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Scooping Environmental Report forthe Proposed Exploration EPL 8724

Mosioline Zeenaro Kasiringua

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Statement of Qualification of the Project Manager

This project has been undertaken and managed by Mr Mulife Siyambango (MSc-IRM,MCSM,MBA, BSc, FGS) Mr Mulife is highly qualified, with more than ten years of professional experience in applied Geosciences covering environmental management, mining (terrestrial and marine), petroleum (terrestrial and marine), geo environmental engineering and geotechnical engineering fields. He gained his experience from Government of Namibia and private employment contracts in Namibia. Mr Siyambango is a member of the Geological Society of Namibia, Consulting Geoscientist with the Ministry of Mines and Energy. Mr Siyambango has experience, skills and technical knowledge in mining industry, petroleum industry, environment assessment and management, local, regional and national land use planning, production and management of various planning thematic information, maps and related documentations, gained in local, national and regional developmental programmes he undertook.

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Mulife Siyambango (MSc-IRM, MCSM, MBA, BSc, FGS)

Consultant

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Executive Summary

The Mosioline Zeenaro Kasiringua holds mineral rights under the Exclusive Prospecting Licence (EPL) No. 8724.The EPL No. 8724 is located in the Karasburg District of the Karas Region, in the southern Namibia. The EPL is located to the southwest of the settlement of Grunau. The EPL 8724 area totaling 13064.6555 Ha cover parts of the following private farmlands: Nakais-11, Grabwasser-261, 408 Gamkab and Grunau N.W. The mineral commodities that are targeted in the area are base and rare metal as well as industrial minerals. The proponent intends to implement an exploration programme and possible test mining of the potential economic mineral commodities that may be identified. The intended exploration programme will cover scoping, pre-feasibility and feasibility studies. The activities to be undertaken will include geological mapping, drilling, sampling as well as possible development of test mining infrastructure.

MOSIOLINE ZEENARO KASIRINGUA is required to undertake an Environmental Impact Assessment (EIA) for the proposed exploration and possible test mining activities within the framework of the existing environmental assessment process as describedin the Environmental Assessment Policy for Sustainable Development and Environmental Conservation of 1995, published by the Ministry of Environment and Tourism (MET).

As part of the fulfilment of the requirements, MOSIOLINE ZEENARO KASIRINGUA has requested CEGEOR cc as the Environmental Consultants to undertake the EIA with respect to the proposed exploration and possible test mining activities under the EPL 8724.

The main objective of the EIA is to investigate and assess the likely short and long – term positive and negative environmental impacts of the proposed exploration and possible test mining activities with respect to the EPL No. 8724. The main objectives of the EIA are summarised as follows:

- To prepare this scooping environmental report including details of the proposed exploration and possible test mining activities with respect to the EPL No. 8724. Communicate the report to all interested and affected parties

and their views and comments to form part of the ToR for the full EIA study to be implemented in form of specialised studies;

- Implement the full EIA and undertake specialised studies, followed by the evaluation of the likely positive and negative impacts associated with the proposed project activities on the environment. The results of the assessment to be presented in a Draft EIA report including an EMP;

- Present the Draft EIA Report including an Environmental Management Plan (EMP) to the client (MOSIOLINE ZEENARO KASIRINGUA), key interested stakeholders and the authorities for further comments and;

- To incorporate all comments received in the final EIA and EMP reports for the proposed exploration and possible test mining activities with respect to the EPL No. 8724 for submission to the client (MOSIOLINE ZEENARO KASIRINGUA) and to the Directorate of Environmental Affairs (DEA) in the Ministry of Environment and Tourism for consideration.

1. Background to the Project

1.1 Introduction

The Mosioline Zeenaro Kasiringua holds minerals rights over an 13064.6555 HA area under the EPL No. 8724, located in the Karas Region Southern Namibia (Fig. 1.1). The Company intents to implement a detailed exploration programme with possible test mining for base and rare metals as well as industrial minerals which are the commodities being targeted. MOSIOLINE ZEENARO KASIRINGUA is required to undertake an Environmental Impact Assessment (EIA) for the proposed exploration programme and possible test mining in the EPL No. 8724.

The EIA is to be undertaken within the framework of the existing environmental assessment process (Fig. 2.1) as described in the Environmental Assessment Policy for Sustainable Development and Environmental Conservation of 1995, published by the Ministry of Environment and Tourism. MOSIOLINE ZEENARO KASIRINGUA has appointed Centre for Geosciences Research (CEGEOR) CC as the Environmental Consultants. Centre for Geosciences Research has prepared this draft Scooping Environmental Report of the proposed project area and interested and affected parties are hereby invited to comment on the proposed project activities as part of the requirements for the environmental assessment process. Centre for Geosciences Research recognises that a good EIA is a key tool to further the implementation and promotion of sound and sustainable environmental managementin striving to achieve Integrated Environmental Management (IEM). Centre for Geosciences Research also recognises that, good and sound environmental assessment tools such as Strategic Environmental Assessments (SEAs), Environmental Impact Assessments (EIAs), Environmental Management Plans (EMPs) and Environmental Management Systems (EMSs) are important and ensures that the environmental consequences of various policy, plan, programme and project development are considered, understood and incorporated at the early stages of the project planning and implementation process. And, it's within the context of IEM that the term *environment* is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.

1.2 Location, Infrastructure and Services

1.2.1 Location

The EPL Area (No. 8724) is situated in the located to the southwest of the settlement of Grunau Figs. 1.1 and 1.2). The area covers the following four (4) farms:

1. Nakais-11,
2. Grabwasser-261,
3. 408 Gamkab
4. Grunau N.W

1.2.2 Infrastructure

Regionally, the EPL area is linked to the national road network by the B1 connecting Namibia's southern coastal Port town of Lüderitz and Keetmanshoop in the central part of the country. Parallel to the B1 road, Lüderitz and Keetmanshoop are also connected by the railway network. Both the B1 and the rail link infrastructure are located about 70 km east of the EPL area.

The EPL area is accessible by road which includes the connecting to the B1. Apart from the Farmhouses, there are no major settlements within the EPL Area. The nearest major settlements is Karasburg located to the south east of the EPL Area respectively (Fig. 1.1). The EPL area does not have mobile telecommunication but reception is available towards Grunau. Fixed telecommunication infrastructure as well as all the related business services is available in the region.

1.2.3 Water

Bulk water supply in Namibia is provided by the Namibia Water Corporation, NamWater, and a fully government-owned commercial company. Government through the Ministry of Agriculture, Water and Forestry is the sole shareholder of the Corporation. NamWater supplies water in bulk to industry, municipalities and the Directorate of Rural Water Supply in the Ministry of Agriculture, Water and Forestry. The Directorate, in turn, supplies water to rural communities. Although limited to the increasing developmental project, groundwater resources are available for new projects in the area. The EPL Area in particular, is located within the carbonate terrain with good groundwater potential. Limited groundwater is also available in the region and is associated with the paleo-channels covered by the Desert Sand Dunes (Department of Water Affairs, 2001).

In accordance with the Water Resources Management Act, 2004, (Act No. 24 of 2004) and in view of the arid nature of the Namibian environment, the disposal of wastewater as well as all other type of waste is strictly controlled. In most cases and in particular wastewater is disposed off in evaporation ponds because no effluent may be discharged into the ephemeral, dry river beds in the interior of Namibia. The reclamation, re-use and recycling of waste is encouraged whenever an industry applies for a waste water disposal permit.

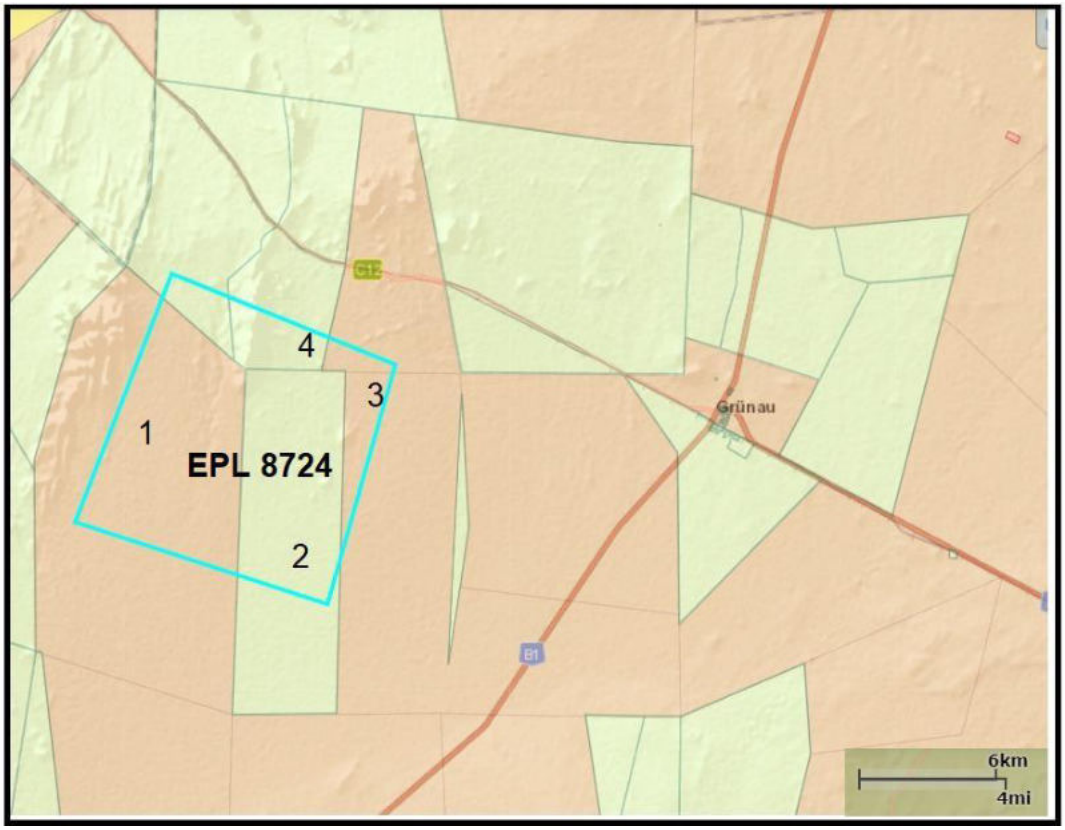

Figure 1.2: Detailed overview of the farms covered by the EPL 8724.

1.2.4 Energy

The EPL area is cut across by a main electricity supply infrastructure network connecting the mining Town of Karasburg located to south east of the EPL 8724. The main sources of power supply in Namibia are the thermal, coal-fired Van Eck power station outside Windhoek (120 megawatts), the hydroelectric plant at Ruacana Falls (240 megawatts), the diesel driven Paratus power station at Walvis Bay (24 megawatts) and one interconnecting line from Eskom (South Africa) (200 megawatts). To meet the growing power demand, NamPower commissioned the construction of the 900-kilometer, 400kV interconnector power line from Kenhardt in South Africa to Auas near Windhoek in 2000. Furthermore, a number of private – public partnership generation projects have been announced by the Electricity Control Board (ECB) including the wind power project in Lüderitz and coal power stations in Walvis Bay.
In terms of the availability of fuels to run the any project in the area, the country has a well-established downstream oil marketing infrastructure that is closely linked with South Africa. There are five main companies distributing and marketing fuel products in Namibia.

1.3 Project Summary

1.3.1 General Overview

Mosioline Zeenaro Kasiringua , intend to implement an exploration programme and possible test mining under the Exclusive Prospecting License (EPL) No. 8724. The purpose of the proposed mineral exploration programme is to prove the existence and extent of ant potential mineral resources within the EPL No. 8724. The exploration targets to locate a new source of base, rare metals and industrial minerals in the area. This includes industrial minerals (such as silica used in the making of glass or clay and limestone minerals used in the making of ceramics and cement products), base rare metals such as Tin Tantalite, Beryllium and possible Lithium, and copper.

The regional geological setting as well as the types of rocks (geology) in parts of the EPL Area is similar to rocks found in other areas of Namibia where base and industrial mineral deposits have already been discovered. Despite all these indications, it is imperative to ensure that potential resources identified in the area are economically viable and to determine how it can be extracted and marketed. Mineral exploration is the first phase of the mining cycle. It is the search for mineral deposits. Every new mine has its beginnings as an exploration project but not all exploration projects will advance to become economic productive mines.

The proposed exploration under the EPL 8724 is the first of its kind in the area. The exploration process is likely to be slow and is estimated to last the duration of the Exploration Licence. During the exploration phase, local community may notice prospectors walking around. A small exploration camp will be established with the permission of the landowner/s. The camp may consist of a few wall tents or trailers. The size and type of camp will depend on the length of the job and the number of people staying at the camp. Vehicles bringing in supplies, taking out samples and sending prospectors in field, will support the camp and the whole exploration programme. These activities do not mean that a mine is going to be developed but, rather, that there are people searching for signs of minerals.

The following is the summary of the proposed exploration programme by MOSIOLINE ZEENARO KASIRINGUA :

(i) Preliminary Exploration Phase (Scoping);
(ii) Pre-feasibility; and
(iii) Feasibility.

1.3.2 Scoping

The scoping exploration phase will involve looking for potential deposits within the larger EPL 8724 Area. The techniques that will be employed include review of all published and unpublished reports, satellite mapping, and regional geological mapping as well as environmental assessments of the targeted area. Other activities to be undertaken as part of the scoping phase exploration programme includes:

(i) Exploration Project Management;
(ii) Preliminary field visits and field work support and logistic assessments
(iii) Initial Field Investigations;
(iv) Geologic Data Compilation and Database Management;
(v) Mineral Rights Management;
(vi) Legal and Regulatory;
(vii) Other Service.

If there are signs of minerals occurrences within the EPL 8724, prospecting activities will progress to more detailed work programmes such as sampling and drilling. The detailed work programme will form part of the pre-feasibility and feasibility studies.

1.3.3 Detailed Exploration

The detailed exploration programme will cover pre-feasibility and feasibility studies. The detailed exploration programme can take many forms, from a prospector walking through the bush with a geological hammer to a prospector using sophisticated tools such as Global Positioning System (GPS) and geophysical instruments to identify exact positions of any mineral deposits within the boundaries of the EPL 8724. The detailed exploration phase will largely includes prospectors walking the ground examining and mapping rock types and collecting rock and soil samples by hand for either mineral or chemical analysis.

The detailed exploration programme will continue to get deeper as more data become available. Larger samples that can be checked in the laboratory will also be

collected in order to full understand the type and extent of the potential mineral resources in the area. Basic geoscience surveys, such as geological mapping and even satellite coverage, will help to guide the field search for economic mineral deposits under the EPL 8724.

Many mineral deposits are structurally controlled, so understanding the basic structural geology of an area (i.e., how the rocks have been folded and faulted) is very important. After the rocks have been examined on the ground, geologicalmapping will be created to show the location of different types of rocks or structures within the EPL Area.

Following the completion of the data collection process under pre-feasibility and feasibility phases, an evaluation exercise will be implemented. All information including samples testing results and survey information will be carefully reviewed to see if the work that has been done is encouraging enough to continue with more detailed and expensive activities, such as detailed drilling and bulk sampling, and then advance to test mining and possible mine development.

2. Regulatory Framework

2.1 Proposed Exploration Project EPL 8724

The constitutionality of the environmental regulatory framework in Namibia is based on the Article 95 of the Constitution of the Republic of Namibia (1990), which states that; "*the State 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 natural resources on a sustainable basis for the benefit of all Namibians both present and future*" Article 101 further states that; "*the principles embodied within the constitutionshall not of and by themselves be legally enforceable by any court, but shall nevertheless guide the Government in making and applying laws*." The courts are entitled to have regard to the said principles in interpreting any laws based on them. The most important pieces of legislations with respect to the proposed project are those covering mining, environment and water.

Currently, the Environmental Assessment (EA) process in Namibia is governed by the Cabinet approved Environmental Assessment Policy for Sustainable Development and Environmental Conservation of 1995 published by the Ministry of Environment and Tourism (Directorate of Environmental Affairs (DEA), 1995). Fig. 2.1 shows all the relevant stages that are required in an environmental assessment process.

The Environmental Assessment (EA) procedure as outlined in the Environmental Assessment Policy for Sustainable Development and Environmental Conservation (1995), (Fig. 2.1), set out to:

(i) Better inform decision makers and promote accountability for decisions taken;

(ii) Consider broad range of options and alternatives when addressing specific policies, programmes and projects;

(iii) Strive for a high degree of public participation and involvement by all sectors of the Namibian community in the EA process;

(iv) Take into account the environmental costs and benefits of proposed policies, programmes and projects;

(v) Incorporate internationally accepted norms and standards where appropriate to Namibia;

(vi) Take into account the secondary and cumulative environmental impacts of policies, programmes and projects;

(vii) Ensure that the EA procedure is paid for by the proponent. In certain cases, such as programmes initiated by the State, it is recognised that the Government is the proponent and will meet the costs of an independent EA;

(viii) Promote sustainable development in Namibia, and especially ensure that a reasonable attempt is made to minimise anticipated negative impacts and maximise the benefits of all developments;

(ix) Be flexible and dynamic, thereby adapting as new issues, information and techniques become available.

The draft Environmental Management Bill of (2004), administered by the Directorate of Environmental Affairs, Ministry of Environment and Tourism is aimed at giving statutory effect to the Environmental Assessment Policy for Sustainable Development and Environmental Conservation (1995). The purpose of this bill is to give effect to Articles 95(c) and 95(1) of the Namibian Constitution by establishing general principles for the management of the environment and natural resources. It further promotes the coordination and integrated management of the environment. Schedule 1 of the bill lists activities that require a full environmental assessment tobe conducted and include exploration and mining related.

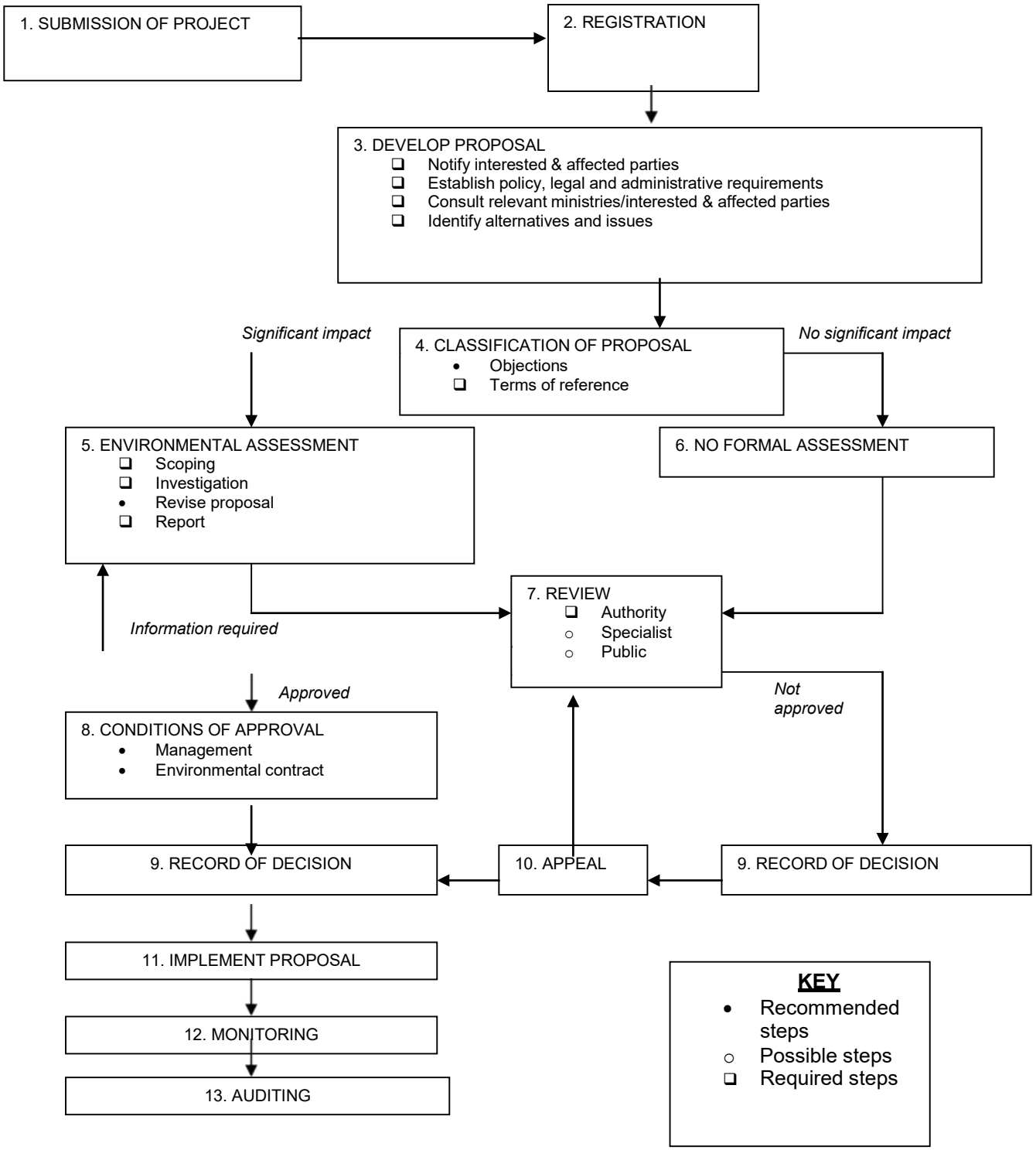

Figure 2.1: Environmental Assessment process in Namibia (Directorate of Environmental Affairs (DEA), 1995).

2.2 Other Relevant Legislation and Policies

The following are some of the relevant legislation and policy strategies with respect to the proposed exploration project and possible test mining under the EPL 8724;

(a) Legislations;

- Prospecting and Mining Act, 1992, (Act No 33 of 1992);
- Water Resources Management Act, 2004, (Act No. 24 of 2004);
- Hazardous Substances Ordinance 14 of 1974;
- Atmospheric Pollution Prevention Ordinance 11 of 1976;
- The Nature Conservation Ordinance, Ordinance 4 of 1975, Amendment Act, Act 5 of 1996 and the current draft Parks and Wildlife Management Bill of 2006;
- The Regional Councils Act, 1992, (Act 22 of 1992);
- The Local Authorities Act, 1992, (Act 23 of 1992);
- The Labour Act 2004, (Act 15 of 2004);
- Petroleum (Exploration and Production) Act 1991 (Act 2 of 1991);

(a) Policies

- General;
    - Namibia's Green Plan;
    - Vision 2030;
    - Regional Development Strategy;

- Environmental Management;
    - Namibia's 12 Point Plan for Integrated and Sustainable;
    - Environmental Management;
- Water;
    - National Water Policy White Paper 2000;
    - Water and Sanitation Policy;
    - Integrated Water Resource Management and Water Demand Management Policy;

- Tourism
    - White Paper on Tourism Policy;
    - Policy on Wildlife Management, Utilisation and Tourism in Communal Areas;
    - Policy on Community-Based Tourism Development;

- Energy;
    - White Paper on Energy Policy;

- Land;
    - National Land Policy;
    - National Resettlement Policy;
    - Land Use Planning Policy;
- Agriculture;
    - National Agriculture Policy;
- Biodiversity and Forestry;
    - Development Forestry Policy for Namibia;
    - Conservation and Biotic Diversity and Habitat Protection Policy;
    - Policy Framework for Wildlife and Utilisation Production in;
    - Support of Biodiversity Conservation and Economic Development;
    - National Policy on the Safe Use of Biotechnology;
    - Community Based Natural Resource Management (CBNRM) Policy.

3. Description of the Exploration

3.1 General Overview

Overall the exploration programme including test mining proposed for the EPL 8724 could be divided into three phase and these are:

(i) Scoping;

(ii) Pre-feasibility; and

(iii) Feasibility.

The activities that will be covered in the first year of exploration will include all those relevant to the scoping phase as well as other activities from Phases 2 and 3 to some extent. Nonetheless, the following are the relevant components to the phase 1:scoping exploration programme:

(i) Exploration Project Management;
(ii) Geological Work;
(iii) Initial Reserve Estimation;
(iv) Field work support and logistic assessments;
(v) Initial Field Investigations;
(vi) Geologic Data Compilation and Database Management;
(vii) Mineral Rights Management;
(viii) Legal and Regulatory;
(ix) Exploration and Subsurface Sampling;
(x) Other Services.

The breakdown of the associated activities linked to the above 1- 10 scoping phase components are shown in the Tables 3.1 – 3.10:

Table 3.1: Exploration project management.

Activities	Schedule	Responsibility
a) Project Conception & Planning of the Exploration Programme		
b) Budgeting process		
c) Scheduling of activities in accordance with the exploration programme		
d) Financial Management associated with the local activities		
e) Legal matters associated with whole exploration programme		
f) Community and all related stakeholders relations particularly in the northern part of Namibian		
g) Human Resources (including consultants procumbent and management)		
h) Health and Safety requirements for the whole exploration programme		

Table 3.2: Geological work.

Activities	Schedule	Responsibility
a) Literature Searches		
b) Regional Geology		
c) Local Geology		
d) Mineralogy/Petrology		
e) Stratigraphy / Sedimentology		
f) Geologic Hazards		

Table 3.3: Initial reserve estimation.

Activities	Schedule	Responsibility
a) Country and regional mineral potential reports		
b) Resource and reserve estimation and audits		
c) Mineral property appraisals, evaluations and due diligence reviews		
d) Reserve Calculations		
e) Independent project reviews and audits for loan funding and Stock Exchange listings		

Table 3.4: Field work support and logistic assessments.

Activities	Schedule	Responsibility
a) Campsite evaluation and assessment		
b) Design		
c) Procurement		
d) Installation/Construction		
e) Manage/operate		
f) Decommission		

Table 3.5: Initial field investigations.

Activities	Schedule	Responsibility
a) Surveying		
b) Geochemistry soil, silt, rocks		
c) Trench drilling and blasting		
d) GPS		
e) Surface Geologic Mapping		

Table 3.6: Geologic data compilation and database management.

Activities	Schedule	Responsibility
a) Development and implementation of GIS integrated database for land management		
b) Geologic Drafting and Illustrating		

Table 3.7: Mineral rights management.

Activities	Schedule	Responsibility
a) Mineral tenure control and maintenance of mineral rights including the filling of claim		
b) Coordination of the preparation of quarterly, biannual and annual reporting		

Table 3.8: Legal and regulatory.

Activities	Schedule	Responsibility
a) Environmental Permitting		
b) Environmental scooping studies and environmental permitting for exploration and mining		
c) Planning Phase II, and III Environmental Site Assessments (Environmental Impact Assessment and Environmental Management Plans for the Exploration Programme		
d) Site Maps		
e) Exploration Reclamation Plans		
f) Continuous rehabilitation and Sediment and Erosion Control		
g) Local Zoning Issues Environmental Services		
h) Stormwater Permits and Compliance		
i) Exploration Discharge Sampling Analysis		
j) Above ground / underground storage Tanks / facilities and compliances		
k) Delineation and Remediation of Contaminated Soils and Groundwater		

Table 3.9: Exploration and Subsurface Sampling.

Activities	Schedule	Responsibility
a) Drilling and Subsurface Sampling		
b) Auger Drilling		
c) Core Drilling		
d) Specialized Drilling		

e) Laboratory Analysis		
f) Deposit Delineation		
g) Petrographic Analysis		
h) Groundwater Studies		
i) Surface and Subsurface Maps		

Table 3.10: Other services.

Activities	**Schedule**	**Responsibility**
(a) Expert Testimony for Legal Issues such as condemnations, boundary or royalty disputes etc		
(b) Acquisition Due Diligence where applicable		
(c) Negotiations with all consultants and contractors to be recruited		

3.2 Environmental Management

3.2.1 Environmental Monitoring

Although the proposed exploration programme seems to be very comprehensive, the amount of activities that will be undertaken on the ground will be relatively localised to specific areas of the EPL 8724. During exploration, the exploration company will do most of the environmental monitoring as stipulated in the Environmental Management Plan (EMP). Monitoring may involve checking:

(i) the fuel storage area;
(ii) that waste is properly disposed of;
(iii) that food is not left where animals can get it; and
(iv) that no unwanted waste remains after drilling rigs leave.

Companies must also follow the conditions of any permits or licences granted to conduct exploration. Government inspectors will likely visit the site to make sure that conditions imposed on the licences and/or permits are being met and that all regulations are being respected.

3.2.2 Potential Fauna and Flora Impacts

The proposed exploration programme will be undertaken over time and destructive methods such as drilling and sampling will be localized to very limited areas. Overall the likely negative impacts such as fauna and flora destruction with respect to the proposed exploration programme and possible test mining will be limited but extent as well as all other component will be assessed in the full EIA. The EPL area falls within the dwarf shrub Savanna (Fig. 3.1). The main reasons for integrating both fauna and flora in the conceptual model of this study are to evaluate:

- The ecological significance and conservation status with respect to the international and local conservation requirements in order to avoid conflicts between the purposed mineral exploration and test mining and conservation;

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

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

The likely temporal and long-term impacts and influences of the proposed exploration project will largely be localised and will depend on the susceptibility ofthe local flora and fauna to be evaluated in the EIA study. Such local condition will include the type, density and conservation status of the concerned species with respect to exploration activities to be undertaken.

Different plant species have adapted to the prevailing local climatic and ground conditions and these plants have been able to deal with and survive high temperature and low precipitation through photosynthesis, dormancy, morphological and physiological adaptation strategies (The World Book Encyclopedia of Science, 1990; Directorate of Environmental Affairs, 1998). Photosynthesis adaptive species have water loss protection strategies typical of a variety of grasses and plants found around the area and they do not photosynthesise during hot day times. The ephemerals (avoiders) are mostly annuals, which survive low precipitation and long droughts in their seed form only to bloom during temporal short rains (The World Book Encyclopedia of Science, 1990). Morphologically adaptive plant species survive on specific terrains (Directorate of Environmental Affairs, 1998). Typicalexamples are the variety of the plants and grass species that dominate the topographically high and low terrain. Other morphologically adaptive plants may survive by having shallow and wide root systems typical of the succulents that grow on rock slopes, those with deep and wide root systems typical of the xeromorphic shrubs while other plants have very deep root systems that penetrate the deep-waterbodies.

Physiologically adapted plants survive harsh conditions by shedding leaves, typical of the drought deciduous plants. Other physiologically adaptive plants store water in parenchymatous tissues found in leaves or stems while some have smaller leaf

surface areas exposed to the heat. This is typical of xeromorphic shrubs and a variety of the *Acacias*. However, due to the likely diverse ecological settings of the area, the field investigations will focus on evaluating the interactive dependence of fauna on flora with respect to environmental protection and potential influence of the proposed project activities. Generally, plant species are sources of food and shelter to a variety of birds and animals. The size of the habitat area that might be impacted and the conservation status of affected species are important in the assessment process. Numerous bird species, insects as well as other animals may be found in the area.

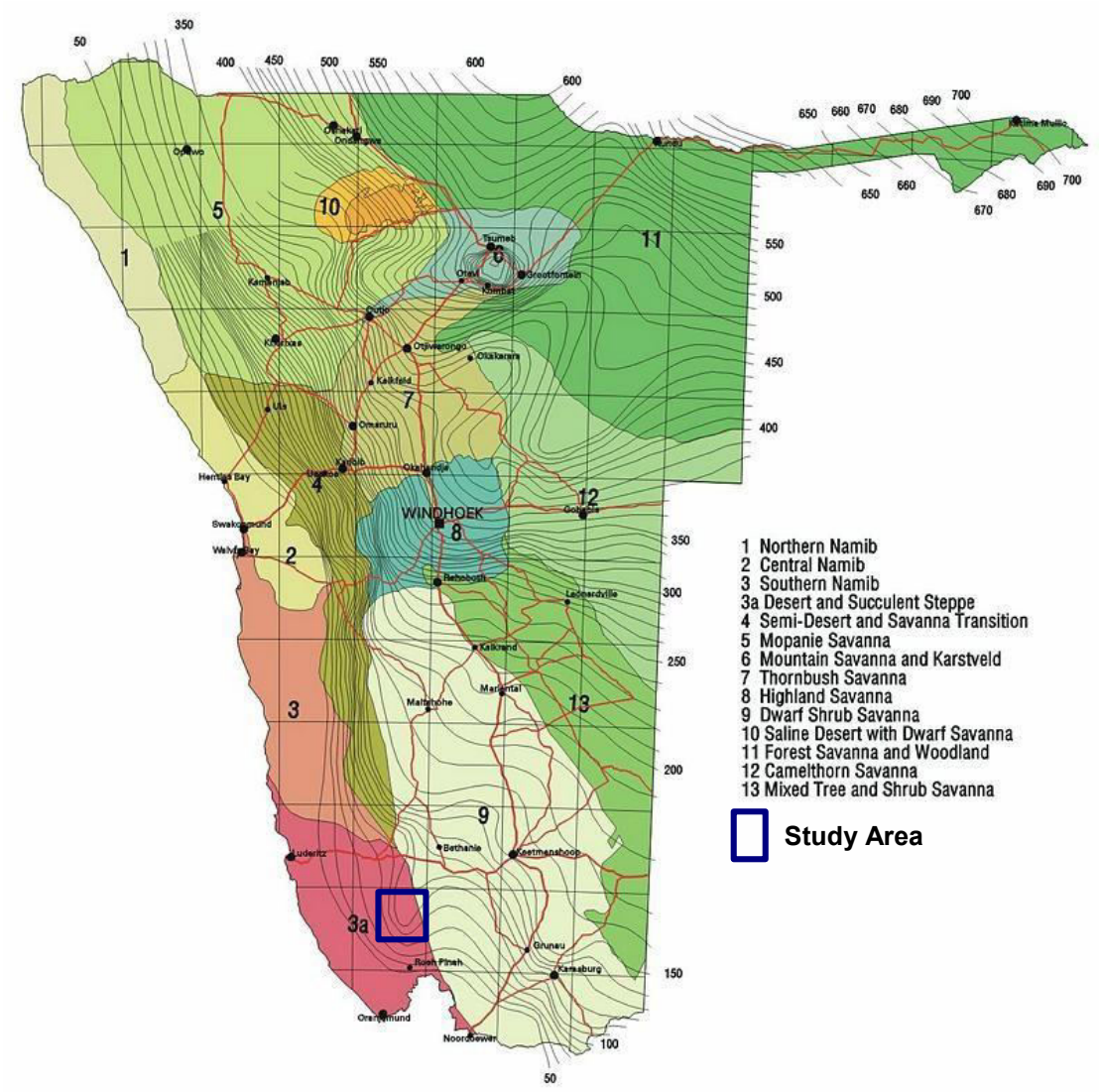

Figure 3.1: The vegetation zones of Namibia (Directorate of Environmental Affairs, 2002).

3.2.3 Potential Social, Economic and Cultural Impacts

Social impacts at the exploration stage are likely to be minimal and tend to be positive. A clear understanding of these impacts may help communities understand and anticipate the effects of exploration. One of the major possible impacts ofexploration may be unrealistic expectations about the development of a mine. It's important for local communities to bear in mind that most exploration activity will not advance to mine development. The following is the summary of the likely positiveand negatively social, economic and cultural impacts:

(i) Social

- Opportunities for social shift work / rotational work associated with the exploration programme;
- Less time to spend on traditional activities such as farming;
- Workers and their families are separated for several days or weeks resulting in some marital stress;
- Members leaving the community (because they now have money and good-paying jobs);
- Members leaving their skilled jobs in the community to take exploration related temporal jobs because of good temporal returns;
- The community then has to spend money to train new workers.

(ii) Economic

- Increased employment levels;
- Increased income levels;
- Increased training and skill development opportunities;
- Increased buying power;
- Creates positive role models;
- More money flowing into a community could result in more liquor;
- and/or drugs coming into the community;
- Widens the gap between the employed and unemployed;
- Use the positive working role models within the community;
- Create addiction response programs and support groups.

(iii) Cultural

- Cultural strangers in the community;
- Increased population;
- Strains existing services;
- Worsens existing social problems.

3.2.4 Opportunities for Community Participation

Any likely major community input during early exploration will be through direct communication with the company carrying out the project. Governments encourage prospectors and exploration companies to communicate with Regional Councils and to talk to local community members before going onto the land. This is the time for communities to ask questions, raise concerns, and learn about the exploration process. Early consultations can serve to alert communities to the many challenges and opportunities that may lie ahead and are an opportunity to ask important questions such as:

- Do we want to get involved in mining related businesses?
- What are the employment /business opportunities?
- What are the potential negative impacts and how do we minimize them?

The full EIA studies will strive to have answers to these questions and many more in order to prepare the community should an exploration project lead to larger investment. The project promoters and the exploration company and the community should arrange a follow-up meeting. This should happen after the fieldwork is complete and the company has analyzed the results, which could take many months.Depending on the size and the location of the exploration project, communities may also have input through further environmental studies that maybe undertake for investment proposes.

3.3 Likely Emissions, Effluents and Solid Wastes

The proposed exploration programme and possible test mining will be associated with localised emissions and these will include:

- Air emissions from vehicles and drilling unit;
- Particulate matter from vehicles and drilling unit;
- Effluent sources from the exploration camp;
- Solid waste from the various exploration activities such camp and field related logistics.

3.3.1 Likely Air Emission Sources

- **Carbon dioxide emissions;**

There are two different sources of CO_2 associated with the proposed exploration and possible mining process and these are:

(i) Combustion of fuels main sources; and
(ii) Emissions that maybe associated with the test mining in which chemical process maybe involved.

The EIA study will also include the assessment of the most significant way to reduce CO_2 emissions.

- **Particulate emissions;**

A major source of particulate matter (or dust) associated with mineral exploration process and test mining activities is the physical breaking of the rock mass.

Overall, the main sources are:

(i) Bulk sampling;

(ii) Drilling process;
(iii) Vehicles and equipment movement;
(iv) Sample grinding and handling;
(v) Dust also arises from crushing, mixing, grinding and final grinding and packaging stages of the test mining.

3.3.2 Likely Effluent Sources

The likely higher levels of water pollution may occur when water is allowed to contact collected dusts or contaminated materials such as oils. Three most significant sources where this contact may occur are:

- The leaching operation during test mining, important because it removes soluble alkaline and recovers solid insoluble portions for reuse, and discharges overflow (leachate) as waste;

- Disposal of entire wet dust slurry with no recovery or reuse (slurry is fed to a pond, solid settles and overflow is discharged);

- Aqueous effluents associated with the test mining equipments.

The other sources of pollution in the associated with overall process of exploration and test mining are;

- Blow down from cooling test mining equipments and processing (high in: TDS and TSS);

- Spent lube oil from exploration and test mining garage and workshops if mixed with water will give oily wastewater;

- Domestic wastewater from field campsite.

The likely polluting parameters are TDS, TSS and heavy metals.

3.3.3 Likely Solid Waste Sources

A variety of solid wastes substances are frequently will be generated associated with field camp as well as test mining activities. Sources of solid wastes include rejected plastic and paper, sacks from packaging process and from the workshops andgarage as well as sludge. Unless managed and stored in a shelter, and in a dry country like Namibia, wind can be a major pathway for pollutant migration to targets of concern that may be present in the area. Furthermore, during the rainy season, rainfall may percolate through these piles, dissolve (or leach) soluble matter andcarry them with the surface run-off water. In some instances, polluted water can migrate through permeable sub-surface layers beneath the material storage pilesand contaminate water resources if present in the area.

3.3.4 Occupational Healthy and Safety

Noise	Noise is likely to arise from test mining grinding, crushing, and packaging operations. Noise may reach as high as 100-110 dB;
Heat Stress	Workers will be exposed to summer and equipment heat during exploration and test mining stages.

4. The Natural Environment of the License Area

4.1 Climatic Components

The EPL 8724 is located in southern Namibia with daytime mild to warm temperatures throughout the year, while the nights are mild to cool. The meanannual rainfall is approximately between 50 - 100 mm (Fig. 4.1). The distribution of rainfall is extremely seasonal with almost all the rain falling in summer - from October to April with occasional winter rains with mean annual gross evaporation of about 3400 mm.

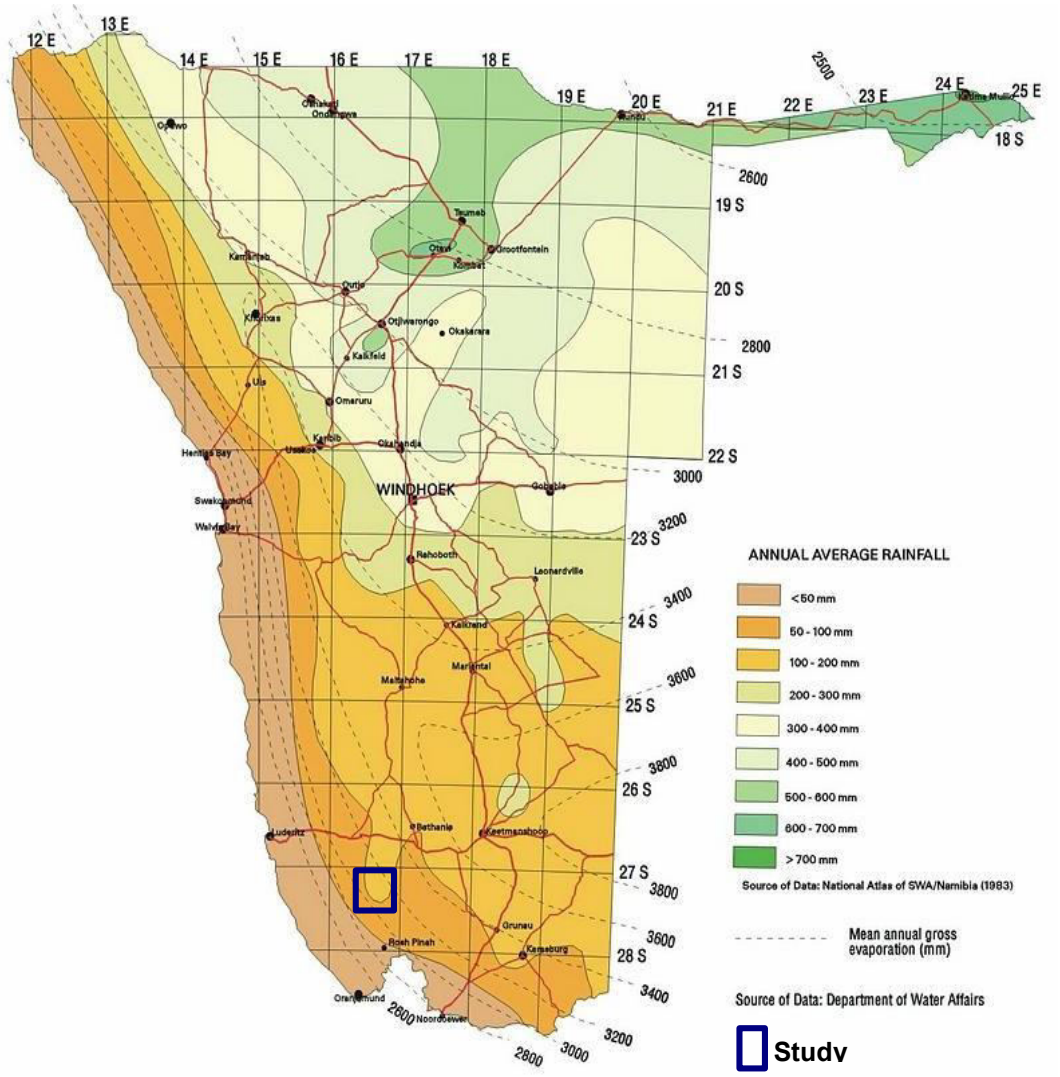

Figure 4.1: Regional climatic patterns of Namibia showing the location of the study area (Directorate of Environmental Affairs, 2002).

4.2 Environmental Components

4.2.1 Vertebrate fauna expected in the EPL 8724 area

As part of the scooping study, a desktop study (i.e. literature review) was conducted between in January 2023 on the vertebrate fauna (e.g. reptiles, amphibians, mammals & birds) expected to occur in the general EPL 8724 area, with special emphasis on the area along the River beds.

This literature review was to determine the actual as well as potential vertebrate fauna associated with the general area commonly referred to as the Dwarf Shrub Savannah (Giess 1971, Mendelsohn *et al.* 2002, Van der Merwe 1983). Only 7% of the Savannah biome are formally protected with the Dwarf Shrub Savannah region inNamibia being badly under represented with only 0-2% of the land area being protected (Barnard 1998).. Southern Namibia in general and the Witsput North area in particular, is regarded as “relatively low to moderate” in overall (all terrestrial species) diversity (Mendelsohn *et al.* 2002). Overall terrestrial endemism in the area is classified as “moderate” (Mendelsohn *et al.* 2002). The overall diversity and abundance of large herbivorous mammals (big game) is viewed as moderate with 3-4 species while overall diversity of large carnivorous mammals (large predators) is determined at 2-3 species – e.g. leopard (medium) and cheetah and brown hyena at low densities (Mendelsohn *et al.* 2002).

It is estimated that at least 72 species of reptile, 6 amphibian, 62 mammal and 134 bird species (breeding residents) occur in the general/immediate in the area of which a high proportion are endemics.

4.2.1.1 Reptile Diversity

Table 4.1 indicates the reptile diversity known and/or expected to occur in the general EPL area.

Table 4.1: Reptile diversity known and/or expected to occur in the EPL Area.

Species: Scientific name	**Species: Common name**	**Expected**	**Status**
TORTOISES & TERRAPINS			
Geochelone pardalis	Leopard Tortoise	√	
Psammobates tentorius verroxii	Bushmanland Tent Tortoise	√	Endemic
Psammobates tentorius trimeni	Namaqualand Tent Tortoise	√	Endemic
Homopus solus	Nama Padloper	√	Endemic
SNAKES			
Blind Snakes			
Rhinotyphlops schinzi	Schinz's Beaked Blind Snake	√	Endemic
Thread Snakes			
Leptotyphlops gracilior	Slender Thread Snake	√	Endemic
Leptotyphlops scutifrons	Peter's Thread Snake	√	
Leptotyphlops occidentalis	Western Thread Snake	√	Endemic
Typical Snakes			
Lamprophis fuliginosus	Brown House Snake	√	
Lamprophis guttatus	Spotted House Snake	√	Endemic
Pseudaspis cana	Mole Snake	√	
Prosymna bivittata	Two-striped Shovel-snout	√	Endemic
Prosymna frontalis	South-western Shovel-snout	√	
Dipsina multimaculata	Dwarf Beaked Snake	√	Endemic
Psammophis trigrammus	Western Sand Snake	√	
Psammophis notostictus	Karoo Sand Snake	√	
Psammophis leightoni	Namib Sand Snake	√	

trinasalis			
Dasypeltis scabra	Common/Rhombic Egg Eater	√	
Telescopus semiannulatus polystrictus	Eastern Tiger Snake	√	
Telescopus beetzii	Beetz's Tiger Snake	√	Endemic
Aspidelaps lubricus lubricus	Coral Snake	√	
Naja nivea	Cape Cobra	√	Endemic
Naya nigricollis nigricincta	Black-necked Spitting Cobra	√	Endemic
Dendroaspis polylepis	Black Mamba	√	
Bitis arietans	Puff Adder	√	
Bitis caudalis	Horned Adder	√	
Bitis cornuta	Many-horned Adder	√	Endemic
Bitis xeropaga	Desert mountain Adder	√	Endemic
WORM LIZARDS			
Zygaspis quadrifrons	Kalahari Round-headed Worm Lizard	√	
Monopeltis infuscata	Dusky Spade-snouted Worm Lizard	√	
LIZARDS			
Skinks			
Acontias lineatus lineatus	Striped Legless Skink	√	Endemic
Typhlosaurus meyeri	Meyer's Blind Legless Skink	√	Endemic
Scelotes capensis	Western Dwarf Burrowing Skink	√	Endemic
Mabuya capensis	Cape Skink	√	
Mabuya occidentalis	Western Three-striped Skink	√	
Mabuya spilogaster	Kalahari Tree Skink	√	
Mabuya striata sparsa	Striped Skink	√	
Mabuya sulcata	Western Rock Skink	√	
Mabuya variegata variegata	Variegated Skink	√	
Old World Lizards			
Heliobolus lugubris	Bushveld Lizard	√	
Meroles ctenodactylus	Smith's Desert Lizard	√	Endemic
Meroles knoxii	Knox's Desert Lizard	√	Endemic
Pedioplanis	Spotted Sand Lizard	√	Endemic

lineoocellata lineoocellata			
Nucras tessellate	Western Sandveld Lizard	√	Endemic
Pedioplanis lineoocellata	Spotted Sand Lizard	√	Endemic
Pedioplanis namaquensis	Namaqua Sand Lizard	√	
Pedioplanis inornata	Plain Sand Lizard	√	Endemic
Plated Lizards			
Cordylosaurus subtessellatus	Dwarf Plated Lizard	√	
Girdled Lizards			
Cordylus polyzonus	Karoo Girdled Lizard	√	Endemic
Flat Lizards			
Platysaurus capensis	Cape Flat Lizard	√	Endemic
Monitors			
Varanus albigularis	Rock Monitor	√	
Agamas			
Agama aculeate aculeata	Ground Agama	√	
Agama anchietae	Anchieta's Agama	√	
Agama atra	Southern Rock Agama	√	Endemic
Agama hispida	Southern Spiny Agama	√	Endemic
Chameleons			
Chamaeleo namaquensis	Namaqua Chameleon	√	
Geckos			
Chondrodactylus angulifer angulifer	Giant Ground Gecko	√	Endemic
Goggia gemmula	Richtersveld Dwarf Leaf-toed Gecko	√	Endemic
Goggia lineata	Striped Dwarf Leaf-toed Gecko	√	Endemic
Lygodactylus bradfieldi	Bradfield's Dwarf Gecko	√	Endemic
Narudasia festiva	Festive Gecko	√	Endemic
Pachydactylus bibronii	Bibron's Thick-toed Gecko	√	Endemic
Pachydactylus turneri	Turner's Thick-toed Gecko	√	Endemic
Pachydactylus mariquensis latirostris	Marico Thick-toed Gecko	√	Endemic
Pachydactylus namaquensis	Namaqua Thick-toed Gecko	√	Endemic

Pachydactylus haackei	Haacke's Thick-toed Gecko	√	Endemic
Pachydactylus punctatus	Speckled Thick-toed Gecko	√	
Pachydactylus rugosus rugosus	Rough Thick-toed Gecko	√	Endemic
Pachydactylus serval purcelli	Western Spotted Thick-toed Gecko	√	Endemic
Pachydactylus weberi	Weber's Thick-toed Gecko	√	Endemic
Phelsuma ocellata	Namaqua Day Gecko	√	Endemic
Ptenopus garrulus maculatus	Common Barking Gecko	√	Endemic

Source for literature review: Branch (1998), Boycott & Bourquin 2000, Broadley (1983), Cunningham (2006), Griffin (2003), Hebbard (n.d.), Marais (1992)

Approximately 261 species of reptiles are known or expected to occur in Namibia thus supporting approximately 30% of the continents species diversity (Griffin 1998a). At least 22% or 55 species of Namibian lizards are classified as endemic. The occurrence of reptiles of "conservation concern" includes about 67% of Namibian reptiles (Griffin 1998a). Emergency grazing and large scale mineral extraction in critical habitats are some of the biggest problems facing reptiles in Namibia (Griffin 1998a). The overall reptile diversity and endemism in the Uguchab River area is estimated at between 51-60 species and 13-16 species, respectively (Mendelsohn *et al.* 2002). Griffin (1998a) presents figures of between 21-30 and 7-8 for endemic lizards and snakes, respectively, from the general south-western part of Namibia. At least 72 species of reptiles are expected to occur in the Uguchab River area with 42 species being endemic – i.e. 58% endemic. These consist of at least 24 snakes (1 blind snake, 3 thread snakes & 20 typical snakes), 11 of which are
endemic (46%) to Namibia, 4 tortoises, 44 lizards, 28 (64%) of which are endemic to Namibia. The Nama Padloper (*Homopus solus*) tortoise, Namibia's only true endemic (i.e. occurs only in Namibia), occurs in the area. Gecko's (16 species) and

Skink's (9 species) are the most numerous lizards expected from the Uguchab River area. Namibia with approximately 129 species of lizards (Lacertilia) has one of the continents richest lizard fauna (Griffin 1998a). Geckos have the highest occurrence of endemics in the Uguchab River area with 15 of the 16 species (94%) expected and/or known to occur in the area, being endemic to Namibia. Due to the fact that reptiles are an understudied group of animals, especially in Namibia, it is expected that more species may be located in the Uguchab River area than presented above.

4.2.1.2 Amphibian Diversity

Table 4.2 indicates the amphibian diversity known and/or expected to occur in the general Uguchab River area.

Table 4.2: Amphibian diversity known and/or expected to occur in the EPL Area.

Species: Scientific name	**Species: Common name**	**Expected**	**Status**
Platannas			
Xenopus laevis	Common Platanna	√	
Kassinas			
Kassina senegalensis	Bubbling Kasina	√	
Rubber Frog			
Phrynomantis annectens	Marbled Rubber Frog	√	Endemic
Common Frogs			
Afrana fuscigula	Cape River Frog	√	
Cacosternum namaquense	Namaqua Dainty Frog	√	
Bull & Sand Frogs			
Tomopterna cryptotus	Tremolo Sand Frog	√	

Source for literature review: Carruthers (2001), Channing (2001), Channing & Griffin (1993), Passmore & Carruthers (1995)

Amphibians are declining throughout the world due to various factors of which much has been ascribed to habitat destruction. Basic species lists for various habitats are not always available with Namibia being no exception in this regard while the basic ecology of most species is also unknown. Approximately 4 000 species of amphibians are known worldwide with just over 200 species known from southern Africa and at least 57 species expected to occur in Namibia. Griffin (1998b) puts thisfigure at 50 recorded species and a final species richness of approximately 65 species, 6 of which are endemic to Namibia. This “low” number of amphibians from Namibia is not only as a result of the generally marginal desert habitat, but also due to Namibia being under studied and under collected. Most amphibians require water to breed and are therefore associated with the permanent water bodies, mainly in northeast Namibia.

The ephemeral Uguchab River and its tributaries south of Witsput North (e.g. Nukaneb, Gemsbok & Aukam Rivers) and the Fish River drain the central region of Namibia although both rivers flow sporadically after heavy local thundershowers. Other water bodies in the area include temporary pools in afore mentioned rivers as well as any other suitable natural water holding features. Man made ground dams and reservoirs hold water temporarily and could serve as a short term habitat for amphibians in the area. With the exception of long-lived pools in the Uguchab River and the occasional fountain in the general area no permanent natural surface water exists in the area. This lack of natural long term surface water (i.e. amphibian breeding places) affects the amphibian diversity in the area. The Naute Dam situated in the Löwen River with drains into the Fish River from the east has notbeen taken into consideration here as it does not fall within the general EPL 8724 area. According to Mendelsohn *et al.* (2002), the overall frog diversity in the Uguchab River area is estimated at between 1 to 7 species.

According to the literature, at least 6 species of amphibians occur in the general Uguchab River area of which 1 species (Marbled Rubber Frog – 17%) is endemic to Namibia. Griffin (1998b) also puts the species richness in the general area around 3-6 species. The Uguchab River area is under represented, with 2 common frogs and 1 species each for platanna, kassina, rubber and bull/sand frogs expected (i.e. potentially could be found in the area) to occur in the general area. *Phrynomantis*

annectens (Cape River Frog) is known from pools in the Swartkopberg to the north west of Witsput North farm although could potentially occur there. *Phrynomantis annectens* (RubberFrog) is classified as endemic to Namibia (Griffin 1998b).

4.2.1.3 Mammal Diversity

Table 4.3 indicates the mammal diversity known and/or expected to occur in the general Uguchab River area.

Table 4.3: Mammal diversity known and/or expected to occur in the EPL Area.

Species: Scientific name	**Species: Common name**	**Expected**	**Status**
Shrews			
Crosidura cyanea	Reddish-grey Musk Shrew	√	
Elephant Shrews			
Macroscelides proboscideus	Round-eared Elephant-shrew	√	Endemic [2]Vulnerable
Elephantulus rupestris	Smith's Rock Elephant-shrew	√	[2]Vulnerable
Elephantulus intufi	Bushveld Elephant-shrew	√	
Bats			
Tadarida aegyptiaca	Egyptian Free-tailed Bat	√	
Myotis seabrai	Angola Hairy Bat	√	
Cistugo seabrai	Namibian Wing-gland Bat	√	Endemic [1]Vulnerable
Laephotis namibensis	Namib Long-eared Bat	√	Endemic [2]Endangered
Eptesicus hottentotus	Long-tailed Serotine Bat	√	
Pipistrellus capensis	Cape Serotine Bat	√	
Nycteris thebaica	Common Slit-faced Bat	√	
Rhinolophus	Rüppell's Horseshoe	√	[1]Near Threatened

fumigatus	Bat		
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	√	[1]Near Threatened
Rhinolophus darlingi	Darling's Horseshoe Bat	√	[1]Near Threatened
Rhinolophus denti	Dent's Horseshoe Bat	√	[1]Near Threatened
Monkeys & Baboons			
Papio ursinus	Chacma Baboon	√	
Hares & Rabbits			
Lepus capensis	Cape Hare	√	
Lepus saxatilis	Scrub Hare	√	
Pronolagus rupestris	Smith's Red Rock Rabbit	√	
Rodents			
Molerat			
Cryptomys damarensis	Damara Molerat	√	
Squirrels			
Xerus inauris	Cape Ground Squirrel	√	
Xerus princeps	Mountain Ground Squirrel	√	Endemic [1]Near Threatened
Porcupine, Springhare & Dassie Rat			
Hystrix africaeaustralis	Cape Porcupine	√	
Pedetes capensis	Springhare	√	
Petromus typicus	Dassie Rat	√	Endemic [1]Near Threatened
Rats & Mice			
Parotomys brantsii	Brant's Whistling Rat	√	
Parotomys littledalei	Littledale's Whistling Rat	√	Endemic [1]Near Threatened
Rhabdomys pumilio	Striped Mouse	√	
Mus musculus	House Mouse	√	Invasive alien
Aethomys namaquensis	Namaqua Rock Mouse	√	

Desmodillus auricularis	Short-tailed Gerbil	√	
Gerbillurus paeba infernus	Hairy-footed Gerbil	√	Endemic
Gerbillurus vallinus	Brush-tailed Hairy-footed Gerbil	√	Endemic
Malacothrix typical	Large-eared Mouse	√	
Petromyscus collinus	Pygmy Rock Mouse	√	Endemic
Carnivores			
Proteles cristatus	Aardwolf	√	
Hyaena brunnea	Brown Hyena	√	[1]Near Threatened [2]Endangered
Acinonyx jubatus	Cheetah	√	Vulnerable; CITES Appendix 1
Panthera pardus	Leopard	√	
Felis caracal	Caracal	√	
Felis lybica	African Wild Cat	√	
Felis nigripes	Small Spotted Cat	√	Rare; [2]Vulnerable; CITES Appendix 1
Otocyon megalotis	Bat-eared Fox	√	
Vulpes chama	Cape Fox	√	
Canis mesomelas	Black-backed Jackal	√	
Mellivora capensis	Ratel or Honey Badger	√	[1]Near Threatened
Ictonyx striatus	Striped Polecat	√	
Genetta genetta	Small-spotted Genet	√	
Suricata suricatta	Suricate	√	
Cynictis penicillata	Yellow Mongoose	√	
Galerella sanguinea	Slender Mongoose	√	
Galerella pulverulenta	Small Grey Mongoose	√	Rare
Aardvark			
Orycteropus afer	Aardvark	√	
Dassie			
Procavia capensis	Rock Dassie	√	
Zebra			
Equus zebra hartmannae	Hartmann's Mountain Zebra	√	Endemic
Antelopes			

Alcelaphus buselaphus	Red Hartebeest	√	
Sylvicapra grimmia	Common Duiker	√	
Antidorcas marsupialis	Springbok	√	
Oreotragus oreotragus	Klipspringer	√	
Raphicerus campestris	Steenbok	√	
Oryx gazella	Gemsbok	√	
Tragelaphus strepsiceros	Kudu	√	

[1]SARDB (2004) [2]IUCN (2004): Source for literature review: De Graaff (1981), Griffin (2005), Estes (1995), Joubert & Mostert (1975), Skinner & Smithers (1990) & Taylor (2000)

Namibia is well endowed with mammal diversity with at least 250 species occurring in the country. These include the well known big and hairy as well as a legion of smaller and lesser-known species. Currently 14 mammal species are considered endemic to Namibia of which 11 species are rodents and small carnivores of which very little is known. Most endemic mammals are associated with the Namib and escarpment with 60% of these rock-dwelling (Griffin 1998c). According to Griffin (1998c) the endemic mammal fauna is best characterized by the endemic rodent family *Petromuridae* (Dassie rat) and the rodent genera *Gerbillurus* and *Petromyscus*. The overall mammal diversity in the Uguchab River area is estimated at between 61-75 species with 9-10 species being endemic to the area (Mendelsohn *et al.* 2002).

According to the literature at least 62 species of mammals are expected to occur in the general Uguchab River area of which 10 species (16%) are classified as endemic, 6 species as near threatened, 2 species as vulnerable and 2 species as rare (this excludes other categories - i.e. only take the highest category and not all a species might be classified as). The House Mouse (*Mus musculus*) is potentially viewed as an invasive alien species to the area. Mammal species probably underrepresented in the above mentioned table for the general area are bats and rodents, as these groups have not been well documented from the arid rocky

southern parts of Namibia. Other species such as Cheetah and Red Hartebeest may not necessarily occur in the area throughout the year, but may venture into the area from time-to-time depending on rainfall, prey and disturbance elsewhere.

The general Uguchab River area is understudied and under collected especially regarding the bat and rodent fauna. Overall terrestrial diversity – all species – is classified as “low” in the central-southern parts of Namibia (Mendelsohn *et al.* 2002). The overall diversity (3-4 species) and abundance of large herbivorous mammals is medium in the Uguchab River area with Springbok, Kudu, Oryx and Mountain Zebra having the highest density of the larger species (Mendelsohn *et al.* 2002). The overall abundance and diversity of large carnivorous mammals is moderate (2-3 species) in the Uguchab River area with Leopard and Cheetah, followed by Brown Hyena having the highest density of the larger species (Mendelsohn *et al.* 2002). Atleast 30.7%, 27.4% and 17.73% of the mammalian fauna that occur or are expected to occur in the Uguchab River area are represented by rodents (19 species), carnivores (17 species) and bats (11 species). Important habitats often not realised and/or neglected include mountains and hills (including inselbergs) as well as ephemeral rivers and drainage lines (e.g. Uguchab River and its tributaries) and associated vegetation. Habitat alteration and overutilization are the two primary processes threatening most mammals (Griffin 1998c).

4.2.1.4 Avian Diversity

Table 4.4 indicates the avian diversity known and/or expected to occur in the general Uguchab River area. This table excludes aquatic and migratory birds and/or birds only attracted to the area after localized rain showers, but rather focus on birds that are breeding residents or can be found in the area during any time of the year. This would imply that many more birds could occur in the area depending on “favourable” environmental conditions.

Table 4.4: Avian diversity known and/or expected to occur in the EPL Area.

Species: Scientific name	**Species: Common name**	**Expected**	**Status**
Struthio camelus	Ostrich	√	
Scopus umbretta	Hamerkop	√	
Sagittarius serpentarius	Secretary bird	√	
Gyps africanus	Whitebacked Vulture	√	
Torgos tracheliotus	Lappetfaced Vulture	√	
Elanus caeruleus	Blackshouldered Kite	√	
Aquila verreauxii	Verreaux's Eagle	√	
Aquila rapax	Tawny Eagle	√	
Polemaetus bellicosus	Martial Eagle	√	
Circaetus gallicus	Blackchested Snake Eagle	√	
Buteo rufofuscus	Jackal Buzzard	√	
Micronisus gabar	Gabar Goshawk	√	
Melierax canorus	Southern Pale Chanting Goshawk	√	
Circus maurus	Black Harrier	√	
Falco peregrinus	Peregrine Falcon	√	
Falco biarmicus	Lanner Falcon	√	
Falco chicquera	Rednecked Falcon	√	
Falco tinnunculus	Common Kestrel	√	
Falco rupicoloides	Greater Kestrel	√	
Polihierax semitorquatus	Pygmy Falcon	√	
Francolinus adspersus	Redbilled Francolin	√	
Coturnix coturnix	Common Quail	√	
Numida meleagris	Helmeted Guineafowl	√	
Ardeotis kori	Kori Bustard	√	
Neotis ludwigii	Ludwig's Bustard	√	
Eupodotis vigorsii	Karoo Korhaan	√	
Eupodotis afra	Black Korhaan	√	
Vanellus coronatus	Crowned Plover	√	
Vanellus armatus	Blacksmith Plover	√	
Burhinus capensis	Spotted Dikkop	√	
Cursorius rufus	Burchell's Courser	√	
Rhinoptilus africanus	Doublebanded Courser	√	

Pterocles namaqua	Namaqua Sandgrouse	√	
Pterocles bicinctus	Doublebanded Sandgrouse	√	
Columba guinea	Rock Pigeon	√	
Streptopelia capicola	Cape Turtle Dove	√	
Streptopelia senegalensis	Laughing Dove	√	
Oena capensis	Namaqua Dove	√	
Agapornis roseicollis	Rosyfaced Lovebird	√	Endemic
Corythaixoides concolor	Grey Lourie	√	
Tyto alba	Barn Owl	√	
Otus leucotis	Whitefaced Owl	√	
Glaucidium perlatum	Pearlspotted Owl	√	
Bubo capensis	Cape Eagle Owl	√	
Bubo africanus	Spotted Eagle Owl	√	
Bubo lacteus	Giant Eagle Owl	√	
Caprimulgus tristigma	Freckled Nightjar	√	
Apus bradfieldi	Bradfield's Swift	√	
Cypsiurus parvus	Palm Swift	√	
Colius colius	Whitebacked Mousebird	√	
Merops hirundineus	Swallowtailed Bee-eater	√	
Upupa epops	Hoopoe	√	
Phoeniculus cyanomelas	Scimitarbilled Woodhoopoe	√	
Lybius leucomelas	Pied Barbet	√	
Dendropicos fuscescens	Cardinal Woodpecker	√	
Mirafra apiata	Clapper Lark	√	
Mirafra sabota	Sabota Lark	√	
Mirafra curvirostris	Longbilled Lark	√	
Mirafra albescens	Karoo Lark	√	
Mirafra erythrochlamys	Dune Lark	√	Endemic
Chersomanes albofasciata	Spikeheeled Lark	√	
Calandrella cinerea	Redcapped Lark	√	
Spizocorys conirostris	Pinkbilled Lark	√	

Spizocorys sclateri	Sclater's Lark	√	
Alauda starki	Stark's Lark	√	
Eremopterix verticalis	Greybacked Finchlark	√	
Eremopterix australis	Blackeared Finchlark	√	
Hirundo fuligula	Rock Martin	√	
Riparia paludicola	Brownthroated Martin	√	
Dicrurus adsimilis	Forktailed Drongo	√	
Corvus capensis	Black Crow	√	
Corvus albus	Pied Crow	√	
Parus cinerascens	Ashy Tit	√	
Anthoscopus minutes	Cape Penduline Tit	√	
Pycnonotus nigricans	Redeyed Bulbul	√	
Turdus olivaceus	Olive Thrush	√	
Monticola brevipes	Shorttoed Rock Thrush	√	
Oenanthe monticola	Mountain Chat	√	
Cercomela familiaris	Familiar Chat	√	
Cercomela tractrac	Tractrac Chat	√	
Cercomela sinuata	Sicklewinged Chat	√	
Cercomela schlegelii	Karoo Chat	√	
Cossypha caffra	Cape Robin	√	
Erythropygia coryphaeus	Karoo Robin	√	
Erythropygia paena	Kalahari Robin	√	
Parisoma subcaeruleum	Titbabbler	√	
Parisoma layardi	Layard's Titbabbler	√	
Sylvietta rufescens	Longbiled Crombec	√	
Eremomela icteropygialis	Yellowbellied Eremomela	√	
Eremomela gregalis	Karoo Eremomela	√	
Eremomela usticollis	Burntnecked Eremomela	√	
Euryptila subcinnamomea	Cinnamonbreasted Warbler	√	
Cisticola subruficapilla	Greybacked Cisticola	√	
Prinia flavicans	Blackchested Prinia	√	
Prinia maculosa	Spotted Prinia	√	
Malcorus pectoralis	Rufouseared Warbler	√	
Melaenornis	Marico Flycatcher	√	

mariquensis			
Melaenornis infuscatus	Chat Flycatcher	√	
Batis pririt	Pririt Batis	√	
Motacila capensis	Cape Wagtail	√	
Anthus navaeseelandiae	Richard's Pipit	√	
Anthus similes	Longbilled Pipit	√	
Lanius collaris	Fiscal Shrike	√	
Laniarius atrococcineus	Crimsonbreasted Shrike	√	
Nilaus afer	Brubru	√	
Telophorus zeylonus	Bokmakierie	√	
Creatophora cinerea	Wattled Starling	√	
Lamprotornis nitens	Glossy Starling	√	
Onychognathus nabouroup	Palewinged Starling	√	
Nectarinia famosa	Malachite Sunbird	√	
Nectarinia fusca	Dusky Sunbird	√	
Zosterops pallidus	Cape White-eye	√	
Plocepasser mahali	Whitebrowed Sparrowweaver	√	
Philetairus socius	Sociable Weaver	√	
Passer domesticus	House Sparrow	√	
Passer motitensis	Great Sparrow	√	
Passer melanurus	Cape Sparrow	√	
Passer griseus	Greyheaded Sparrow	√	
Sporopipes squamifrons	Scalyfeathered Finch	√	
Ploceus velatus	Masked Weaver	√	
Quelea quelea	Redbilled Quelea	√	
Euplectes orix	Red Bishop	√	
Pytilia melba	Melba Finch	√	
Uraeginthus granatinus	Violeteared Waxbill	√	
Estrilda astrild	Common Waxbill	√	
Amadina erythrocephala	Redheaded Finch	√	
Vidua macroura	Pintailed Whydah	√	
Vidua regia	Shafttailed Whydah	√	
Serinus atrogularis	Blackthroated Canary	√	

Serinus alario	BlackheadedCanary	√	
Serinus flaviventris	Yellow Canary	√	
Serinus albogularis	Whitethroated Canary	√	
Emberiza capensis	Cape Bunting	√	
Emberiza impetuani	Larlike Bunting	√	

Source for literature review: Brown et al. (1998), Komen (n.d.), Maclean (1985) & Tarboton (2001)

** Names of birds follow the old Roberts (1985) classification system*.

Although Namibia's avifauna is comparatively sparse compared to the high rainfall equatorial areas elsewhere in Africa, approximately 658 species have already been recorded with a diverse and unique group of arid endemics (Brown *et al.* 1998, Maclean 1985). Fourteen species of birds are endemic or near endemic to Namibia with the majority of Namibian endemics occurring in the savannas (30%) of which ten species occur in a north-south belt of dry savannah in central Namibia (Brown *et al* 1998). Bird diversity is viewed as medium in the Uguchab River area with 81-110 species (this would include migrant species) estimated with no species being endemic to the general area (Mendelsohn *et al.* 2000).

At least 134 species of terrestrial ["breeding residents"] birds occur and/or could occur in the general Uguchab River area at any time (Maclean 1985, Tarboton 2001). Rainfall (or lack thereof) would affect bird species distribution and abundance. This however excludes all aquatic species (freshwater & marine) and migrant species that could also be found in the area depending on rainfall and temporary pools, season, etc. in the area. Two of the 14 Namibian endemic bird species (14% of al Namibian endemic species or 1.5% of the species expected to occur in the area) can or are likely to occur in the general Uguchab River area. The general Uguchab River area does not fall within one of the 21 Important BirdingAreas (IBA's) as determined for Namibia (Simmons 1998a) although the Sperrgebiet Park) northwest of the EPL.

4.2.1.5 Important Species

The high percentage of endemic reptile species (58%) associated with the rocky escarpment region of central southern Namibia underscores the importance of this area without formal state protection. Reptile species of concern are the various endemic geckos (e.g. *Pachydactylus* species), desert lizards (e.g. *Meroles* species), adders (e.g. *Bites* species) and tortoises (especially *Homopus solus*) associated with rocky substrates and of which very little is known about their ecological role and actual status in Namibia. Snakes are often killed outright due to the "fear factor" associated with all snakes as well as local beliefs and negative folklore. The most problematic snake species are probably the endemic *Telescopus beetzii* and the endemic, but poisonous *Bitis xeropaga*. Indiscriminate killing of snakes does not bode well for rare and endemic snake species. Tortoises consumed as food has resulted in them often becoming locally extinct. Tortoises are viewed as the reptile family of greatest concern (Griffin 1998a) and the collection and eating of tortoises are of grave concern. The endemic *Homopus solus* is known from the area and collection for whatever reason of this species is worrisome.

Except for periodic flooding of the Uguchab River and its tributaries and occasional fountains, the lack of surface water in the general area results in amphibians not being viewed as extremely important. The endemic *Phrynomantis annectens* (17% of the expected amphibians in the area) is of concern in this area. Endemic mammals expected to occur in the general Uguchab River area make up a relatively large percentage (16%) of the mammals expected from the area. Mammal species of concern are most often predators such as the Cheetah (*Acinonyx jubatus*) – classified internationally as Vulnerable (CITES Appendix 1) and Small Spotted Cat (*Felis nigripes*) – classified as Rare and Vulnerable (CITES Appendix 1) as well the Dassie Rat and Mountain Ground Squirrel, both of which are endemic and classified as near threatened (SARDB 2004). Other species of concern include various endemic bats of which very little are known. Bats are unfortunately often viewed with undeserved revulsion and exterminated for such reasons.

Although there are only 2 endemics (14% of endemics in Namibia or 1.5% of al the birds expected to occur in the area) expected from the general Uguchab River area,

they still remain important and should be taken into consideration regarding development in the area. From a development point of view the dry southern parts of Namibia are sparsely populated with avian although certain habitats – e.g. Uguchab River and its tributaries – are oasis especially when water is available. The overall decline of raptors in general (declines not always understood, although humans are often the cause thereof e.g. killed as perceived predators of poultry and lambs or as collateral damage during poisoning episodes against problem animals) is disconcerting throughout Namibia, including the Uguchab River area.

4.2.1.6 Conclusion

It is estimated that at least 72 species of reptile, 6 amphibian, 62 mammal and 134 bird species occur in the general/immediate Uguchab River area of which a large proportion are endemics. Endemics include at least 58% of the reptiles, one (17%) of the amphibians, 17% of the mammals and 1.5% of all the birds known, or estimated to occur in the general Uguchab River area. Although endemics are known to occur from the general area, it is currently not clear if any of these are associated with the proposed prospecting areas.

The reptile diversity is varied in the area with a high percentage of unique and/or endemic species (58%). Species such as the various endemic *Pachydactylus* geckos, *Meroles* lizards, Nama Padloper tortoise (*Homopus solus*) and Mountain Adder (*Bitis xeropaga*), often associated with rocky substrates, are important in the general area.

Due to the lack of permanent surface water, amphibians are not well represented in the general area although will emerge after rains and be associated with rock pools and other temporary water bodies in the area. The marbled Rubber Frog (*Phrynomantis annectens*) is the only endemic expected from the general area.

Mammals, especially small mammals (bats and rodents) and carnivores are well represented in the area although only 16% is classified as endemic to Namibia. Due to the farmer persecution, fencing and competition with domestic stock over years, very few larger mammal species, especially bigger carnivores, abound. Mountain zebra (endemic) are often also persecuted as “fence destroyers” in the mountainous areas of southern Namibia.

Birds are well represented in the general area with many more species known and expected to occur in the area, but excluded here due to either being aquatic or highly nomadic and not necessarily permanently associated with the area. It is expected that only two bird species known or expected to occur in the general area are endemic.

The southern escarpment parts of Namibia are generally viewed as particularly important areas from a faunal perspective, with numerous endemic, especially reptile species. This signifies the ecologically importance of the area. Deserts, and more specifically rocky areas, are viewed as marginal farming habitats, but extremely important from a biodiversity perspective and the fact that currently no formal protection exists in the area, is disconcerting. Ephemeral rivers (e.g. Uguchab River) and the associated biodiversity are extremely important in marginal areas.

All development (including mining prospecting and associated activities) have potential negative environmental consequences, but identifying the most important faunal species including high risk habitats beforehand, coupled with environmentally acceptable mitigating factors, lessens the overall impact of such development. It is suggested that a formal EIA be conducted in the prospective prospecting site(s) in the Uguchab River area to determine local issues and show overall environmental commitment.

4.2.2 Flora Expected in the EPL 8724 Area

A desktop study (i.e. literature review) was conducted between 5 and 8 October 2013 on the flora (focusing on endemic and potentially rare and endangered species) known and/or expected to occur in the general Uguchab River area, with special emphasis on the area north of Witsput North along the Uguchab River.

This literature review was to determine the actual as well as potential flora associated with the general area commonly referred to as the Dwarf Shrub Savannah (Giess 1971, Mendelsohn *et al.* 2002, Van der Merwe 1983). Only 7% of the Savannah biome are formally protected with the Dwarf Shrub Savannah region in

Namibia being badly underrepresented with only 0-2% of the land area being protected (Barnard 1998). No communal and freehold conservancies are located in the general area (Mendelsohn *et al.* 2002, NACSO 2006).

According to Maggs (1998) there are approximately 4 344 higher plant species with the most species being within the grasses (422), composites (Asteraceae) (385), legumes (Fabaceae) (377) and fygies (Mesembryanthemaceae) (177), recorded from Namibia. Total species richness depends on further collecting and taxonomic revisions. High species richness is found in the Okavango, Otavi/Karsveld, Kaokoveld, southern Namib and Central Highland (Windhoek Mountains) areas. Endemic species – approximately 687 species in total – are manly associated with the Kaokoveld (northwestern) and the succulent Karoo (southwestern) Namibia. The major threats to the floral diversity in Namibia are:
1). Conversion of the land to agriculture (with associated problems) and, 2).
poorly considered development (Maggs 1998, Mendelsohn *et al.* 2002).
The overall plant diversity (all species) in the general Uguchab River area is estimated as between 100-149 species (Mendelsohn *et al.* 2002). The Huib Hoch Plateau area and Huns Mountains, approximately 100-150km southwest of Witsput North, has a higher diversity of 300-399 and >500 plant species, respectively (Mendelsohn *et al.* 2002). These estimates are limited to “higher” plants as information regarding “lower” plants is sparse. The greatest variants affecting the diversity of plants are habitat and climate with the highest plant diversity generally associated with high rainfall areas. Pockets of high diversity are found throughout Namibia in “unique” habitat – often transition zones – e.g. mountains, inselbergs, etc.Plant endemism is viewed as “low to medium” – with between 2-5 endemics expected from the general Uguchab River area (Mendelsohn *et al.* 2002). The Huns Mountains area, further southwest, is identified as an important area with localendemics with >35 endemic species expected (Mendelsohn *et al.* 2002). Furthermore, Mendelsohn *et al.* (2002) views the overall plant production as very lowto extremely low, the availability of hardwoods as virtually none and the grazing and browse as relatively poor in the general area. Bush thickening (encroachment) is notviewed as problematic in the general Uguchab River area (Bester 1996, Cunningham 1998, Mendelsohn *et al.* 2002).

Sheep and goat farming is the dominant farming activity in the Uguchab River area with between 90-100% of stock farmed with being sheep and 10% being goats (van der Merwe 1983). The stock density is estimated at between 10-20sheep & goats/km² (14.4km² in the general Keetmashoop/Lüderitz/Karasburg/Bethanie area) in the Uguchab River area with 30.5% and 7.2 of the total percentage sheep and goats in Namibia found in the Keetmashoop/Lüderitz/Karasburg/Bethanie Districts (van der Merwe 1983). The risk of farming is viewed as extremely high with the carrying capacity viewed as 0-10kg/ha (Mendelsohn *et al.* 2002) or >24ha/LAU (van der Merwe 1983). The tourism potential of this area is viewed as moderate (Mendelsohn *et al.* 2002, van der Merwe 1983).

4.2.2.1 Tree & Shrub Diversity

The general area is classified as the Dwarf Shrub Savannah (Giess 1971). The dominant vegetation structure is viewed as “low shrubs” or “sparse shrubland” (Mendelsohn *et al.* 2002). Trees such as *Acacia erioloba*, *A. karoo* and Tamarix usneoides are confined along the drainage lines while shrubs such as *Catophractes alexandri*, *Eriocephalus* (Karoo bushes) species and *Rhigozum trichotomum* characterise the area. Other tree species often common in the area include *A. nebrownii*, *Boscia albitrunca*, *B. foetida* and *Parkinsonia Africana* (Giess 1971). Although *Rhigozum trichotomum* occurs in the area it is not viewed as such a “problem” species with regards to bush thickening (encroachment) as elsewhere in southern Namibia.

It is estimated that at least 37-59 species of larger trees and shrubs (>1m) (Coats Palgrave 1983 [45sp.], Curtis & Mannheimer 2005 [59sp.], Van Wyk & Van Wyk 1997 [37sp.]) occur in the general Uguchab River, southern central Namibia, area.

Table 4.5 indicates the trees & shrubs known and/or expected to occur in the general Uguchab River area and are derived from Curtis & Mannheimer (2005). Some species indicated to possibly occur in the area according to Coats Palgrave (1983) and Van Wyk & Van Wyk (1997) are excluded here.

Table 4.5: Trees and shrubs known and/or expected to occur in the EPL Area.

Species: Scientific name	**Expected**	**Status**
Acacia erioloba		Protected (F)
Acacia hebeclada		
Acacia hereroensis		
Acacia karroo		
Acacia mellifera subsp. mellifera		
Acacia nebrownii		
Adenolobus garipensis		
Aloe dichotoma		NC, C2
Boscia albitrunca		Protected (F)
Boscia foetida		
Cadaba aphylla		
Catophractes alexandri		
Ceraria fruticulosa		
Ceraria namaquensis		
Commiphora capensis		Near-endemic
Commiphora cervifolia		Endemic Near Threatened
Commiphora namaensis		Near-endemic
Diospyros lycioides		
Ehretia alba		
Euclea pseudebenus		Protected (F)
Euclea undulata		
Euphorbia avasmontana		C2
Euphorbia gregaria		C2
Euphorbia guerichiana		C2
Euphorbia virosa		C2
Ficus cordata		Protected (F)
Ficus ilicina		
Grewia tenax		
Gymnosporia linearis		
Gymnosporia		

senegalensis		
Gymnosporia sp. A		
Haematoxylum dinteri		Endemic
Lycium bosciifolium		
Lycium eenii		
Lycium cinereum		
Lycium hirsutum		
Maerua schinzii		Protected (F)
Montinia caryophyllacea		
Neoluederitzia sericeocarpa		Endemic
Nymania capensis		
Ozoroa concolor		Near-endemic
Ozoroa crassinervia		Protected (F)
Ozoroa dispar		
Ozoroa namaensis		
Pappea capensis		Protected (F)
Parkinsonia africana		Protected (F)
Phaeoptilum spinosum		
Rhus burchelli		
Rhus lancea		Protected (F)
Rhus populifolia		
Rhus tenuinervis		
Rhigozum trichotomum		
Salsola nollothensis		
Salvadora persica		
Sisyndite spartea		
Tamarix usneoides		Protected (F)
Tetragonia schenckii		
Ziziphus mucronata		Protected (F)
Zygophyllum prismatocarpum		

Endemic *(Craven 1999)*

Near-endemic *(Curtis & Mannheimer 2005)*

Near Threatened *(Craven & Loots 2002)*

F *Forestry Ordinance No. 37 of 1952 and/or Forest Act No. 72 of 1968 (Curtis & Mannheimer 2005)* ***NC*** *Nature Conservation Ordinance No. 4 of 1975 (Curtis & Mannheimer 2005).* ***C2*** *CITES Appendix 2 (Curtis & Mannheimer 2005)*

Six species of trees and shrubs (10%) expected to occur in the Uguchab River area are classified as endemic (3 species) and/or near-endemics (3 species), 1 species (1.7%) near threatened, 11 species (18.6%) are protected under the Forestry Ordinance No. 37 of 1952 or Forest Act No. 72 of 1968, 1 species (1.7%) are protected under the Nature Conservation Ordinance No. 4 of 1975 while 5 species (8.5%) are classified as CITES Appendix II species.

Twenty seven species of Aloe (all protected) occur throughout Namibia with at least 8 species (30%) (*A. dichotoma*, *A. erinacea*, *A. gariepensis*, *A. hereroensis*, *A. meyeri*, *A. pachygaster*, *A. striata* subsp. *karasbergensis* & *A. variegata*) present in the general Uguchab River area (Rothmann 2004).

According to Burke (2003) at least 5 stem succulents, 10 leaf succulents, 7 dwarf succulents, 6 dwarf shrubs, 7 shrubs, 5 bulbs & 7 occur in the southern Namib. These plants are however just a selection of common plants from the general area and also mainly focus on the south-western winter rainfall area of the southern Namib.

4.2.2.2 Grass Diversity

It is estimated that at least 31-43 grasses (Müller 2013 [43sp.], Van Oudshoorn 1999 [31sp.]) - approximate total of 49 species – occur in the general Uguchab River, central southern, Namibia area. Grass species in the Dwarf Shrub Savannah area depend mainly on the soil types associated with, with *Stipagrostis* species such as *S.anomala*, *S. brevifolia*, *S. obtusa* and *S. uniplumis* characteristic of the general area (Giess 1971). Other valuable – i.e. palatable – grasses in the general area include *Anthephora pubescens*, *A. ramosa*, *Digitaria eriantha*, *Panicum arbusculum* and *Setaria appendiculata* (Giess 1971).

Table 4.6 indicates the grasses known and/or expected to occur in the general Uguchab River area and are derived from [1]Müller (2013) and [2]Van Oudtshoorn (1999).

Table 4.6: Grasses known and/or expected to occur in the EPL Area.

Species: Scientific name	Expected	Ecological Status *	Grazing Value *
[1,2]*Anthephora pubescens*		Decreaser	High
[1,2]*Aristida adscensionis*		Increaser 2	Low
[1,2]*Aristida congesta*		Increaser 2	Low
[1]*Aristida engleri*		?	Low
[1,2]*Aristida meridionalis*		Increaser 2	Low
[1]*Brachiaria glomerata*		Decreaser	Average
[1,2]*Cenchrus ciliaris*		Decreaser	High
[1,2]*Centropodia glauca*		Decreaser	High
[1,2]*Chloris virgata*		Increaser 2	Average
[2]*Cladoraphis spinosa*		Increaser 1	?
[1]*Cymbopogon pospischilii*		?	Low
[1,2]*Cynodon dactylon*		Increaser 2	High
[1,2]*Dichanthium annulatum*		Decreaser	High
[1,2]*Digitaria eriantha*		Decreaser	High
[1,2]*Enneapogon cenchroides*		Increaser 2	Low
[1,2]*Enneapogon desvauxii*		Intermediate	Average
[1,2]*Enneapogon scaber*		?	Low
[1]*Entoplocamia aristulata*		Intermediate	Low
[1,2]*Eragrostis annulata*		Increaser 2	Low
[1]*Eragrostis brizantha*		Increaser 2	Average
[1,2]*Eragrostis nindensis*		Increaser 2	Average
[1]*Eragrostis porosa*		Intermediate	Low
[1,2]*Eragrostis rotifer*		Intermediate	Low
[1]*Eragrostis scopelophila*		?	High
[1,2]*Fingerhuthia africana*		Decreaser	Average
[1,2]*Heteropogon contortus*		Increaser 2	Average
[2]*Hyparrhenia hirta*		Increaser 1	Average
[1]*Leucophrys mesccoma*		?	Average
[1,2]*Melinis repens*		Increaser 2	Low
[1]*Oropetium capense*		Increaser 2	Low
[1]*Panicum arbusculum*		Decreaser	High
[1]*Panicum maximum*		Decreaser	High
[2]*Pentaschistis airoides*		Increaser 2	Low
[2]*Polypogon monspeliensis*		?	Average
[1,2]*Schmidtia kalahariensis*		Increaser 2	Low

[1]*Setaria appendiculata*		Decreaser	High
[2]*Setaria incrassata*		Decreaser	High
[1]*Setaria verticillata*		Increaser 2	Average
[1]*Stipagrostis anomala*		?	Low
[1,2]*Stipagrostis ciliata*		Decreaser	High
[1]*Stipagrostis fastigiata*		?	High
[2]*Stipagrostis hirtigluma*		Increaser 2	Low
[1,2]*Stipagrostis namaquensis*		?	Average
[1,2]*Stipagrostis obtusa*		Decreaser	High
[1,2]*Stipagrostis uniplumis*		Increaser 2	Average
[1]*Triraphis purpurea*		?	Low
[1]*Triraphis ramosissima*		?	Average
[1,2]*Tragus berteronianus*		Increaser 2	Low
[1]*Tragus racemosus*		Increaser 2	Low

According to Burke (2003) 5 grasses are common in the southern Namib. None of the grasses expected in the general Uguchab River are endemic to Namibia (Müller 2013).

4.2.2.3 Important Species

Important tree and shrub species in the general Uguchab River area are the endemics (i.e. *Commiphora cervifolia*, *Haematoxylum dinteri* & *Neoluederitzia sericeocarpa*), near-endemics (i.e. *Commiphora capensis*, *Commiphora namaensis* & *Ozoroa concolor*) as well as the species protected under the Forestry Ordinance No. 37 of 1952, Forest Act No. 72 of 1968, Nature Conservation Ordinance No. 4 of 1975 and CITES Appendix 2. *Commiphora cervifolia* is also classified as near threatened and probably the most important species in the general area (Craven & Loots 2002).

Other important plant species in southern central Namibia (including the Uguchab River area) is the Quiver Tree (*Aloe dichotoma* – protected under the Nature Conservation Ordinance No. 4 of 1975 and CITES Appendix 2) and the Tsamma Mellon (*Citrullus lanatus*) (Mendelsohn *et al.* 2002). *Aloe dichotoma* are associated with rocky outcrops in the general area and relatively abundant in the far south.

Their flowers and associate nectar is an important source of food for insects and birds throughout their range. As the direct ancestor of the watermelon, *Citrullus lanatus* could prove important for developing drought and pest resistant commercial varieties. It is also used as a source of food throughout its range (Mendelsohn *et al.* 2002). All aloe species are protected in Namibia and thus viewed as important plants (Mendelsohn *et al.* 2002, Rothmann 2004). It is certain that many other plant species will be viewed as economically important in the future, especially if viewed as medicinally important (e.g. *Hoodia* sp. also found in the far south as well as a number of fygie species).

4.2.2.4 Conclusion

It is estimated that at least 37-59 species of larger trees and shrubs (>1m) (Coats Palgrave 1983, Curtis & Mannheimer 2005, Van Wyk & Van Wyk 1997) and at least 31-43 (approximately 49 species) grasses (Müller 2013, Van Oudshoorn 1999) occur in the general Uguchab River, southern central Namibia, area. If “lower” plants (e.g. algae, lichens, etc.) were to be included, this would undoubtedly increase the floral composition of the area tremendously. However, the focus for this desktop study was limited to the bigger and thus more obvious species of trees, shrubs andgrasses.

The southern central part of Namibia is not viewed as floristically important as the the Spergebiet area with high diversity and endemism and classified as local floral hotspots, but still important from a biodiversity perspective and the fact that currently no formal protection exists in the area. The Spergebied area is exceptions as it enjoy formal protection. Currently only 8 of the 13 vegetation types identified by Giess (1971) contain protected areas, some – including the Dwarf Shrub Savannah (Uguchab River area) – contain <5% of the vegetation type (Maggs 1998). As an important small stock (goats & sheep) farming area (and consequently a source of employment) as well as renewed interest from a tourism point of view, the importance of the south central Namibia to the GDP of Namibia is invaluable.

All development have potential negative environmental consequences, but identifying the most important flora species including high risk habitats beforehand,

coupled with environmentally acceptable mitigating factors, lessens the overall impact of such development including potential mining related prospecting. It is suggested that a formal EIA be conducted in the prospective development site(s) in the Uguchab River area to determine local issues and show overall environmental commitment.

4.2.3 Land Use and Infrastructure

The surrounding land uses are mainly dominated by agriculture (game, cattle, sheep, goats). In terms of infrastructure transportation, telecommunication and energy, the project area is well served by good infrastructure systems and supportive to the economic development drive such as the proposed project in the area.

4.2.4 Health and Safety Considerations

Previous and some of the current land use and related activities around the EPL Area is associated with environmental health and safety impacts that includes open trenches, abandoned quarry, scrap metals, abandoned fence and wires as well as existing fences defining the current farms / plot boundaries. The assessment of the extent of the health safety impacts to the proposed exploration and possible test mining will be covered in the EIA study.

4.2.4 Community Aspects

EPL Area falls within the long established private commercial farming communities. The farm has been home to different groups of people for over a very long time. The majority of the local community in this area survives on subsistence as well as commercial farming of cattle, goats and sheep. Hence, within the vicinity of the existing or previous settlements, it's likely that, there might be some traditional, religious sites as well as private grave yards. These sites may be associated with thecurrent location of some of the houses, and cemetery. There may also be some sitesof archaeological significance in the area. As far as possible, the EIA study will assess the likely presences of traditional, religious or grave yards as well as any site that maybe of archaeological significance.

4.3 Ground Components

4.3.1 Regional Geology

The EPL 8724 is situated in the southern plateau of Namibia at an altitude of approximately 900 metres above mean sea levels. The terrain around the surrounding farms is generally rough (Fig. 4.3). Regionally, the most important geological formation is the limestones of the Nama Group. The upper Proterozoic to Cambrian Nama Group is a shallow marine, partly fluviatile platform succession covering the Kalahari Craton and surrounding lower to mid-Proterozoic belts. The basal Kuibis Subgroup paraconformably overlies the Numees Formation. Folding and thrusting during the Damara and Gariep orogenies affected only thenorthwestern part (Naukluft nappes) and the southwestern fringes of the Nama basin. During early deposition the WSW-ENE trending Osis ridge, passing between Mariental and Keetmanshoop, divided the Nama basin into northern and southern sub-basins - the Zaris and the Witputs basins respectively. The EPL 8724 is located in the Witputs sub-basin (Fig. 4.4).

The basal Nama cycle (Kuibis Subgroup) comprises mature clastic rocks (mainly quartzitic sandstone) overlain by carbonates (Schwarzkalk member). The middle cycle (Schwarzrand Subgroup) consists of immature clastic sediments and carbonates (Huns and Spitskop members). The uppermost cycle, of fossil-proven Cambrian age (Fish River Subgroup), constitutes a Damaran molasse of pelitic to psammitic sediments, with red sandstones being a common lithotype.Unconformities, some of which are related to periods of glaciation, divide the above subgroups into several sequences (Fig. 4.4). The majority of these various formations are also a major aquifer in the area. Other lithologies are less important interms of major water resources but may be important for water supply on individual farm holdings.

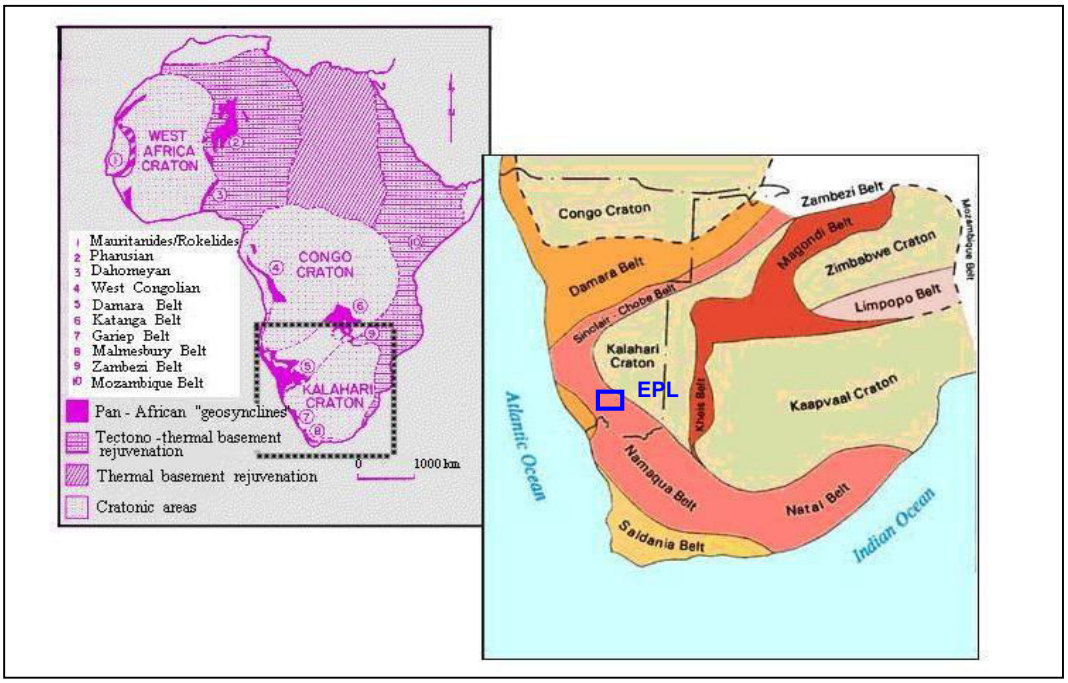

Figure 4.2: Geology of Southern Africa with respect to the EPL 8724.

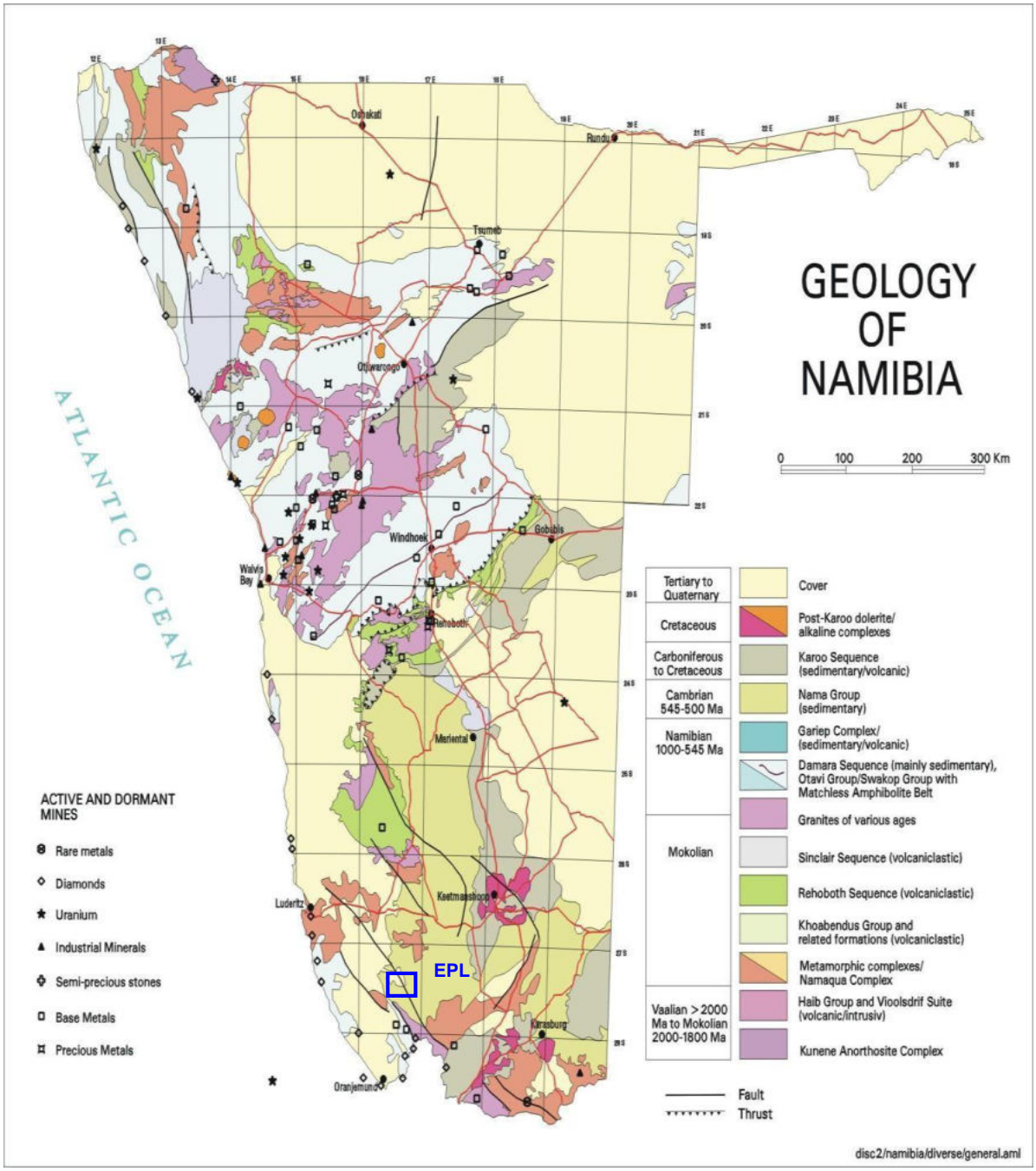

Figure 4.4: The regional geology of Namibia (Geological Survey of Namibia, 1999)

4.3.2 Mineral Potential of the EPL 8724

The NMC (Namaqua Metamorphic Complex) forms most of the pre-Gariep and pre-Nama basement. A broad four- fold subdivision into pretectonic rocks, charnockitic, gabbroic and ultrabasic rocks, syn-tectonic granitic rocks, and late- to post-tectonic granitic rocks is possible in most areas. The pre-tectonic group includes all rocks older than the Namaqualand tectonothermal event; the remaining rocks formed during this event and range from 1 200 to 900 million years in age. The pre-tectonic group includes metasedimentary rocks. The second group of rocks includes charnockite, gabbro (both partially retrograded) and serpentinite. Some of these are early syntectonic, but diffuse contacts in other areas, particularly between charnokite and country rock, make temporal relationships difficult to determine. Most characteristic of the syntectonic granitic rocks is a coarse-grained, porphyritic biotite granite with variable intensity of gneissic foliation called the Beenbreek Orthogneiss in the Warmbad area. The late- to post-tectonic granites include both biotitic and leucocratic varieties as well as porphyritic and medium- grained types. The most extensive of these are the Warmbad and the Aus Granites. A gabbro-granite complex occurs near Ai-Ais . The ubiquitous pegmatites belong to this phase of activity. The rest of the geology in the EPL and surrounding area comprises minor Cenozoic sediment deposits underlying the volcanic and plutonic rocks basement rocks described above. The younger Cenozoic deposits comprise Aeolian sand in the flat-lying areas and alluvial sediments.

In the central portion of the EPL are barren surficial sands and calcretised gravels. To the southern, are thin layers of pink felsite and quartz porphyry that are present throughout the dark aphanitic rocks. Minor conglomerates and metapelites are interbedded near the top of the formation. Grade of Metamorphism is low; a high pressure facies may exist in the east.

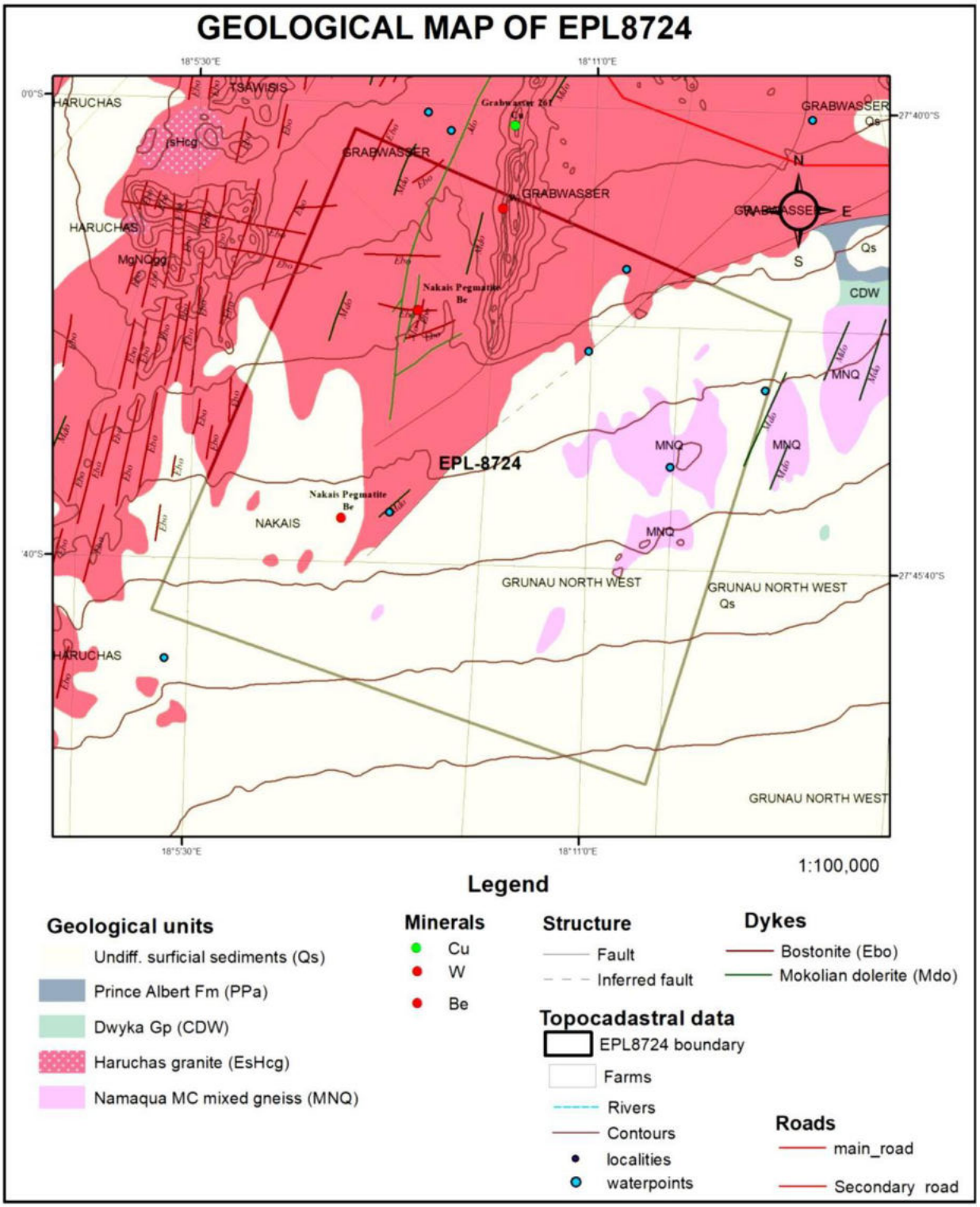

Figure 4.4: The geology of epl 8724 (Geological Survey of Namibia,1999

Economic Mineral Deposit in EPL 8724

The EPL 8724 is highly prospective for the types of pegmatite (fig 4.4) associated Sn and rare metals mineralization, mostly vein type Sn-W and Sn-Be- vein hosted. A new emphasis will be placed to evaluating Lithium potential as prior exploration focused on tin-tungsten mineralisation in the pegmatites in farms Nakais-11 and Grabwasser-261. Lithium and other industrial minerals have been overlooked since the market demand was limited compared to tin and tantalum back before the early 90's within this licence area.

Copper-bearing quartz veins will be investigated as similar mineralisation have formed in northeast-trending shear zones dipping 25o to 40° to the northwest parallel to the foliation of a gneissic rock on the farm Grabwasser 261 within the EPL 8724. At the turn of the century one of the veins near the farmhouse was opened up by several shafts and pits, yielding malachite, azurite, chalcopyrite and scheelite.

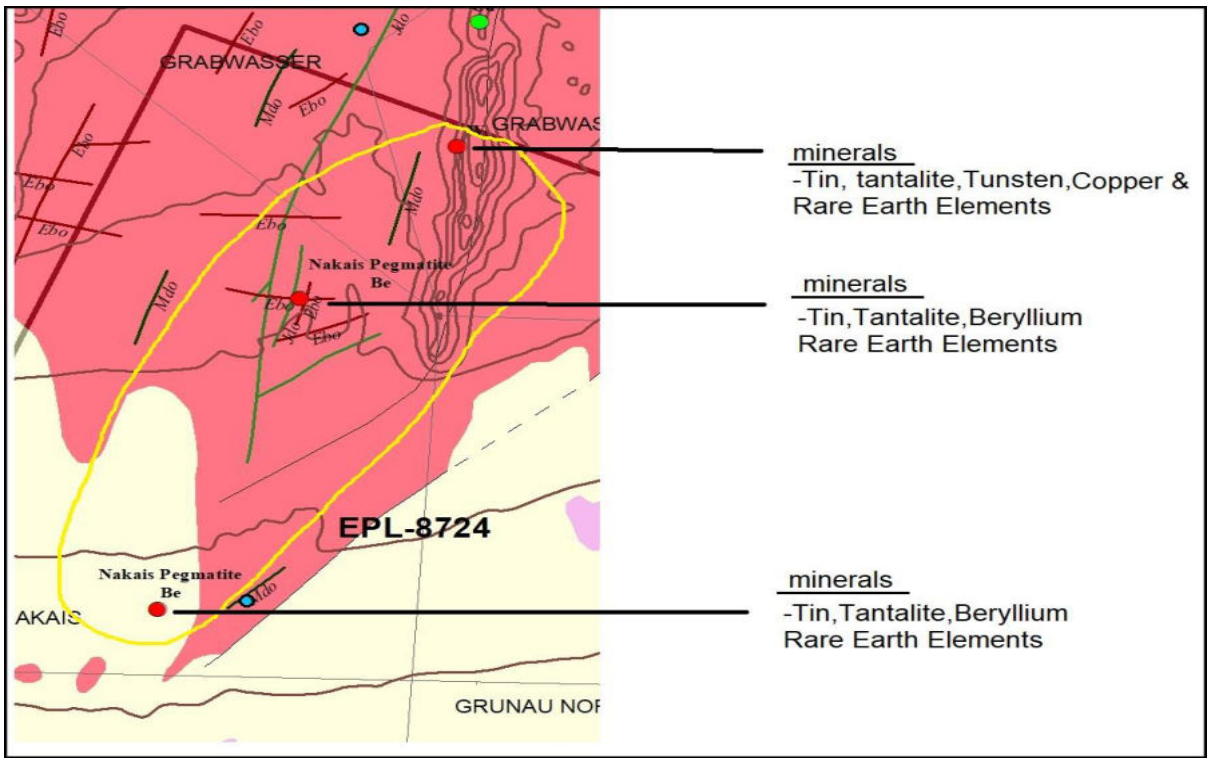

Figure 4.5: The target minerals in epl 8724 (Geological Survey of Namibia,1999

4.3.3 Surface and Groundwater

According to the Department of Water Affairs and Forestry, (1999) the EPL 8724 is situated in regional area that is classified as "generally low potential - locally moderate potential" for groundwater yield. This applies to the area within the EPL Area which "calcrete" outcrops. However, the area is mainly covered by limestone hence locally has very good potential for groundwater occurrence. There are even some spring indications in the area within the EPL. The regional groundwater flow inthe area is towards the south. Both the positive influences such as increased understanding of the hydrogeological setting of the area and negative influencessuch as localised water pollution due to the proposed project activities will be full evaluated in the EIA study and mitigations where required will be proposed in the Environmental Management part of the EIA report.

Developers, including the proponents of the proposed exploration and possible test mining project under the EPL 8724 are encouraged to consider their options for minimising water consumption and maximizing the re-use and recycling of water. Viable options will be fully assessed in the EIA study but some general suggestions includes adopting Cleaner Production (CP) right from the initial stages of the industry development encompassing issues such as:

- high pressure - low volume washing systems and toilets with two flush levels;
- selection of laundry equipment which is economical in terms of water consumption;
- a system to condense and recycle steam, capture of rainwater from roofs;

5. Environmental Impact Register

5.1 Interested and Affected Parties

The influence of each of the different interested and affected stakeholders (authorities, local communities, environmental groups etc) on the proposed project activities will be included in the EIA study. A number of interviews and workshops willbe conducted with the members of the local community and other stakeholder, covering some of the following aspect with respect to the proposed project activities (exploration and possible test mining):

- Awareness about the proposed exploration and possible test mining and the likely or unlikely associated temporal and permanent positive and negative impacts;

- Expectations of local communities in terms of temporal and permanent job opportunities as well as expanding their income base (local economic benefits);

- Any worries of people coming in their area during exploration and possible test mining stages (temporal and long-term local social impacts);

- Views of the various stakeholders, particularly the local communities, with respect to the likely impacts of the proposed project on the environment and suggestions on the appropriate mitigation measures.

The following is the provisional list of the identified interested and affected stakeholder institutions/originations/community who will be contacted for input to the Environmental Assessment (EA) process:

- Ministry of Mines and Energy (MME);

- Ministry of Environment and Tourism (MET);

- Ministry of Agriculture, Water and Forestry (MAWF);
- Ministry of Trade and Industry;
- Namibia Investment Centre;
- Karas Regional Council ;
- Local farming community as well as communities within the EPL area;
- National Botanical Research Institute (NBRI) of Namibia ;
- Succulent Karoo Ecosystem Programme (SKEP);
- Earthlife Namibia;
- Namibia Nature Foundation (NNF);
- Wildlife Society of Namibia;
- Others to be identified during the newspaper advertisement and to be registered and reflected in the Final EIA Report.

5.2 Climatic Components

A number of relevant climatic components have been identified to have a likely direct and indirect influence with respect to the proposed project activities at the various stages of the project development. Those that will need to be incorporated in the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) assessments associated with the proposed exploration and possible test mining activities are as follows:

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

5.3 Environmental Components

Some environmental components have been identified to have a likely direct and indirect influence by the proposed project activities. Those that will need to be further investigated and incorporated in the full Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) are summarised in Table 5.1.

Table 5.1: Environmental components of the natural environment to be incorporated in the EIA.

FACTOR	EXPLANATIONS
Major planned activities in the area (Exploration and possible test mining)	Covering a detailed assessment of the planned project including activities associated with the an infrastructure development, construction, operation and rehabilitation linked to the exploration and possible test mining;
Types of waste	Assess the various type of waste likely to be produced by various activities associated with the proposed project;
Fauna	Numerous species animals as well as the vegetation around the proposed project area will need to be incorporated in the influence assessments of the proposed activities on each of the major species / habitat etc;
Flora	
Social	The proposed project area is generally within the private farmland and small settlements in some areas and is likely to have short and long-term positive and negative social influences that will need to be evaluated in detail
Visual	Visual effects that will need to be evaluated in the EIA and incorporation into the EMP studies included vehicles and human access in the surrounding areas as well as the impact of the project infrastructure construction, operation and rehabilitation);
Dust	Dust maybe associated with the construction, operation and rehabilitation of exploration and or test mining infrastructure. Furthermore, access gravel roads around the project site during the various stages of the project development, particularly during the dry seasons will also be associated with dust;
Noise	The noise maybe associated with the exploration and or test mining infrastructure development, construction, operation and rehabilitation including frequent vehicles, as well as other daily activities such as on-site human interactions;
Private	Private grave yards, cultural heritage, historical and archaeological sites of importance in the area will need to be evaluated in the EIA with mitigation measures being proposed in the EMP section of the EIA Report;
Cultural	
Historical	
Archaeological	
Public health	The potential for influx of temporal job seekers to the area may have an

	influence on the general public/local community health such as an increased HIV prevalence as well as other diseases ;
Health and safety	Old excavations, erosional features, unstable slopes / rocks as well as scrap metals and abandoned fencing are a potential hazard and need to be included in the EIA studies. Other issues to be included are the health and safety issues associated with the development, construction, operation and rehabilitation of the exploration and or test mining infrastructure;
Economic	Economic benefit to local communities, regional as well as central governments will need to be explored and represented appropriately in the EIA study;
Others	**Other issues that maybe identified by the interested and affected parties.**

5.4 Ground Components

The following ground components have been identified to have likely direct and indirect influences to the proposed project activities at various stages of the project development. The ground components that will need to be incorporated in the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) assessments associated with the proposed exploration and possible test mining project are summarised in Table 5.2.

Table 5.2: The ground components of the natural environment to be incorporated in the EIA.

FACTORS	*EXPLANATIONS*
Regional geology	The regional and local geological setting will be covered in the EIA and EMP. The geological setting forms an important component of the natural environment that maybe impacted as a result of some of the activities associated with the proposed exploration and or test mining project;
Local solid geology	
Superficial cover	
Weathering	

profile	Geotechnical setting of the area with respect to the proposed project will need to be explored in detail as part of EIA and EMP studies. The various geotechnical engineering data sets are important for infrastructure and environmental protection and sustainable development strategies linked to the proposed project;
Dry density	
Strength parameters	
Ground excavatibility	
Soil erosion	
Dispersive	
Compressibility	
Settlement	
Slope instability	
Subsidence	
Surface occurrence	Availability of water, quality and vulnerability with respect to the proposed project activities will need to be included in the EIA study. Namibia is a dry country and the limited available freshwater resources need to be used in a sustainable manner and protected;
Groundwater occurrence	
Primary porosity	
Secondary porosity	
Primary permeability	
Secondary permeability	
Flooding	Considering that the proposed project is long-term project, the influence of flooding in low laying areas defined by drainage channels is very important, and will be delineated as part of EIA assessment;
Others	**Other issues that maybe identified by the interested and affected parties.**

6. The EIA Study

6.1 General Overview

MOSIOLINE ZEENARO KASIRINGUA is required to undertake an Environmental Impact Assessment (EIA) for the proposed exploration and or possible test mining activities with respect to the EPL No. 8724. The EIA is to be undertaken within the framework of the existing environmental assessment process (Fig. 2.1) as described in the Environmental Assessment Policy for Sustainable Development and Environmental Conservation of 1995, published by the Ministry of Environment and Tourism.

6.2 Objective of the Environmental Assessment Process

The main objective of the EIA is to investigate and assess the likely short and long – term positive and negative environmental impacts of the proposed exploration and possible test mining activities with respect to the EPL No. 8724. The main objectives of the EIA are summarised as follows:

- To prepare this scooping environmental report including details of the proposed exploration and possible test mining activities with respect to theEPL No. 8724. Communicate the report to all interested and affected parties and their views and comments to form part of the ToR for the full EIA study to be implemented in form of specialised studies;

- Implement the full EIA and undertake specialised studies, followed by the evaluation of the likely positive and negative impacts associated with the proposed project activities on the environment. The results of the assessment to be presented in a Draft EIA report including an EMP;

- Present the Draft EIA Report including an Environmental Management Plan (EMP) to the client (MOSIOLINE ZEENARO KASIRINGUA), key interested stakeholders and the authorities for further comments and;

- To incorporate all comments received in the final EIA and EMP reports for the proposed exploration and possible test mining activities with respect to the EPL No. 8724 for submission to the client (MOSIOLINE ZEENARO KASIRINGUA) and to the Directorate of Environmental Affairs (DEA) in the Ministry of Environment and Tourism for consideration.

6.3 Constraints to the Environmental Assessment Process

One of the major constraints to the EIA process is time and access to the receiving environment such as farms. However, time constraints will not influence the quality of the outputs. For instance, one way of fast-tracking the process without compromising the quality of the outputs has been the preparation of this full draft scooping environmental information report for comments / input by interested and affected parties to the Environmental Assessment process.

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