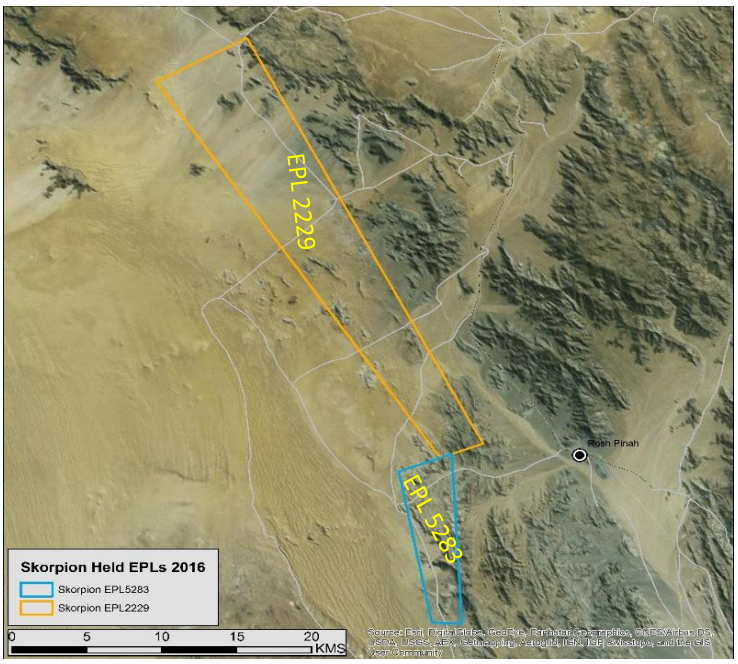
ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT PLAN FOR EXPLORATION ACTIVITIES AT EPL 5283 BY SKORPION ZINC MINE

22 JULY 2016



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Document Status

Proponent	Skorpion Zinc Mine
Title of the proposed Activity	Environmental Impact Assessment for Exploration Activities at EPL 5283 at Skorpion Zinc Mine
Activity Type	Environmental Impact Assessment Study
Location	Skorpion Zinc Mine, Rosh Pinah, Karas Region
Competent Authority	Environmental Commission (Ministry of Environment and Tourism)
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PURPOSE OF THIS DOCUMENT

This document, Environmental Impact Assessment (EIA) Report and Environmental Management Plan (EMP) for the Exploration and Mining activities presents the findings of the impact assessment with respect to issues and concerns raised during the scoping phase of the EIA. The findings are presented in the following reports:

- The final Environmental Impact Assessment (this report), with several appendices, including the Issues and response report (indicating to stakeholders where their issues have been captured)
- Environmental Management Plan (also part of this report).

APPRECIATION FOR PARTICIPATION BY STAKEHOLDERS

Stakeholders were invited to take part in the consultation process. Various media were used to engage the public on the proposed activities as per the BID (Background Information Document). Newspaper advertisements were placed in local daily English

and German newspapers. In addition, radio announcements were made via the local languages (NBC Oshiwambo, Nama/Damara, Afrikaans and OtjiHerero Radio Stations) about the Public Participation meeting. Social Media (Facebook) and the internet through the G&K website (http://www.gandkenviro.com) was also used to engage the stakeholders. BIDs were available from Amica Guesthouse at reception, G&K website and the National Library (Windhoek). The BID was also available from the consultant on request.

PUBLIC REVIEW OF THE DRAFT ENVIRONMENTAL IMPACT REPORT

A period of two weeks (25th July to 5th August 2016) is dedicated for receiving comments and inputs from the public on the draft Environmental Impact Assessment Report. Copies of the draft report are couriered to 3 public places RoshSkor (Pty) Ltd, a company owned by Rosh Pinah Zinc Mine and Skorpion Zinc Mine jointly to manage the affairs of the Rosh Pinah Town, Oranjemund Constituency Office and the National Library in Windhoek. In addition, the availability of the draft Environmental Impact Assessment Report was announced in the media as well as by way of letters addressed to registered key stakeholders. The Report was also available for download or view from the consultant's website (www.gandkenviro.com).

OPPORTUNITIES FOR PUBLIC REVIEW

The following methods of public review of the Environmental Impact Assessment Report were available:

- Completing the comment sheet enclosed with the reports;
- Additional written submissions;
- Comment by email or telephone;
- Comment during the public participation meeting and site visits in Rosh Pinah (meeting held on Saturday, 04 June 2016).

FINAL ENVIRONMENTAL IMPACT REPORT (EIR)

Comments received from stakeholders on the draft findings during the review period will be assessed, and be included in this Final EIA Report.

ACRONYMS AND ABBREVIATIONS

BID	Background Information Document
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management System
I&AP	Interested and Affected Party
MET	Ministry of Environment and Tourism
NGO	Non-Governmental Organization
PA	Performance Assessment

Glossary of Terms

Assessment - The process of collecting, organizing, analyzing, interpreting and communicating information relevant to decision making.

Competent authority - means a body or person empowered under the local authorities to act or a delegation made under the Pollution Prevention and Waste Management Bill to enforce the rule of law.

Cumulative Impacts - in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Evaluation – means the process of ascertaining the relative importance or significance of information, the light of people's values, preference and judgments in order to make a decision.

Environment - As defined in the Environmental Assessment Policy and Environmental Management Act - "land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, paleontological or social values".

Environmental Impact Assessment (EIA) - process of assessment of the effects of a development on the environment.

Environmental Management Plan (EMP) - A working document on environmental and socio-economic mitigation measures, which must be implemented by several responsible parties during all the phases of the proposed project.

Interested and Affected Party (I&AP) - any person, group of persons or organization interested in, or affected by an activity; and any organ of state that may have jurisdiction over any aspect of the activity.

Mitigate - The implementation of practical measures to reduce adverse impacts.

Proponent (Applicant) - Any person who has submitted or intends to submit an application for an authorization, as legislated by the National Environmental Assessment Policy, to undertake an activity or activities identified as a listed activity or listed activities; or in any other notice published by the Minister or Ministry of Environment & Tourism.

Public - Citizens who have diverse cultural, educational, political and socio-economic characteristics. The public is not a homogeneous and unified group of people with a set of agreed common interests and aims. There is no single public. There are a number of publics, some of whom may emerge at any time during the process depending on their particular concerns and the issues involved.

Scoping Process - process of identifying: issues that will be relevant for consideration of the application; the potential environmental impacts of the proposed activity; and alternatives to the proposed activity that are feasible and reasonable.

Significant effect/Impact - means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment

Stakeholders - A sub-group of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term therefore includes the proponent, authorities (both the lead authority and other authorities) and all interested and affected parties (I&APs). The principle that environmental consultants and stakeholder

engagement practitioners should be independent and unbiased excludes these groups from being considered stakeholders.

Stakeholder engagement - The process of engagement between stakeholders (the proponent, authorities and I&APs) during the planning, assessment, implementation and/or management of proposals or activities. The level of stakeholder engagement varies depending on the nature of the proposal or activity as well as the level of commitment by stakeholders to the process. Stakeholder engagement can therefore be described by a spectrum or continuum of increasing levels of engagement in the decision-making process. The term is considered to be more appropriate than the term "public participation"

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Executive Summary

I. Introduction

This EIA study seeks to identify environmental issues associated with the exploration and mining activities at EPL 5283 at Skorpion Zinc Mine in Rosh Pinah. Issues identified through site visits and stakeholders' consultation meetings are put forward in this report. These are further assessed and evaluated through a process developed as detailed in the EIA report.

II. Activity Description and natural environment

Skorpion Zinc Mine and Refinery is a green field development, situated about 25 km north of Rosh Pinah town, in Southern Namibia. It is the 8th largest zinc mine in the world producing Special High Grade (SHG) zinc of 99.995% purity. Mining activities at the current ML 108have a limited lifespan and thus the mine is proposing to expand its exploration and hopefully extend their mining activities to EPL 5283 in the near future.

III. Environmental Assessment Methodology

The identified environmental aspects are assessed based on set criteria as per the EIA guideline document. The criteria used for assessment are:

- **Magnitude** – this criterion looks at the size or extend of the environmental issues that might come as a results of the proposed activity;
- **Direction** – this method looks at the course along which the proposed development moves and the impacts that come as results of the proposed development;
- **Extent** – this measures looks at the area that will be covered by the proposed development;
- **Duration** - this criterion looks at the time which the exploration activities will takes place.

- **Frequency** – this criterion looks at the rate at which issues or impact of the exploration;
- **Reversibility** – this criterion looks at the issue cause by the activity can be reversed to go back to its original condition.

These were used to work out the overall significance level (SP) of the identified impacts.

The study concludes that the proposed activities do not pose major environmental or social impacts provided that activities are carried out within the provisions made in the Environmental Management Plan.

1. Background to the Activity

1.1. Introduction

Skorpion Zinc Mine currently mines Zinc Oxide at an Open Pit about 187 m below the mean ground level. Some areas of the Open Pit where the large concentrate of the deposit sit are surrounded by underground water which need to be pumped out for mining to take place. The mine plans to expand its operations in the near future and would like to explore the availability of Zinc Oxide at EPL 5283 situated southern part of the mine area.

The proposed activity cannot be undertaken without an environmental clearance certificate as per the EIA Regulations and Environmental Management Act No. 7 of 2007. Therefore, G&K Environmental Consultants was appointed by Skorpion Zinc Mine to undertake the required EIA.

Figure 1: Project Study Area

1.2. Purpose and Scope of EIA and EMP

The aim of this EIA is to identify and assess the significance of impacts, and where appropriate to make recommendations that may then be used by the relevant authorities as conditions of approval and be incorporated into the Environmental Management System (EMS). The ultimate aim is to minimize the number of residual negative impacts of HIGH significance during the exploration and mining activities at EPL 5283.

1.3. Summary of the Proposed Activities

The proposed activity entails the exploration activities at EPL 5283 in order to assess the amount of Zinc Oxide and other minerals resources that can be found in the EPL 5283 area. The proposed method for exploration would have minimal impact as it will be done on small scale and rehabilitation of the natural vegetation will be done as per the Environmental Management Plan (EMP). During the site visits to EPL 5283, it was learned that some exploration activities has been done before by the previous EPL holder where they have used among others the drilling methods. However, it can be easily seen that the area has been rehabilitated near to its natural state.

1.4. Alternatives

The 'do nothing' alternative is the option not to undertake the proposed exploration and mining activities. This alternative is counterproductive to the mines operation, given the fact that there are dwindling ore reserves from the current pit.

In addition, the 'do nothing' alternative is not consistent with the Vision 2030, Harambee Prosperity Plan, the National Development Plans and Namibian government's commitment of employment creation, poverty reduction and economic growth.

1.5. Study Team

G&K Environmental Consultants CC, Reg. No. CC/2009/2115 is a dynamic consultancy offering sustainable solutions to the private sector, NGO's, government and donor community. G&K is 100% Namibian and black owned with experiences in the fields of Environmental Assessment – specializing in Environmental Assessments, Management Plans, Risk Assessments, Public Consultation, Application for clearance Certificates, Baseline Surveys, Health and Safety training and Rehabilitation of mines.

CVs for the project team are included in the Annexures.

2. Regulatory Framework

2.1. Introduction

Namibia has a number of legislation dealing with environmental issues. Environmental legislation determines the objectives guiding, and the strategies to be used in order to strengthen the respect for environmental values, taking into account the existing social, cultural and economic situation. The foundation for the Namibian environmental policy framework is Article 95 (l) of the Constitution. It stipulates that the state shall actively promote and maintain the welfare of the people by adopting policies which include the "maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefits of all Namibians (The Namibia Constitution).

The State is further committed to actively promote and maintain the environmental welfare of all Namibians by entrenching the principles of sound environmental management practice in the Namibian Constitution and formulating and

institutionalizing policies that can realize the sustainable development objectives (Ruppel, 2013).

2.2. Environmental Legislation

To give effect to articles 91(c) and 95(l) of the Constitution of Namibia, general principles for sound management of the environment and natural resources in an integrated manner were formulated in Namibia's Environmental Assessment Policy of 1995. The Environmental Assessment and Management Act was promulgated in 2007 to give statutory effect to the Policy and gazetted on 27 December 2007 as the Environmental Management Act (Act No. 7 of 2007), Government Gazette No. 3966. Regulations for Environmental Impact Assessment, in terms of the Act, were published in January 2012. The Act defines "the environment" as including "the human environment that is the landscape and natural, cultural, historical, aesthetic and social heritage and values."

The process followed for this EIA study is outlined in Figure 2 below.

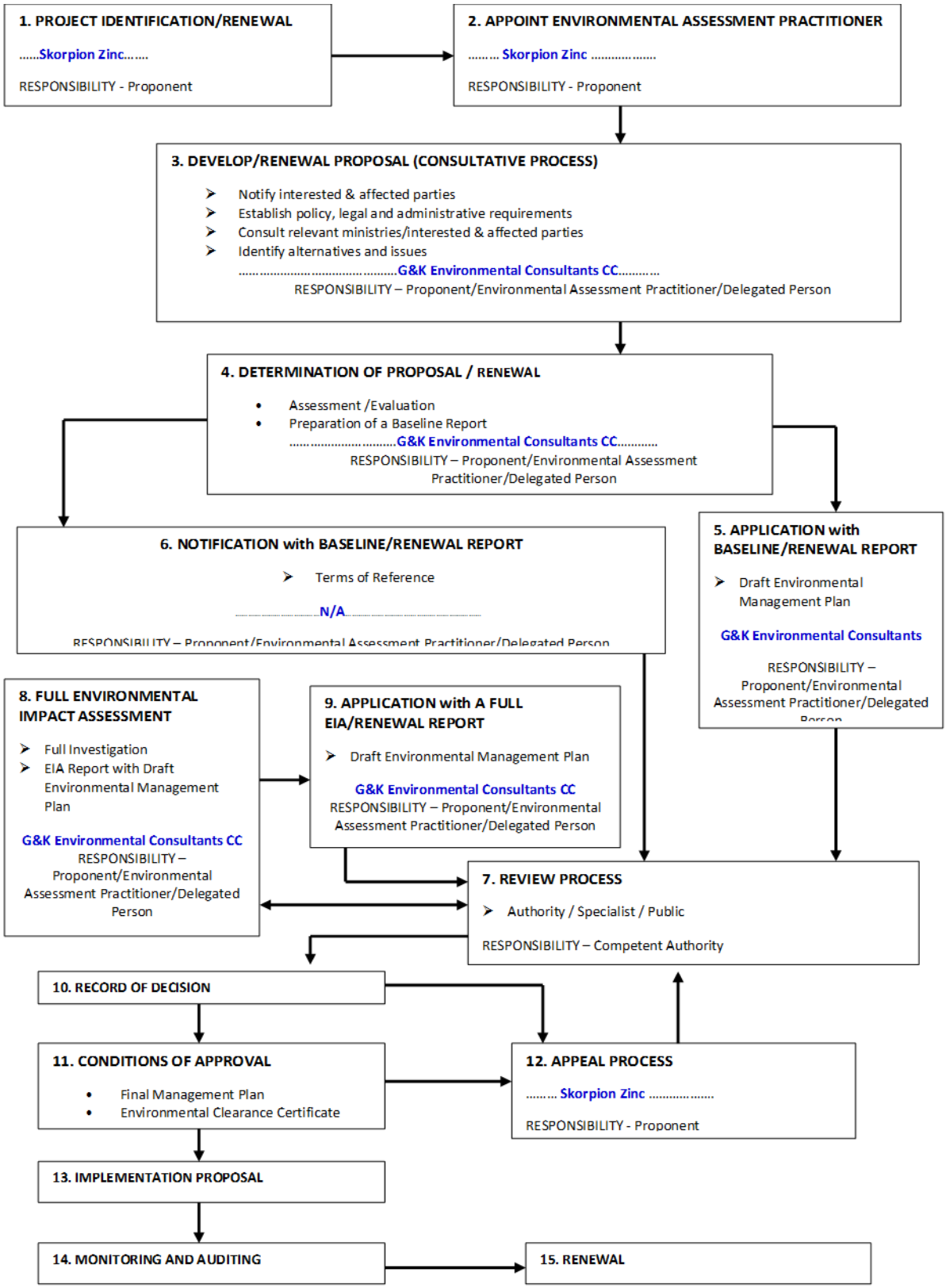

Figure 2: EIA scoping process as per Environmental Management Act (7 of 2007)

As the organ of state responsible for management and protection of its natural resources, the Ministry of Environment and Tourism (MET) is committed to pursuing these principles of environmental management.

The Act also provides for ensuring that there are opportunities for timeous participation of interested and affected parties throughout the assessment process in matters affecting their lives.

2.3. Environmental Impact Assessment Policy

Namibia's Environmental Assessment Policy recognizes that EIAs seek to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process. The term 'environment' is broadly interpreted to include biophysical, social, economic, cultural, historical and political components. The Policy defines the required steps for an EIA, the required contents of an EIA report, the need for post-implementation monitoring, and the system of appeals. All these aspects have since been taken up in the subsequent Environmental Management Act (EMA) and the accompanying Regulations, which were drafted in response to the Environmental Assessment Policy.

2.4. Local Authorities Act

The Local Authority Act (23 of 1992) makes provisions for municipalities, towns and villages to make regulations and rules regarding the activities that may be conducted within the municipal, town or village jurisdiction. Incidents such as pollution, spillages or contamination may be investigated by the Health and Safety Officer at the Municipality, Town or Village Council and the offender may be fined an amount as per the rules and regulations of that Local Authority.

The Rosh Pinah Town Council have been informed about the proposed activity and will assist in inspection of any health hazard that may be caused by the exploration activities.

2.5. Soil Conservation Act

To consolidate and amend the law relating to the combating and prevention of soil erosion, the conservation, improvement and manner of use of the soil and vegetation and the protection of the water sources in the Republic and the territory of Namibia. Taking into account the proposed activity, care should be exercised to ensure that where soil erosion occurs, mitigation measures should be implemented to lessen the impact. Specific measures regarding these possible impacts will be proposed further in EMP.

2.6. Hazardous Substance Ordinance (Ordinance No. 14 of 1974)

A substance is considered hazardous if it has one or more of the following hazardous properties i.e. explosive, flammable, oxidizes, corrosive or toxic to people. Exploration activities must ensure there are no hydrocarbon spillages in the field that can contaminate the soil. Mobile bund walls must be used in all cases where hydrocarbons are used in the field.

2.7. Atmospheric Pollution Prevention Ordinance of 1976

The Atmospheric Pollution Ordinance makes provision for the prevention of any activity that contributes to the pollution of the atmosphere. The proposed activity does not pose any direct impact on the atmosphere such as pollution etc. The proponent informed the EIA Consultant that exploration activities will be limited at a small scale and that they will use low impact operations that may have minimal impacts on the natural environment.

2.8. Water Resources Management Act, 2004 (Act No. 24 of 2004)

The Water Resources Management Act provides for the management, development, protection, conservation and use of water resources throughout Namibia. Provisions have been made in the EMP to ensure that the excess water that will be disposed of should be used productively at the mine for example for dust suppression.

3. Baseline Description of Proposed Activity

3.1. General

The availability of Zinc Oxide Ore at the current mining area at ML 108 cannot sustain the mine indefinitely. Skorpion Zinc mine has therefore planned to explore alternative areas where they have exclusive prospecting licences to assess the availability of Zinc Oxides Ore and other mineral resources. The mine propose to carry out exploration activities at EPL 5283 which is immediately south of EPL 2229 as can be seen on the photo below.

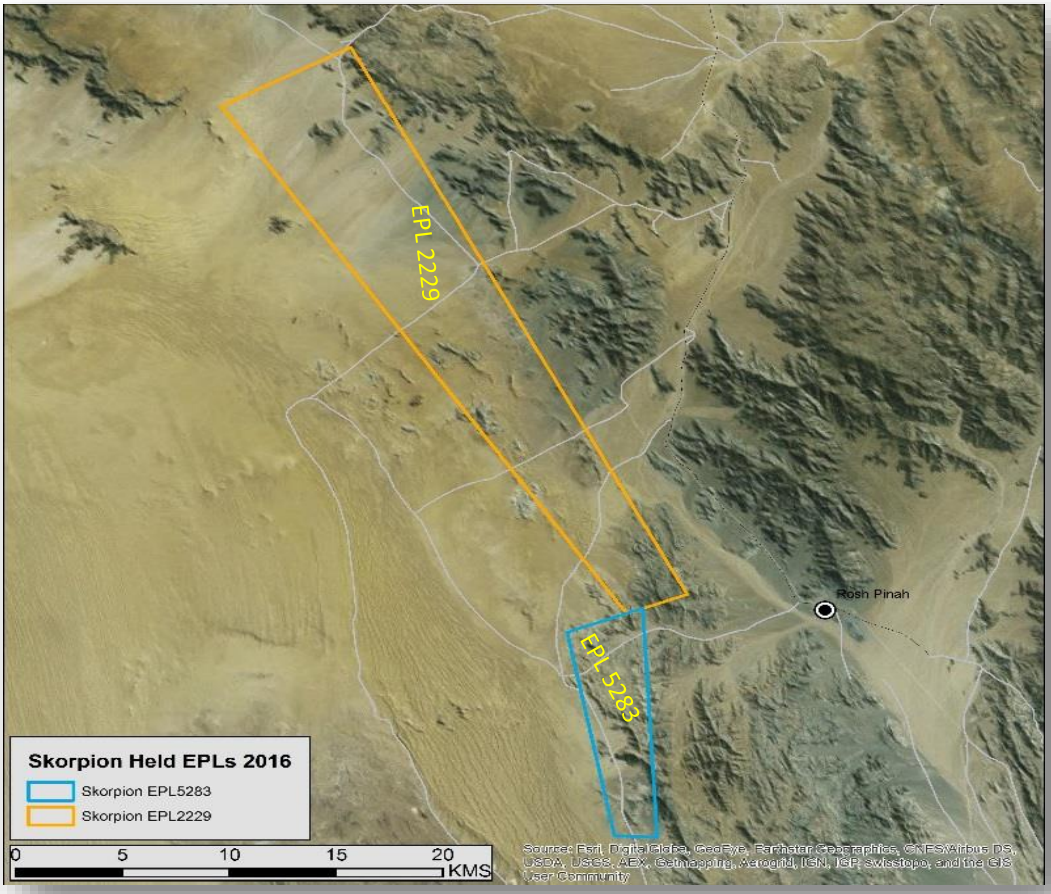

Figure 3 shows the proposed area (EPL5283) for exploration activities

EPL 5283 falls within an ecologically sensitive area of the Namibian desert called the Sperrgebiet National Park. It is imperative that through studies are carried out to ascertain the biophysical condition of the area prior to the exploration or mining activities.

3.2. Physical Environment

3.2.1 Climate

Rosh Pinah:

Rosh Pinah is a mining town located in Southern Namibia and close to the Namibian and South African borders. It is situated about 360 km south of

Keetmanshoop in the Karas Region. Rosh Pinah belongs to the Oranjemund Electoral Constituency. The town is connected via C13 road to Aus village about 168 km. Rosh Pinah is not proclaimed and does not have a municipality. The town falls under the control of the two mines, Rosh Pinah Zinc Mine and Skorpion Zinc Mine. The average rainfall for Rosh Pinah is about 47 mm and there appears to have been a very slight increase in rainfall over the years.

Topography

The topography of Aus and Rosh Pinah can be described as generally flat with numerous ranges and small mountain ranges, and torra formations seen occasionally. The areas vegetation can be describe as a composition of bushes and shrubs with grasses evident almost everywhere. Amongst the important wildlife species found within the area are springbok, Chacma Baboon, Kudu, Cape Fox, Steenbok, and Aardwolf etc. The area also teemed with many species of birds and reptiles. During the site visits, a number animals like Ostrich, Oryx and Springbok were observed roaming free.

3.2.2 Geology Soils

The geological formation of the Karas Region varies from one area to another. The region is well known for having abundance of minerals and vast natural resources, and contributes a large chunk to the country's revenue. Towns like Oranjemund, where diamonds are mined, Lüderitz with its fishing industry and Rosh Pinah where Skorpion Zinc Mine is situated are major contributor to the country's economy. The Rosh Pinah area is dominated by the Karas mountain range mostly on the south eastern part.

On a local scale, the central and western area of Skorpion mine area is underlain by rocks of the Gariep Complex, predominantly quartzite, arkose,

limestone and felsic meta-volcanic and schists of the Hilda and Stinkfontein Sequences, Figure 4 (Source: KLM Reports, 2015).

The eastern area comprises rocks of the Nama Group i.e. siliciclastic sediments comprising shales, sandstones and limestones (Schwarzrand Subgroup) and sandstones, black shales, limestones and conglomerates (Kuibis Subgroup), unconformably overlying the granitic to granodioritic intrusives of the Vioolsdrif Suite and calc-alkaline metavolcanics of the Orange River Group.

The Skorpion ore body is hosted in volcano-sedimentary schist with main mineralization comprising clay sauconite (zinc clay), smithsonite (zinc carbonate), and hemimorphite (zinc silicate). Minor ore minerals include: tarbuttite and Scholzite (zinc phosphates), chalcophanite and Hydrohaeterolite (zinc oxides), hydrozincite (zinc carbonate) and "skorpionite" (zinc phosphate).

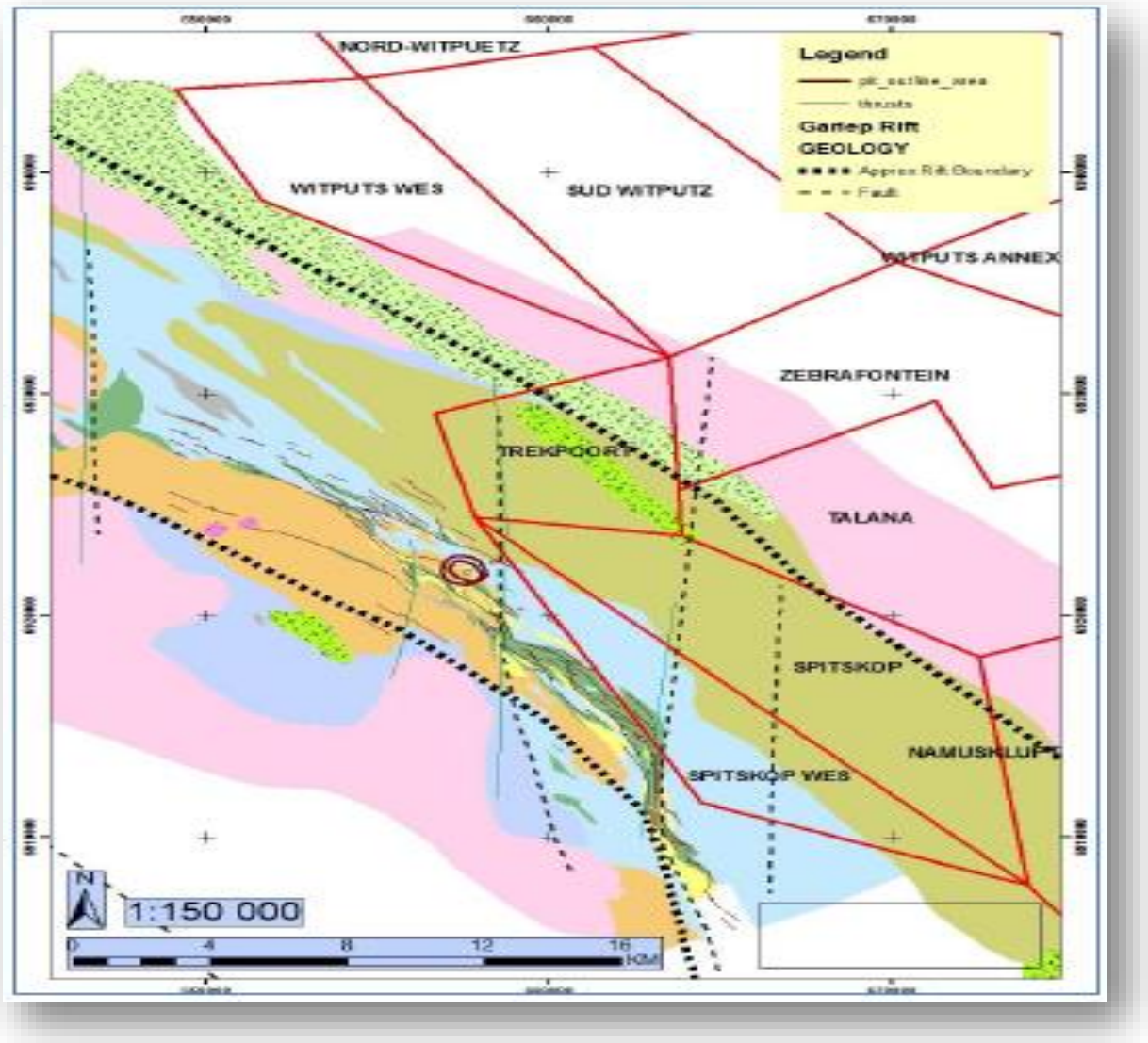

Figure 4: General Stratigraphy of the mine Geology ((Source: KML Report, Skorpion Zinc Mine)

Figure 5: Mountains in southern part of Rosh Pinah

3.3. Bio-physical Environment

Karas Region is well known for its arid, pest and insect free climate nourished by the waters from the Orange and Fish Rivers. These rivers make the area ideal for abundant, plush crops. There is hardly any vegetation but grapes and dates adapt very well in the environment. Sheep, game and even ostrich are some of the livestock observed in the study area. Partial shrubs have been observed mostly along the B4 and C13 national road and throughout the Region.

3.4. Social Environment

According to the Namibia Statistics Agency (NSA) the population of Karas of 2011 was 77 421, with the population projected to grow to 85 800 by 2016. With an average of 0.4 persons to every km², Karas is one of the most sparsely populated areas in the country. The largest concentrations of people are found in major urban/mining centres such as Lüderitz (±13 500); Oranjemund (±11 000) and Keetmanshoop (±12 000), with the remaining population spread across the region

in smaller settlements such as Berseba (±5000), Aroab (±5000), Bethanie (±2000) and Tses (±2000).

The Karas regional government is centred in Keetmanshoop and the region comprises the magistrate districts of Lüderitz, Keetmanshoop and Karasburg. It is the largest regional area in Namibia with a population of around 69 000 (2001 Population and Housing Report of NPC). The mining sector is the largest employer and the most economically significant. Just over a quarter of the economically active population of the region is directly employed in mining, which includes diamonds along the Orange River to Oranjemund and up the coast to just south of Lüderitz, zinc and lead at Rosh Pinah and gemstones in small deposits throughout the region.

3.5. Current Infrastructure in the area

The Karas Region has a set of very good road networks that connect the region to the Lüderitz Harbour via the B4 national road and to Hardap Region via the B1 national road. There are also railway network connecting Lüderitz to Windhoek and the rest of the country. Most towns in the regions are connected via either bitumen road or in some cases gravel but well maintained road. The electricity connection covers the entire region and water infrastructures are also available. **Detailed Project Description**

4.1. Introduction

Skorpion Zinc Mine and Refinery is a green field development, situated 25 km north of the Rosh Pinah town, in Southern Namibia. It is the 8th largest zinc mine in the world producing Special High Grade (SHG) zinc of 99.995% purity. The mine intends to conduct explorations at EPL 5283 situated south of ML 108 where the mining area is located.

The proposed exploration activities constitute a number of listed activities in terms of the Environmental Impact Assessment (EIA) Regulations as promulgated under the national Environmental Management Act (Act No. 7 of 2007).

Any activity which requires a permit, license or other form of authorisation in terms of law governing the generation or release of emissions, pollution, effluent or waste; Waste Management, treatment, handling & disposal activities; require Environmental Clearance in terms of the EIA Regulations.

4.2. Environmental Management

This study has identified potential environmental and social impacts. An Environmental Management Plan exploration activities at EPL 5283 has been developed to ensure that all activities during the exploration stage are in line with the Environmental Management Act, ISO14001 and OHSAS18001 standards as stipulated by the Skorpion Zinc SHEQ System. Therefore, mitigation measures are proposed where issues have been identified and where positive impacts are identified; measures to enhance those have also been identified.

4. Public Participation

5.1. Public participation requirements

Public participation is the cornerstone of any EIA processes. Its key objective is to assist stakeholders to raise issues of concern and suggestions for enhancement benefits and to comment on the findings of the EIA. Namibia's Environmental Management Act No. 7 of 2007 defines public consultation as a "process in which potential interested and affected parties are given an opportunity to comment on or raise issues relevant to specific matters". This is therefore an integral process for any EIA process.

During this study, stakeholders were given an opportunity to participate in the EIA process through the following:

- Stakeholders Consultation meeting was arranged at Rosh Pinah Community Hall on Saturday, 4th June 2016 and due to poor attendance from the community members and since all the meetings attendants were employees of the proponent, the meeting discussed the operations of the proposed exploration activities. The team was then taken to EPL 5283 and was oriented with the natural environment of the site to assess the condition before any exploration activity take place.

- Further consultations where also done with the Rosh Pinah Town Council, Namwater and with the Namibian Chamber of Mines in Windhoek.

- A list of stakeholders was established for the study (Appendix 4). Key stakeholders include people and institution at national, regional and local levels. At National and regional levels, the consultation focused mainly at government institutions such as Rosh Pinah Town Council, Namwater, Oranjemund Constituency Office, Namibian Chamber of Commerce, MET and the nearby farmers. At local level, the consultation targeted institutions, communities and people in close proximity to the Skorpion Zinc Mine.
- A Background Information Document (BID) (Appendix 2) which contained concise background information about the proposed activity was compiled and widely circulated to all key stakeholders in Windhoek, Oranjemund, and in Rosh Pinah. Copies of the BID were also left at government offices at national, regional and local levels as well as at public facilities such as municipal offices, Police offices, shops, post offices, Oranjemund Airport and regional councillors' office Oranjemund for further distribution to Interested &

Affected Parties (I&AP). Electronic copy of the BID was forwarded to regional and local authorities and other institutions for further dissemination.

- Notices were placed in the local daily newspapers (Namibian Sun Newspaper and New Era Newspaper) on 3rd June 2016. The notices provided a brief description of the activity and the sites where the exploration will be done and invited Interested and Affected Parties to register as such (Appendix 8 a & b).

- Where applicable people living within the vicinity of the proposed activity (Rosh Pinah) were directly contacted and provided with a brief explanation about the proposed project in the language of their preference and were also provided with copies of the BID.

- The BID was accompanied by a stakeholder registration form which made provision for stakeholder to raise their issues of concern and return the form to the project office through the contact details provided on the form.

- Interested and/or Affected Parties (I&APs) were notified of the proposed activity as per the requirements of the Environmental Impact Regulations published in Government Notice No 28,29 & 30 in Government Gazette No. 4878 of 6 February 2012, under Section 21 – 24 the Environmental Management Act, 2007 (Act No. 7 of 2007), as amended.

5. Environmental Impacts identified

6.1. Methodology for impact identification

The identified impacts associated with the exploration activities were identified either through the public consultation process, site visits, or from previous baseline studies conducted in the Karas Region. Other studies such as EIA's conducted for mining activities and exploration in the area were also used to ensure a wider

spectrum of study and consultation take place to identify the pertinent environmental issues for the proposed activity. It is important to note that environmental impacts from exploration activities (including ground geophysics and exploratory drilling) are generally temporary and of relatively small magnitude.

The exploration activities if not carried out properly, may have some negative impacts on the physical environment. The physical environment includes land, air, water, animals and other natural resources that provide our basic needs and opportunities for social and economic development. The proponent indicated that the type of activities that will be carried out during exploration may not have major impacts on the physical environment. Rehabilitation of the areas needs to be carried out as per the EMP.

The following list identifies the various environmental and social impacts associated with the mining exploration activities:

6.2. Impacts on Physical Environment

- **Acoustics or noise** associated with exploration from earth-moving equipment, vehicle traffic, seismic surveys, blasting and drill rig operations;
- Geophysical and exploratory drilling crews may generate **waste** (plastic, paper, containers, fuel leaks/spills, food and human waste). Waste produced by exploratory drilling occurs at a lesser extent than those produced during drilling and operation of production bore holes. These would include drilling fluid and muds, used oil and filters, spilled fuel, drill cuttings, spent and unused solvents, scrap metal, solid waste and garbage.
- **Potential impacts on human health and safety** resulting from exploration activities such as occupational accidents and injuries, vehicle accidents, exposure to weather extremes, wildlife encounters, trips and falls on uneven terrain, adverse health effects from dust generation and emissions and

contact with hazardous materials. The potential for these impact to occur would be low because of the limited range of activities and number of workers required during exploration.

- **Temporary and localised impacts to land use** would result from exploration activities. These activities could create a temporary disturbance in the immediate vicinity of a surveying or monitoring site or an exploratory bore hole(e.g. disturbance to wildlife);
- **Disturbance to paleontological resources** could be disturbed by vehicular traffic, ground clearing and pedestrian activities;
- **The loss of biological crusts** can substantially increase water and wind erosion. However, the amount of surface disturbance and use of geologic materials during exploration would be minimal;
- **Visual impacts** would could be adverse if the landscape were substantially degraded or modified. Exploration activities would have only temporary and minor visual effects, resulting from the presence of drills rigs, workers, vehicles and other equipment;
- Minimal **impact to water resources** (water quality, water flows and surface/groundwater interactions) would be anticipated from exploration activities.

6.3. Impact on Biotic Environment

Impacts to ecological resources (vegetation, wildlife, aquatic biota, special status species and habitats) would be minimal and localised during exploration because of the limited nature of the activities. Impacts on air quality during exploration activities such as emissions and dust from earth moving equipment, vehicles, geophysical surveys, bore hole completion and testing and drill rig exhaust. Impacts on air quality would depend on upon the duration, location and characteristics of the emissions and the metrological conditions (e.g., wind speed and direction, precipitation and relative humidity).

6.4. Impact on Social Environment

The preliminary assessment indicated activities conducted during exploration phase are temporary and limited in scope, they would not result in significant socioeconomic impacts on employment, local services or property values. However, depending on the results of the exploration activities, more employment opportunity might arise as results of the expansion of the mining activities later when the mining activities commence.

6. Assessment of identified Environmental Impacts

This chapter provides details of the potential impacts that will emanate from the exploration activity. It should be noted that the exploration activities at EPL 5283 will be done within the provisions of the Namibian laws as permitted by the Ministry of Mines and Energy, Ministry of Environment and Tourism guided by the proposed mitigation measures. The purpose of this Section is to identify and consider the most important environmental impacts and to provide possible mitigation measures that are expected from the exploratory activities. The impact assessment was done for both period and mitigation measures are proposed for each stage. The following impact criteria as per guidelines and procedures for EIA's and EMPs were used to assess the significance of the identified potential environmental impacts.

Key impacts that are inherent to a project of this nature have been identified. These impacts are generic and are common for all activities involving prospecting, exploration and mining. Therefore, the overall impacts that are relevant to the exploratory activities are discussed below:

- ***Health impact associated with Exploration:*** Potential impacts on human health and safety resulting from exploration activities such as occupational accidents and injuries, vehicle accidents, exposure to weather extremes, wildlife encounters, trips and falls on uneven terrain, adverse health effects

from dust generation and emissions and contact with hazardous materials. The potential for these impact to occur would be low because of the limited range of activities and number of workers required during exploration.

- ***Effects on paleontological resources:*** Disturbance to paleontological resources could be disturbed by vehicular traffic, ground clearing and pedestrian activities.
- ***Temporary and localised impacts to land use***: These would result from exploration activities. These activities could create a temporary disturbance in the immediate vicinity of a surveying or monitoring site or an exploratory well (e.g. disturbance to wildlife).

The extent of the impacts will be assessed below.

Assessment Criteria	**Description of criteria**
Magnitude (MA)	**The absolute or relative change in the size or value of environmental feature.** ***0 – None*** ***2 – Minor*** ***4 – Low*** ***6 – Moderate*** ***8 – High*** ***10 – Very high/don't know***
Direction (DI)	**Will the impact represent beneficial or adverse change? *Positive (P) versus negative (N) impacts*. Negative impacts are cause of concern.** ***0 – Positive Impact*** ***1 – Negative Impact***
Extent (EX)	**The extent of environmental impacts associated with the proposed activity.** ***1 - Immediate (the site and immediate surrounds)*** ***2 - Local (Rosh Pinah)*** ***3 - Regional (Karas)*** ***4 - National (Namibia)*** ***5 – International***

Duration (DU)	**The time period over which the impact will be felt.** ***1 – Immediate*** ***2 – Short term (0-5 years)*** ***3 – Medium Term (5-15 years)*** ***4 – Long term (impact ceases after the operation)*** ***5 - Permanent***
Frequency (FR)	**Refers to the return period for impacts which will recur over and over again.** ***0 - Annually or less*** ***1 - 1 to 10 years*** ***2 - 10 to 100 years***
Reversibility (RE)	**Refers to the permanence of the impact.** ***0 -Temporary*** ***1 - Permanent***
Likelihood (LI) of occurrence	**Refers to the possibility of particular impact occurring as forecast.** ***0 - None*** ***1 - Improbable*** ***2 – Low probability (possibility of impact occurring is low)*** ***3 – Medium Probability*** ***4 - Highly probable (where the impact is most likely to occur)*** ***5 - Definite (where the impact will occur)***

Table 1: Impact Assessment Criteria

Once the above factors has been ranked for each impact, the overall risk (environmental significance) of each impact was assessed using the following formula:

SP = (magnitude + direction + extent + duration + frequency + reversibility) X Likelihood

The maximum value is 120 significance points (SP). Environmental impacts were rated as either **High**, **Moderate** or **Low** significance on the following basis:

- SP ≥ 60 : indicates high environmental significance
- SP 40 ≥ 59 : indicates moderate environmental significance
- SP ≤ 39 : indicates low environmental significance

POTENTIAL ENVIRONMENTAL IMPACT	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDATED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		MA	DI	EX	DU	FR	RE	LI	TOTAL	SP		MA	DI	EX	DU	FR	RE	LI	TOTAL	SP
Acoustic or noise associated with exploration from earth moving equipment, vehicle, traffic, geophysical surveys, and drill rig operations	Movement of earth moving equipment	10	1	1	1	0	0	4	14	**56**	Earth moving equipment should stick to the prescribed roads and should follow the park rules.	6	1	1	1	0	0	4	9	**36**
Geophysical and exploratory drill crews may generate waste (plastic, paper, containers, fuel leaks/spills, food and human waste	Throwing away of waste in the open environment	8	1	2	1	0	0	4	12	**48**	Waste generated during the exploration should be disposed of in waste bags / bins and disposed of at appropriate waste area	6	1	1	1	0	0	2	9	**18**
Potential impacts on human health and safety results from exploration activities such as occupational accidents and	Exploration staff working without properly being inducted on health and	8	1	1	1	1	1	3	13	**39**	Exploration team should be properly inducted on health and safety measures and all staff / exploration team should be issued with appropriate PPE	6	1	1	1	1	1	2	11	**22**

injuries, vehicle accidents, exposure to whether extreme, wildlife encounters, trips and falls on uneven terrain, adverse health effects from dust generation and emissions and contact with hazardous materials	safety and without Personal protective equipment (PPE)																			
Disturbance to paleontological resources could be disturbed by vehicular traffic, ground clearing and pedestrian activities	Movement of exploration vehicles and clearing of the ground	10	1	2	2	1	1	4	17	**68**	Any archaeological sites or paleontological resources should be identified and treated with care to avoid disturbance	8	1	1	1	1	1	2	13	**26**
Impact on water resources	Introduction of pollutants through point sources on the surface of land	8	1	1	1	1	1	3	13	**39**	Monitor quality of ground water continuously through installed boreholes around the mine area to detect any pollution. Baseline water quality readings must be used as controls to identify any changes in water quality.	6	1	1	1	1	1	2	11	**22**

Visual impacts would could be adverse if the landscape were substantially degraded or modified.	Excessive cutting down of trees / shrubs	6	1	1	1	0	0	3	9	**27**	Disturbance to natural environment should be minimized and where possible, shrubs removed should be rehabilitated after the exploration.	4	1	1	1	0	0	2	7	**14**
Exploration activities could create temporary disturbance in the immediate vicinity of a surveying or monitoring site or an exploratory bore hole	Removal of trees / shrubs or top soil	8	1	2	1	1	1	4	14	**56**	There is very little vegetation around the proposed site (EPL 5283). However, maximum care should be exercised when removing shrubs / trees etc.	8	1	1	1	1	1	3	13	**39**
Contamination of soil, groundwater and surface water by chemicals from mining / exploration processes	Disposal of oil from field vehicles and machineries	6	1	2	1	1	1	4	12	**48**	Oil from field vehicles and exploration machines should be disposed of used oil. All drilling chemicals to be used must be biodegradable.	4	1	1	1	1	1	3	9	**27**
Loss of biodiversity and destruction of natural flora and fauna	Movement of field vehicles and noise disturbance from exploration machineries.	10	1	2	2	1	1	4	17	**68**	Disturbance from vehicles and machineries is temporary and the disturbed flora and fauna	8	1	2	2	1	1	3	15	**45**

Pollution of air, land and water	Smoke and dust from the field vehicles, exploration machineries and oil drops	6	1	0	0	1	1	3	9	**27**	Smoke and dusts from vehicles and machineries are temporary. However, leakages of oil from vehicle and machines should be contained and where occurs should be collected thoroughly.	4	1	0	0	1	1	2	7	**14**

Table 2: Identified Environmental Impact Analysis

7. Conclusion and Recommendations

8.1. Conclusion

The Environmental Assessment study did not discover any serious threat that the exploratory work may have on the on the natural and socio-economic environment. The impacts identified in this study can be mitigated through effective implementation of Environmental Management Plan and are therefore not expected to have any detrimental negative impacts on the surrounding communities especially in the Sperrgebiet National Park.

It is therefore concluded that the exploratory work can be undertaken without posing any serious health effects to the surrounding communities. It is believed that the benefits of exploration activities at EPL 5283 by Skorpion Zinc Mine far outweigh the minor health risks that can be avoided through EMP implementation and rehabilitation. It is recommended that the EMP should be implemented fully in order to ensure that all potential environmental and social impacts are satisfactorily addressed.

8.2. Recommendations

The Environmental Management Plan contained in this report must be strictly implemented and must become part and parcel of the exploration team's role during the exploration period. The exploration team should adhere to all proposed mitigation measure proposed in the EMP. Skorpion Zinc should ensure that all employees and staff working with the exploration team are sensitised about the mitigation measures proposed in the EMP.

8. Environmental Management Plan (EMP)

9.1. Introduction to the EMP

The EMP is a set of feasible and cost-effective mitigation, monitoring and institutional measures to avoid adverse environmental and social impacts, reduce them to acceptable levels or to compensate for them. This EMP covers all adverse environmental impacts, including any that may result from the exploration activities at EPL 5283. The EMP will provide the technical details for each mitigation, monitoring and institutional measure, including the impact(s) to which it relates and the conditions when it is required, together with designs, equipment descriptions and operating procedures. Where necessary, the EMP will specify for each mitigation measure timing, cost, locations, and institution responsible.

The EMP will specify the monitoring objectives and the types of monitoring needed to ensure that the mitigation measures have been put in place and are working as intended for plus any other monitoring of the environmental and social aspects that area considered appropriate to measure the environmental impacts or to ensure that unanticipated environmental impacts do not occur. The EMP will also specify the monitoring and reporting procedures to ensure early detection of issues and provide information on progress and results of mitigation. This EMP describes the processes that Skorpion Zinc Mine and associates will follow to maximize compliance and minimize harm to the natural environment. This plan will also help the Mine map out progress toward achieving continual improvements. The EMP comprises of a list of actions needed to mitigate the potential negative environmental impacts identified in the EIA.

The development of an Environmental Management Plan is a requirement for any EIA project as per Namibian Environmental Management Act No. 7 of 2007. Therefore this EMP is a legal document that must accompany the EIA Report before an Environmental Clearance is issued.

9.2. Objectives of the EMP

The main purpose of this EMP is to prevent avoidable damage and/or minimise or mitigate unavoidable environmental damage associated with exploration. The EMP forms part of the exploration procedures that all contractors/ employees of the Mine must be committed.

This EMP:

- identifies all mineral exploration activities that could cause environmental damage (risks) and provides a summary of actions required;
- identifies institutions responsible for ensuring compliance with the EMP and provides their contact information;
- provides standard procedures to avoid, minimise and mitigate the identified negative environmental impacts and to enhance the positive impact of the proposed activities on the environment;
- provides for site and exploration rules and actions required;
- forms a written record of procedures, responsibilities, requirements and rules for contractor/s, their staff and any other person who must comply with the EMP;
- provides a monitoring and auditing programme to track and record compliance and identify and respond to any potential or actual negative environmental impacts, and
- Provides a monitoring programme to record any mitigation measures that are implemented.

9.3. EMP Administration

For the general provisions of this EMP to be fully implemented there is a strong need to clearly outline the roles and responsibilities of all stakeholders. There is also a need for Skorpion Zinc Mine and its contractors to appoint an overall responsible person (Environmental Team) to ensure the successful implementation of the EMP. The responsible person needs to

be someone who has an understanding of EMP administration. Under the management actions, each action is allocated to a responsible entity to ensure that the specific action is managed and documented properly.

Furthermore, all key role players such as contractors who will be involved during the exploration process must be informed about the contents of this EMP and activities to be undertaken to mitigate the potential impacts identified.

Any new developments that will occur during exploration process that might have potential impacts on the environment should trigger further adjustments and revision of this EMP to ensure that all potential threats to the environment are addressed on an ongoing basis.

9.4. Management Actions

9.4.1. Generic Management Action

In order to ensure that such activities are effectively maintained and that exploration activities are done in a responsible fashion and that they do not pose any risks to the environment or human health and wellbeing, it is recommended that the following general management actions are implemented.

9.4.2. Record Keeping

Record keeping is an essential part of effective management. Skorpion Zinc Mine should establish an effective monitoring and record keeping system for the duration of the exploration process. The purpose of this is to ensure the effective management and control of all exploration activities are carried out in a responsible manner as required by the law in order to ensure that no impacts are triggered as a result of the transportation activities.

The following is a brief guide to the type of records that should be kept:

Plans and Procedures:

There should be a complete record of steps and procedures clearly indicating what should be done, the responsible person and the activity that should be done as precautionary measure. Such plans should be kept up-to-date by marking up all changes, i.e. omissions and additions to the procedures.

Daily log:

A large, page-a-day diary will serve for this purpose and any information which does not logically fit in some other record must be entered in the diary. Typical examples are weather conditions, temperature, peculiar circumstances and problems encountered.

Environmental, public health and safety education:

Set up an Educational Programme that is led by the Health & Safety Officer for staff involved in the exploration activities. The programme should discuss with staff role that they can and need to play regarding exploration.

9.4.3. Specific Management Actions

The table below summarizes the mitigation measures to be undertaken to minimize the overall environmental impacts identifies for this project site.

No.	Impact	Recommended mitigation	Technical Information	Implementation Schedule	Costing in N$	Responsible Agent
Potential Environmental Impact						
Impact on Biotic Environment						
1.	Impact to ecological resources would be minimal and localized during exploration because of the limited nature of activities.	Ensure that all ecological resources such as vegetation, wildlife, aquatic biota, special status species and habitats are protected from the exploration activities.	Technical information regarding the ecological resources available in the area should be provided by the environmental team.	Mitigation measures applicable during the exploration process.	No additional mitigation cost predicted.	Skorpion Zinc Mine / Exploration team
2.	Impacts on air quality during exploration activities such as emissions and dust from earth moving equipment, vehicles, geophysical surveys, bore hole completion and testing and drill rig exhaust.	Dust suppression method should be done to minimise the dust emission from exploration. Exploration team should be provided with dust mask	Impacts on air quality would depend on the duration, location and characteristics of the emissions and the metrological conditions	Mitigation measures applicable during the exploration process.	Depend on the mitigation measure to be undertaken	Skorpion Zinc Mine / Exploration team
Impact on Social Environment						
3.	Preliminary assessment indicated activities conducted during exploration phase are temporary and limited in scope, they would not result in significant socioeconomic impacts on employment, local services or property values.	Ensure that local people are employed for semi-skilled labour where possible during exploration and after the mining activities commerce	Depending on the results of the exploration activities, more employment opportunity might arise as a results of	As soon as possible where possible	No additional mitigation cost predicted.	Skorpion Zinc Mine / Exploration team

No.	Impact	Recommended mitigation	Technical Information	Implementation Schedule	Costing in N$	Responsible Agent
			the expansion of mining activities later when the mining activities commerce.			
4.	Potential impacts on human health and safety resulting from exploration activities such as occupational accidents and injuries, vehicle accidents, exposure to weather extremes, wildlife encounters, trips and falls on uneven terrain, adverse health effects from dust generation and emissions and contact hazardous materials	All employees working on exploration should be inducted on human health and safety and should be provided with PPE	Technical information on health and safety to be provided by the health and safety team	As soon as possible where possible.	No additional mitigation cost predicted.	Skorpion Zinc Mine / Exploration team
Impacts on Physical Environment						
5.	Acoustics or noise associated with exploration from earth-moving equipment, vehicle traffic, geophysical surveys and drill rig operations	Noise pollution during exploration would be minimal. However, if deemed necessary, employees working on the exploration should exercise maximum care to avoid disruption	N/A	As soon as possible where possible.	No additional mitigation cost predicted	Skorpion Zinc Mine / Exploration team

No.	Impact	Recommended mitigation	Technical Information	Implementation Schedule	Costing in N$	Responsible Agent
6.	Geophysical and exploratory drill crews may generate waste i.e. drilling fluid and muds, used oil and filters, spilled fuel, drill cuttings, spent and unused solvents, scrap metal, solid waste and garbage	Ensure that waste generated during the exploration on site is disposed of at an appropriate site	There should be appropriate waste bins on site	As soon as possible where possible.	No additional mitigation cost predicted	Skorpion Zinc Mine / Exploration team
7.	Temporary and localized impact to land use would result from exploration activities such as disturbance to wildlife	Exploration activity needs to be conducted in such way that disturbance to wildlife is minimized	Survey should be done regularly to determine the extent of the impact.	Ongoing	No additional mitigation cost predicted	Skorpion Zinc Mine / Exploration team
8.	Paleontological resources could be disturbed by vehicular traffic, ground clearing and pedestrian vehicle activities	Exploration activity needs to be conducted in such way that disturbance to paleontology is minimized	Surveys should be conducted 6 monthly to determine the levels of underground water.	Ongoing	No additional mitigation cost predicted	Skorpion Zinc Mine / Exploration team
9.	Loss of biological crusts can substantially increase water and wind erosion. However, the amount of surface disturbance and use of geologic materials during exploration would be minimal	Exploration activity needs to be conducted in such way that disturbance to surface materials is minimized	Ensure that surface materials are protected where possible.	Ongoing	No additional mitigation cost predicted	Skorpion Zinc Mine / Exploration team
10.	Visual impacts could be adverse if the landscape were substantially degraded or modified. However, exploration activities would have only temporary and minor visual effects, resulting from the presence of drills rigs, workers, vehicles and other equipment	N/A	No technical information required	Ongoing monitoring	No additional mitigation cost predicted	Skorpion Zinc Mine / Exploration team

No.	Impact	Recommended mitigation	Technical Information	Implementation Schedule	Costing in N$	Responsible Agent
11.	Minimal impact to water resources (water quality, water flows and surface/groundwater interactions) would be anticipated from the exploration activities.	N/A	Groundwater monitoring reports	Ongoing monitoring	No additional mitigation cost predicted	Skorpion Zinc Mine / Exploration team

Table 3: Management and Mitigation Actions

9.5. Monitoring and Evaluation

9.5.1. Monitoring

This section of the EMP is aimed at providing the monitoring and reporting procedures to ensure early detection of issues and provide information on progress and results of mitigation.

The main objective of this EMP's monitoring program is to ensure that the mitigation measures that have been put in place are working as intended to ensure that unanticipated environmental impacts do not occur. The effectiveness of the mitigation measures should also be evaluated to and adjusted accordingly.

The person to be appointed by Skorpion Zinc Mine to take the overall responsibly of ensuring that the EMP is fully implemented must also monitor the implementation of the EMP and keep records on an throughout the duration of the activity.

Reporting procedures for conveying information from the monitoring activities must be developed by the Skorpion Zinc Management in order to ensure that management is able to take rapid corrective action should certain thresholds be exceeded, this could be included as part of compliance management.

9.5.2. Performance Assessment of the EMP during Operational Phase

Performance Assessment (P.A) is a process to evaluate compliance with stipulated EMP requirements and to assess the achievement of defined objectives and targets. The timing of the P.A. should be conducted once every year by an independent environmental professional or can be done in-house by the environmental division.

A P.A. analyse the results obtained from monitoring, assesses whether objectives and targets have been met and whether there are variances from the stipulated EMP and legal requirements. In addition, the P.A. also

assesses whether EMP implementation has been undertaken according to Programmed arrangements and that the EMP itself is being appropriately updated. The P.A. should confirm that the identified corrective action has been undertaken and then assess the effectiveness of that action.

10. References

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11. Appendices

11.1 Appendix 1: Scope of Work

11.2 Appendix 2: Background Information Document

11.3 Appendix 3: Minutes of the Public Consultation Meeting and Site visits

11.4 Appendix 4: Registration of Stakeholders (IAPs)

11.5 Appendix 5: Attendance Register

11.6 Appendix 6: Company Profile (EIA Consultant)

11.7 Appendix 7: CVs of EIA Consultants

11.8 Appendix 8: Newspaper Advertisements

11.9 Appendix 9: Site Map (EPL 5283)

11.10 Appendix 11: Issues raised by I&Ps and Responses

11.11 Appendix 12: Copy of the Exploring Prospecting License from the Ministry of Mines and Energy

11.12 Appendix 11: Skorpion Zinc Mine Biodiversity Plan