times per year at each location where such works are undertaken)

The overall individual components impact assessment with respect to the impact duration, geographical extent and probability of occurrence have been categorised using a semi quantitative approach as shown in Table 5.6 and the results are presented under Subsection 5.4.4.

5.4.3.2 Overall Significant Impact Assessment

The determination of the significance of the negative impacts / key issues caused by the proposed phase minerals exploration activities as key sources of such impact has been based on the environmental baseline results such as the intensity and duration of the likely negative impact as assessed under individual components likely to be impacted. The assessment focused on the existence of potential pathways, and the degree to which the proposed project activities are likely to result in unwanted consequences on the receptor, covering the receiving environment (natural, built, socioeconomic, flora, fauna, habitat, and ecosystem).

5.4.4 Proposed Project Activities Summary of Impacts Results

The results of the impacts assessment and evaluation has adopted a matrix assessment framework linked to the KBSMM framework. Assessment results of the magnitude, duration, extent, and probability of the potential impacts due to the proposed project activities interacting with the receiving environment are presented in form of a matrix table as shown in Tables 5.6-5.9.

The overall severity of potential environmental impacts of the proposed project activities on the receiving environment will be of low magnitude (Table 5.6), temporally duration (Table 5.7), localised extent (Table 5.8) and low probability of occurrence (Table 5.9) due to the limited scope of the proposed activities and the use of step progression approach in advancing exploration. The step progression approach will allow the Proponent to evaluate the results of exploration success and the implementation of the next stage of exploration will be subject to the positive outcomes of previous activities as graded (Tables 5.6-5.9). It is important to note that the assessment of the likely impacts as shown in Tables 5.6 - 5.9, have been considered without the implementation of mitigation measures as detailed in EMP Report. The need for implementation of the appropriate mitigation measures as presented in the EMP Report has been determined based on the results of the impact assessment (Tables 5.6 - 5.9) and the significant impacts as detailed in Tables 5.10 and 5.11.

Table 5.6: 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
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	3	3	4	4
	(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	3	3	4	4
	(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	3	3	4	4
	(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	3	3	4	4
	(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	3	3	4	4

Table 5.6: 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	3	3	4	
	(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	3	3	4
	(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	3	3	4
	(iv)	Possible Trenching (Subject to the outcomes of i - iii above)	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4
	(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	3	3	4
	(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	3	3	4
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	4
	(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	3	3	4
	(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	3	3	4
	(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	4
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	4
	(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	4
	(iii)	Geotechnical studies for mine design	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
	(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	3	3	4
	(v)	EIA and EMP to support the ECC for mining operations	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	4
	(vi)	Preparation of feasibility report and application for Mining License	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	4

Table 5.7: 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																						
1. Initial Desktop Exploration Activities	(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						
	(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						
	(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						
	(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						
2. Regional Reconnaissance Field-Based Activities	(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	P						
	(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	P						
	(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	P						
	(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	P						
	(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	P						

Table 5.7: 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															
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	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(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	P
	(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	P
	(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	P
	(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	P
	(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	P
4. Detailed Local Field-Based Activities	(i) Access preparation and related logistics to support activities	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(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	P
	(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	P
	(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	P
5. Prefeasibility and Feasibility Studies	(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	P
	(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	P
	(iii) Geotechnical studies for mine design	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(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	P
	(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	P
	(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	P

Table 5.8: 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																												
1. Initial Desktop Exploration Activities	(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												
2. Regional Reconnaissance Field-Based Activities	(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	N												
	(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	N												
	(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	N												
	(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	N												
	(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	N												

Table 5.8: *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		
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																	
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																	
	(ii)	Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken																	
	(iii)	Ground geophysical survey (Subject to the positive outcomes of i and ii above)																	
	(iv)	Possible Trenching (Subject to the outcomes of i - iii above)																	
	(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)																	
	(vi)	Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets																	
4. Detailed Local Field-Based Activities	(i)	Access preparation and related logistics to support activities																	
	(ii)	Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities																	
	(iii)	Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken																	
	(iv)	Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).																	
5. Prefeasibility and Feasibility Studies	(i)	Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping																	
	(ii)	Detailed drilling and bulk sampling and testing for ore reserve calculations																	
	(iii)	Geotechnical studies for mine design																	
	(iv)	Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities																	
	(v)	EIA and EMP to support the ECC for mining operations																	
	(vi)	Preparation of feasibility report and application for Mining License																	

Table 5.9: 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)																												
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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)																												
1. Initial Desktop Exploration Activities	(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	E												
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E												
	(iii) Purchase and analysis of existing Government aerial hyperspectral	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E												
	(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	E												
2. Regional Reconnaissance Field-Based Activities	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis	A	A	A	A	A	A	A	A	A	A	A	A	D	D	E													
	(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	D	D	E														
	(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	D	D	E														
	(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	D	D	E														
	(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	D	D	E														

Table 5.9: Cont.

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
SCALE		DESCRIPTION															
A		Extremely unlikely (e.g. never heard of in the industry)															
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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)															
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															
	(ii)	Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken															
	(iii)	Ground geophysical survey (Subject to the positive outcomes of i and ii above)															
	(iv)	Possible Trenching (Subject to the outcomes of i - iii above)															
	(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)															
	(vi)	Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets															
4. Detailed Local Field-Based Activities	(i)	Access preparation and related logistics to support activities															
	(ii)	Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities															
	(iii)	Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken															
	(iv)	Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).															
5. Prefeasibility and Feasibility Studies	(i)	Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping															
	(ii)	Detailed drilling and bulk sampling and testing for ore reserve calculations															
	(iii)	Geotechnical studies for mine design															
	(iv)	Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities															
	(v)	EIA and EMP to support the ECC for mining operations															
	(vi)	Preparation of feasibility report and application for Mining License															

5.5 Evaluation of Significant Impacts

5.5.1 Overview

The significance of each impact has been determined by assessing the impact severity against the likelihood (probability) of the impact occurring as summarised in the impact significance assessment matrix provided in Table 5.10.

5.5.2 Significance Criteria

Significance criteria for negative/adverse impacts (i.e., relative ranking of importance) are defined in Table 5.10. It is important to note that impacts have been considered without the implementation of mitigation measures. The need for appropriate mitigation measures as presented in the EMP report has been determined based on the basis of the impact assessment presented in this report.

Table 5.10: Scored impact significance criteria.

IMPACT SEVERITY [Magnitude, Duration, Extent, Probability]	RECEPTOR CHARACTERISTICS (SENSITIVITY)				
	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]

5.5.3 Assessment Likely Significant Impacts

The assessment of significant impacts depended upon the degree to which the proposed project activities are likely to result in unwanted consequences on the receptor covering physical and biological environments (Table 5.11). Overall, the assessment of significant impacts has focused on the ecosystem-based approach that considers potential impacts to the ecosystem. The main key sources of impacts that have been used in the determination of significant impacts posed by the proposed minerals exploration comprised activities. Each of the main areas of impact have been identified and assessed as follows:

- ❖ Positive Impacts are classified under a single category. they are then evaluated qualitatively with a view to their enhancement, if practical.
- ❖ Negligible or Low Impacts will require little or no additional management or mitigation measures (on the basis that the magnitude of the impact is sufficiently small, or that the receptor is of low sensitivity).
- ❖ Medium or High Impacts require the adoption of management or mitigation measures.
- ❖ High Impacts always require further management or mitigation measures to limit or reduce the impact to an acceptable level.

Overall, the results of the significant impact assessment matrix for the proposed minerals exploration activities on the physical and biological environments are shown in Tables 5.11.

Table 5.11: 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]																	
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	1/1	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		
	(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		
	(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	
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	1/1	1/1	1/1	1/1	1/1	1/1	4/4		
	(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	4/4	
	(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	4/4	
	(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	4/4
	(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	4/4

Table 5.11: Cont.

SENSITIVITY						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]																
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	4/4	
	(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	4/4	
	(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	4/4	
	(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	4/4
	(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	4/4
	(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	4/4
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	3/3	3/3	4/4	
	(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	3/3	3/3	4/4	
	(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	3/3	3/3	4/4	
	(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	3/2	2/2	2/2	3/3	3/3	4/4
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	3/3	3/3	4/4	
	(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	4/4	
	(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	3/3	3/3	4/4	
	(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	4/4	
	(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	3/3	3/3	4/4	
	(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	3/3	3/3	4/4	

5.6 Assessment of Overall Impacts

5.6.1 Summary of the Results of the Impact Assessment

In accordance with Tables 5.6 - 5.11, the following is the summary of the overall likely negative and significant impacts of the proposed exploration activities on the receiving environment (physical, biological and socioeconomic environments) without:

- (i) Initial desktop exploration activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[1/1]** (Table 5.11). Except for the socioeconomic components which carry a **(+)**, the rest of the likely impacts are negative **(-)**.
- (ii) Regional reconnaissance field-based activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[1/1]**. Some field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations. Overall significant impacts will be negligible **[1/1]** (Table 5.11). Except for the socioeconomic components which carry a **(+)**, all the other likely impacts are negative **(-)**.
- (iii) Initial local field-based activities: Initial field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations. Overall significant impacts will be negligible **[2/2]**. All desktop related activities and laboratory assessments will have negligible impacts with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[2/2]** (Table 5.11). Except for the socioeconomic components which carry a **(+)**, all the other likely impacts are negative **(-)**. Cultural, biological, and archaeological resources will have high significant negative impacts **[4/4]**.
- (iv) Detailed local field-based activities: Overall likely negative impact on the receiving environment will be high and localised impacts without mitigations and localised low impacts with mitigations. Overall significant impacts will be medium **[2/2]** without mitigations and low with mitigations (Table 5.11). Except for the socioeconomic components which carry a **(+)**, all the other likely impacts are negative **(-)**. Tourism and recreation will have medium significant negative impacts **[3/3]**, and cultural, biological, and archaeological resources will have high significant negative impacts **[4/4]** and.
- (v) Prefeasibility and feasibility studies to be implemented on a site-specific area if the local field-based studies prove positive: Overall likely negative impact on the receiving environment will be high and localised impacts without mitigations and localised medium impacts with mitigations. Overall significant impacts will be medium **[3/3]** without mitigations and low with mitigations for bulk sampling, test mining and field logistics (Table 5.11). Except for the socioeconomic components which carry a **(+)**, all the other likely impacts are negative **(-)**. Tourism and recreation will have medium significant negative impacts **[3/3]**, and cultural, biological, and archaeological resources will have high significant negative impacts **[4/4]**.

6. THE EMP

6.1 Summary of the EMP Objectives

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

Regular assessments and evaluation of the environmental liabilities during the exploration will need to be undertaken and will ensure adequate provision of the necessary resources towards good environmental management at various stages of the project development.

6.2 Specific Mitigation Measures

Based on the findings of the Scoping work, the following specific mitigations have been provided for the proposed exploration programme activities and in particular for the field-based exploration activities:

(i) Mitigation measures for preventing flora destruction are:

- ❖ Limit the development and avoid rocky outcrops throughout the entire area.
- ❖ 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.
- ❖ 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.
- ❖ Avoid driving randomly through the area (i.e., “track discipline”), but rather stick to permanently placed roads/tracks – especially during the construction phase. This would minimise the effect on localised potentially sensitive habitats in the area.
- ❖ 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.
- ❖ 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.
- ❖ 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.
- ❖ 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.
- ❖ Prevent and discourage fires – especially during the development phase(s) – as this could easily cause runaway veld fires causing problems (e.g., loss of grazing and domestic stock mortalities, etc.) for the neighbouring farmers.

- ❖ Rehabilitation of the disturbed areas – i.e., initial development access route “scars” and associated tracks as well as temporary accommodation sites. Preferably workers should be transported in/out to the construction sites 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.
- ❖ Implement erosion control. The area(s) towards and adjacent the drainage line(s) are easily eroded and further development may exacerbate this problem. Avoid construction within 20m of the main drainage line(s) to minimise erosion problems as well as preserving the riparian associated fauna.
- ❖ Conduct a thorough investigation on the flora associated with the proposed development site(s).
- ❖ Prevent the planting of potentially invasive alien plant species (e.g., *Tecoma stans*, *Pennisetum setaceum*, etc.) for ornamental purposes as part of the landscaping should mining activities eventually commence. Alien species often “escape” and become invasive causing further ecological damage.
- ❖ Incorporate indigenous vegetation – especially the protected species e.g., *Acacia erioloba*, *Albizia anthelmintica*, etc. – into the overall landscaping should mining activities eventually commence. Indigenous species require less water and overall maintenance.
- ❖ Avoid “overnighting” at the construction sites during the construction phase as this could lead to problems such as the fires/firewood collection/plant collection, and.
- ❖ 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.

(ii) Mitigation measures for preventing faunal destruction are:

- ❖ Limit the development and avoid rocky outcrops throughout the entire area.
- ❖ Avoid development & associated infrastructure in sensitive areas – e.g., in/close to drainage lines, cliffs, boulder and rocky outcrops in the area, etc. This would minimise the negative effect on the local environment especially unique features serving as habitat to various species.
- ❖ Avoid placing access routes (roads & 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.
- ❖ Avoid driving randomly through the area (i.e., “track discipline”), but rather stick to permanently placed roads/tracks – especially during the construction phase. This would minimise the effect on localised potentially sensitive habitats in the area.
- ❖ 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.
- ❖ 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.
- ❖ 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).

- ❖ 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.
- ❖ Prevent and discourage fires – especially during the development phase(s) – as this could easily cause runaway veld fires affecting the local fauna, but also causing problems (e.g., loss of grazing & domestic stock mortalities, etc.) for the neighbouring farmers.
- ❖ 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 construction sites 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.
- ❖ Implement erosion control. The area(s) towards & adjacent the drainage line(s) are easily eroded and further development may exacerbate this problem. Avoid construction within 20m of the main drainage line(s) to minimise erosion problems as well as preserving the riparian associated fauna.
- ❖ Conduct a thorough investigation on the fauna associated with the proposed development site(s).
- ❖ Prevent the number of domestic pets – e.g., cats & dogs – accompanying the workers during the construction phase as cats decimate the local fauna and interbreed & transmit diseases to the indigenous African Wildcat found in the area. Dogs often cause problems when bonding on hunting expeditions thus negatively affecting the local fauna. The indiscriminate and wanton killing of the local fauna by such pets should be avoided at all costs, and.
- ❖ Avoid “overnighting” at the construction sites during the construction phase as this could lead to problems such as the killing/poaching/collection of local fauna.

(iii) Mitigation measures to be implemented with respect to the exploration camps and exploration sites are:

- ❖ Select camp sites and other temporary lay over sites with care – i.e., avoid important habitats.
- ❖ Use portable toilets to avoid faecal pollution around camp and exploration sites.
- ❖ 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.
- ❖ 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.
- ❖ Prevent the killing of species viewed as dangerous – e.g., various snakes – when on site.
- ❖ 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.
- ❖ 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).

- ❖ Remove and relocate slow moving vertebrate fauna (e.g., tortoises, chameleon, snakes, etc.) to suitable habitat elsewhere on property.
- ❖ Avoid the removal and/or damaging of protected flora potentially occurring in the general area – e.g., various Aloe, Commiphora and Lithop species.
- ❖ 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).
- ❖ 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.
- ❖ Inform contractors/workers regarding the above-mentioned issues prior to exploration activities and monitor for compliance thereof throughout.
- ❖ Rehabilitate all areas disturbed by the exploration activities – i.e., camp sites, exploration sites, etc.
- ❖ Implement a policy of replacing 2 tree species (preferably the same species) for every 1 protected tree species having to be removed (if necessary).
- ❖ 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, and.
- ❖ Employ an independent environmental auditor to ensure compliance, especially of the rehabilitation of all the affected areas.

(iv) Mitigation measures for vehicles movements and access tracks management are:

- ❖ Avoid unnecessary affecting areas viewed as important habitat – i.e., Swartmodder River and its network of tributaries of ephemeral rivers. rocky outcrops. clumps of protected tree species.
- ❖ Make use of existing tracks/roads as much as possible throughout the area.
- ❖ Do not drive randomly throughout the area (could cause mortalities to vertebrate fauna and unique flora. accidental fires. erosion related problems, etc.).
- ❖ Avoid off-road driving at night to reduce the mortalities of nocturnal species.
- ❖ 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.
- ❖ 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), and.
- ❖ Rehabilitate all new tracks created.

(v) Mitigation measures for ground surface and groundwater protection as well as general water usage are:

- ❖ Always use as little water as possible. Reduce, reuse and re-cycle water where possible.
- ❖ All leaking pipes / taps must be repaired immediately they are noticed.
- ❖ Never leave taps running. Close taps after you have finished using them.
- ❖ Never allow any hazardous substance to soak into the soil.
- ❖ Immediately tell your Contractor or Environmental Control Officer / Site Manager when you spill, or notice any hazardous substance being spilled anywhere in the solar park areas.
- ❖ 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.
- ❖ Immediately report to your Contractor or Environmental Control Officer / Site Manager when you notice overflowing problems or unhygienic conditions at the ablution facilities.
- ❖ No washing of vehicles, equipment and machinery, containers and other surfaces.
- ❖ Limit the operation to a specific site and avoid sensitive areas and in particular the Swartmodder 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.
- ❖ Disposal of wastewater into any public stream is prohibited.
- ❖ Stoneheart Investments must obtain permission of the land owners before utilising any water resources or any associated infrastructure.
- ❖ If there is a need to drilling a water borehole to support the proposed exploration programme the proponent (Stoneheart Investments) must obtain permission from the land owner and Department of Water Affairs in the Ministry of Agriculture, Water and Land Reform. In an event of discovery of economic minerals resources, the sources of water supply for the mining related operations will be supplied by NamWater pipeline and reservoir supplying the Otjihase Copper Mine owned by Weatherly within the surrounding area, and.
- ❖ As requested by the land owners, if there are any further (larger scale) exploration/drilling activities and/or mining activities to follow from the initial planned four (4) 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.

(vi) Mitigation measures to enhance positive socioeconomic impacts include the following actions to be implemented by the exploration company:

- ❖ 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.
- ❖ Develop a database of local businesses that qualify as potential service providers and invite them to the tender process.
- ❖ Scrutinise tender proposals to ensure that minimum wages were included in the costing.

- ❖ Stipulate that local resident should be employed for temporary unskilled/skilled and where possible in permanent unskilled/skilled positions as they would reinvest in the local economy.
- ❖ 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.
- ❖ 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, and.
- ❖ Encouraged to cater for the needs of employees to increase the spending of wages locally.

(vii) Mitigation measures to minimise negative socioeconomic impacts are:

- ❖ 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.
- ❖ 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.
- ❖ Addressing unrealistic expectations about large numbers of jobs would be created.
- ❖ Exploration camp if required should be established in close consultation with the land owners.
- ❖ Exploration camp should consider provision of basic services.
- ❖ When contracts of employees are terminated or not renewed, contractors should transport the employees out of the area to their hometowns within two days of their contracts coming to an end.
- ❖ Tender documents could stipulate that contractor have HIV/Aids workplace policies and programmes in place and proof of implementation should be submitted with invoicing.
- ❖ Develop strategies in coordination with local health officers and NGO's to protect the local communities, especially young girls.
- ❖ 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.
- ❖ 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.
- ❖ Request that the Roads Authority erect warning signs of heavy exploration vehicles on affected public roads.
- ❖ Ensure that drivers adhere to speed limits and that speed limits are strictly enforced.
- ❖ Ensure that vehicles are road worthy and drivers are qualified, and.

- ❖ Train drivers in potential safety issues.

(viii) Mitigation measures to minimise health and safety impacts are:

- ❖ 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.
- ❖ Some of the public access management measures that may be considered in an event of vandalism occurring are:
 - All exploration equipment must be in good working condition and services accordingly.
 - Control access to the exploration site through using gates on the access road(s) if required.
 - 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.
 - 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.

(ix) Mitigation measures to minimise visual impacts are:

- ❖ Consider the landscape character and the visual impacts of the exploration area including camp site from all relevant viewing angles, particularly from public roads.
- ❖ Use vegetation screening where applicable. Do not cut down vegetation unnecessary around the site and use it for site screening.
- ❖ Avoid the use of very high fencing.
- ❖ Minimise access roads and no off-road that could result in land scarring is allowed.
- ❖ Minimise the presence of secondary structures: remove inoperative support structures, and.
- ❖ Remove all infrastructure and reclaim, or rehabilitate the project site after exploration activities are completed.

(x) Mitigation measures to minimise noise impacts are:

- ❖ Limit vehicle movements and adhere to the speed of 60 km/h.
- ❖ Vehicles and all equipment must be properly serviced to minimise noise pollution.
- ❖ Use of protective equipment to minimise Occupational Health Safety impacts dues to noise pollution around the site, and.
- ❖ National or international acoustic design standards must be followed.

(xi) Mitigation measures for waste (solid and liquid) management are:

- ❖ 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 in Windhoek.

- ❖ 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).
- ❖ Provide site information on the difference between the two main types of waste, namely:
 - General Waste. and
 - Hazardous Waste.
- ❖ 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 or construction rubble.
- ❖ All solid and liquid wastes generated from the proposed project activities shall be reduced, reused, or recycled to the maximum extent practicable.
- ❖ Trash may not be burned or buried, except at approved sites under controlled conditions in accordance with the municipal regulations.
- ❖ 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.
- ❖ Never litter or throwaway any waste on the site, in the field or along any road. No illegal dumping, and.
- ❖ Littering is prohibited.

6.3 Roles and Responsibilities

6.3.1 Overview

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 (socioeconomic, physical and biological).

6.3.2 Employer's Representative (ER)

The proponent is to appoint an **Employer's Representative (ER)** 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 ER 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 ER has the authority to issue fines for transgressions of basic conduct rules and/or contravention of the EMP.
- ❖ Should the Contractor or his/her employees fail to show adequate consideration for the environmental aspects related to the EMP, the ER can have person(s) and/or equipment removed from the site or work suspended until the matter is remedied.
- ❖ 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.

6.3.3 Environmental Control Officer (ECO)

The proponent is to appoint an **Environmental Control Officer (ECO)** with the following responsibilities with respect to the EMP implementation:

- ❖ Assist the ER in ensuring that the necessary environmental authorizations and permits have been obtained.
- ❖ Assist the ER 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 ER as soon as possible.
- ❖ Organize for an independent internal audit on the implementation of and compliance to the EMP to be carried out half way through each field-based exploration activity. audit reports to be submitted to the ER.
- ❖ Continuously review the EMP and recommend additions and/or changes to the EMP document.
- ❖ Monitor the Contractor's environmental awareness training for all new personnel coming onto site.
- ❖ Keep records of all activities related to environmental control and monitoring. the latter to include a photographic record of the exploration activities, rehabilitation process, and a register of all major incidents, and.
- ❖ Attend regular site meetings.

6.3.4 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 / ER 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 ECO is to provide the course content and the following topics, at least but not limited to, should be covered:
 - The importance of complying with the EMP provisions.
 - Roles and Responsibilities, including emergency preparedness.
 - Basic Rules of Conduct (Do's and Don'ts).
 - EMP: aspects, impacts and mitigation.
 - Fines for Failure to Adhere to the EMP, and.
 - Health and Safety Requirements.
 - ❖ Record keeping of all environmental awareness training and induction presentations, and.
 - ❖ Attend regular site meetings and environmental inspections.

6.4 Monitoring of the Environmental Performance

6.4.1 Overview

The monitoring process of the EMP performances for the proposed exploration project is divided into two parts and these are:

- (i) Monitoring activities and effects to be undertaken by the Environmental Control Officer (ECO), and.
- (ii) Preparation of an Environmental Monitoring Report covering all activities related to the Environmental Management Plan during and at closure of the proposed exploration to be undertaken by the Environmental Control Officer (ECO).

Stoneheart Investments (Pty) Ltd will be required to report regularly (twice in a year) to the Ministry of Environment, Forestry and Tourism, 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 regulators. 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 Environmental Control Officer/ Consultant / Suitable qualified in-house resource person.

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 Environmental Control Officer (ECO).

The objective will be to ensure that corrective actions are reviewed and steps are taken to ensure compliance for future EIA and EMP implementation. The report shall outline the status of the environment and any likely environmental liability after completion of the proposed project. The report shall be submitted to the Ministry of Environment, Forestry and Tourism and will represent the final closure and fulfilment of the Environmental Contract conditions as provided for the Environmental Clearance Certificate to be issued.

7. CONCLUSION AND RECOMMENDATION

7.1 Conclusions

Current proposed main mineral exploration field-based activities covering mapping, geochemical sampling and drilling of four (4) boreholes will have low localised impacts on the local receiving environment with low significant impacts. Mitigation measures must be implemented as detailed in Section 6 (EMP) of this report. The proponent (Stoneheart Investments (Pty) Ltd) must obtain permission of the land owners (surface rights holders) before exercising their subsurface rights in all the farms covered by the EPL 4721.

7.2 Recommendations

It's hereby recommended that the proposed exploration activities be issued with an Environmental Clearance Certificate with key conditions of adhering to the provisions of the EMP, Access Agreement as well as all other related regulations governing, mineral exploration, water resources management, health and safety and labour. The proponent (Stoneheart Investments (Pty) Ltd) 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 4721. Recommended actions to be implemented by Stoneheart Investments (Pty) Ltd as part of the management of the likely impacts through implementations of the EMP are:

- (i) The proponent must obtain permission from the land owners to enter the EPL area in order to undertake field-based exploration / prospecting activities.
- (ii) The proponent must implement precautionary measures / approach to environmental management. Once a viable and potentially economic resources have been identified, the proponent must 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 environmental officer 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) Contract an Environmental Control Officer/ Consultant / suitable in-house resources person to lead and further develop, implement and promote environmental culture through awareness raising of the workforce, contractors and sub-contractors in the field during the whole duration of the proposed exploration period.
- (v) Provide with other support, human and financial resources, for the implementation of the proposed mitigations and effective environmental management during the planned exploration activities for the EPL 4721.
- (vi) 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 be prepared by the Environmental Coordinator / Consultant / Suitable in-house resource person and to be submitted to the regulators and to end 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.

7.3 Summary Terms of Reference for Full EIA

Once potential economic resources are discovered within this EPL area, a separate field-based and site-specific Environmental Impact Assessment (EIA) and the development of an Environmental Management Plan (EMP) MUST be implemented as part of the prefeasibility and or feasibility study stage. 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 variable resources are discovered are:

- ❖ 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 (Khomas Region), 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 Forestry, and.
- ❖ 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.

8. BIBLIOGRAPHY / REFERENCES

1. FURTHER GENERAL READING

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

Directorate of Environmental Affairs, 2002. Atlas of Namibia Project. Ministry of Environment, Forestry and Tourism, Windhoek, <http://www.met.gov.na>

Geological Survey of Namibia, 1999. The Simplified Geological Map of Namibia, Windhoek.

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.

Mwiya, S., 2004. A Knowledge-Based System Model Methodology (KBSMM) for Development and Management of Mine Waste sites in Arid and Semiarid Environments of Southern Africa, *Geosciences Africa 2004, University of Witwatersrand, Johannesburg*, South Africa, pp 486.

Risk-Based Solutions, 2014. Final Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) Report for the Proposed Minerals Exploration Activities in the Exclusive Prospecting License (EPL) No. 4742, Hallie Investment Number 411 CC, Windhoek District, Khomas Region, CENTRAL NAMIBIA.

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. 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.
- 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.
- 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. & 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, Windhoek.

- Griffin, M. 2005. Annotated checklist and provisional national conservation status of Namibian mammals. Ministry of Environment, Forestry and Tourism, 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 2012. IUCN Red List of Threatened Species. Version 2012.2, www.iucnredlist.org
- 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. & 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., Cotterill, F.P.D. & Schoeman, M.C. 2010. Bats of southern and central Africa – A biogeographic and taxonomic synthesis. Wits University Press, Johannesburg, South Africa.
- 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, 2006. Namibia's communal conservancies: a review of progress and challenges in 2005. NACSO, Windhoek.
- 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, 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.
- Skinner, J.D. and Chimimba, C.T. 2005. The mammals of the southern African subregion. Cambridge University Press, Cape Town, RSA.
- 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.