Fairview Minerals Exploration (Pty) Ltd

Final Updated Environmental Scoping and Environmental Management Plan (EMP) Report to Support the Application for Environmental Clearance Certificate (ECC) for the Proposed Exploration / Prospecting in the Exclusive Prospecting License (EPL) No. 5897, Grootfontein District, **OTJOZONDJUPA REGION CENTRAL NAMIBIA**

May 2020

13 Feld Street, P. O. Box 3489
Windhoek, Namibia

PROPONENT, LISTED ACTIVITIES AND RELATED INFORMATION SUMMARY

TYPE OF AUTHORISATIONS REQUIRING ECC

Exclusive Prospecting License (EPL) No. 5897

NAME OF THE PROPONENT

Fairview Minerals Exploration (Pty) Ltd

COMPETENT AUTHORITY

Ministry of Mines and Energy (MME)

ADDRESS OF THE PROPONENT AND CONTACT PERSON

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

CONTACT PERSON: Mr. Jon Andrew
Exploration Manager
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Mobile: + 264 81 770 9074
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PROPOSED PROJECT

Proposed Minerals Exploration / Prospecting in the Exclusive Prospecting License (EPL) No. 5897, Grootfontein District, **Otjozondjupa Region Central Namibia**

PROJECT LOCATION

Karibib District, Erongo Region, West-Central Namibia
(Latitude: -19.957222, Longitude: 17.325833)

ENVIRONMENTAL CONSULTANTS

Risk-Based Solutions (RBS) CC
(Consulting Arm of Foresight Group Namibia (FGN) (Pty) Ltd
41 Feld Street Ausspannplatz
Cnr of Lazarett and Feld Street
P. O. Box 1839, **WINDHOEK, NAMIBIA**
Tel: +264 - 61- 306058; Fax: +264 - 61- 306059
Cell: + 264-811413229; Email: smwiya@rbs.com.na
Global Office / URL: www.rbs.com.na

ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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

Summary Profile and Qualification of the Environmental Assessment Practitioner (EAP) / International Consultant Projects Director – Dr Sindila Mwiya

Dr Sindila Mwiya has more than eighteen (18) years of practical field-based technical industry experience in Environmental Assessment (SEA, EIA, EMP, EMS), Energy (Renewable and Non-renewable energy sources), onshore and offshore resources (minerals, oil, gas and water) exploration / prospecting, operation and utilisation, covering general and specialist technical exploration and recovery support, Health, Safety and Environment (HSE) permitting for Geophysical Surveys such as 2D, 3D and 4D Seismic, Gravity and Electromagnetic Surveys for mining and petroleum (oil and gas) operations support, through to engineering planning, layout, designing, logistical support, recovery, production / operations, compliance monitoring, rehabilitation, closure and aftercare projects lifecycles. The great array of highly technical specialist knowledge and field-based practical experiences of Dr Sindila Mwiya has now been extended to supporting the development of Environmentally Sustainable, automated / smart and Climate Change resilient homes, towns and cities.

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

Dr Sindila Mwiya has undertaken and continue to undertake and manage high value projects on behalf of global and local resources and energy companies. Currently, (2020-2023) Dr Sindila Mwiya is responsible for permitting planning through to operational and completion compliance monitoring, HSE and engineering technical support for multiple major upstream onshore and offshore petroleum, minerals and mining projects, Solar and Wind Energy Projects, manufacturing and environmentally sustainable, automated / smart and Climate Change resilient homes developments in different parts of the World including Namibia. Currently, Dr Sindila Mwiya is developing a 16 Ha commercial and residential Mwale Mwiya Park in the Town of Katima Mulilo, Zambezi Region, Namibia as one of first advanced Environmentally Sustainable, automated / smart and Climate Change resilient development in Namibia. He continue to worked as an International Resources Consultant, national Environmental Assessment Practitioner (EAP) / Environmentally Sustainable, automated / smart and Climate Change resilient homes developer, Engineering / Technical Consultant (RBS / FGN), Project Manager, Programme Advisor for the Department of Natural and Applied Sciences, Namibia University of Science and Technology (NUST) and has worked as a Lecturer, University of Namibia (UNAM), External Examiner/ Moderator, NUST, National (Namibia) Technical Advisor (Directorate of Environmental Affairs, Ministry of Environment and Tourism / DANIDA – Cleaner Production Component) and Chief Geologist for Engineering and Environment Division, Geological Survey of Namibia, Ministry of Mines and Energy and a Field-Based Geotechnician (Specialised in Magnetics, Seismic, Gravity and Electromagnetics Exploration and Survey Methods) under the Federal Institute for Geoscience and Natural Resources (BGR) German Mineral Exploration Promotion Project to Namibia, Geophysics Division, Geological Survey of Namibia, Ministry of Mines and Energy.

He has supervised and continue to support a number of MScs and PhDs research programmes and has been a reviewer on international, national and regional researches, plans, programmes and projects with the objective to ensure substantial local skills development, pivotal to the national socioeconomic development through the promotion of sustainable natural resources coexistence, management, development, recovery, utilisation and for development policies, plans, programmes and projects financed by governments, private investors and donor organisations. Since 2006 until 2017, he has provided extensive technical support to the Department of Environmental Affairs (DEA), Ministry of Environment, Forestry and Tourism (MEFT) through GIZ in the preparation and amendments of the Namibian Environmental Management Act, 2007, (Act No. 7 of 2007), new Strategic Environmental Assessment (SEA) Regulations, preparation of the updated Environmental Impact Assessment (EIA) Regulations as well as the preparation of the new SEA and EIA Guidelines and Procedures all aimed at promoting effective environmental assessment and management practices in Namibia.

Among his academic achievements, Dr Sindila Mwiya is a holder of a PhD (Engineering Geology/Geotechnical / Geoenvironmental / Environmental Engineering and Artificial Intelligence) – Research Thesis: Development of a Knowledge-Based System Methodology (KBSM) for the Design of Solid Waste Disposal Sites in Arid and Semiarid Environments, MPhil/PG Cert and BEng (Hons) (Engineering Geology and Geotechnics) qualifications from the University of Portsmouth, School of Earth and Environmental Sciences, United Kingdom. During the 2004 Namibia National Science Awards, organised by the Namibian Ministry of Education, and held in Windhoek, Dr Sindila Mwiya was awarded the Geologist of the Year for 2004, in the professional category. Furthermore, as part of his professional career recognition, Dr Sindila Mwiya is a life member of the Geological Society of Namibia, Consulting member of the Hydrogeological Society of Namibia and a Professional Engineer registered with the Engineering Council of Namibia.

WINDHOEK MAY 2020

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NON-TECHNICAL SUMMARY

Fairview Minerals Exploration (Pty) Ltd (the **Proponent**) holds mineral rights under the Exclusive Prospecting Licence (EPL) No. 5897 covering a total area of 49741.2448 Ha situated in the Grootfontein District of the Otjozondjupa Region. The EPL No. 5897 was granted on the 03/02/2016 and will expire on the 14/08/2021. The proponent intends to continue with prospecting for base and rare metals, dimension stones, industrial minerals, precious metals, precious stones and semi-precious stones using techniques such as geological mapping, geophysical surveys, trenching, sampling and drilling, starting with the desktop studies, followed by regional and local field-based activities that are subject to successful discovery of any potential economic minerals resources.

The proposed exploration activities are listed activities under the Environmental Management Act, 2007, (Act No. 7 of 2007) and cannot be undertaken without an Environmental Clearance Certificate (ECC). The Scoping and Environmental Management Plan (EMP) Report was prepared by the Risk-Based Solutions (RBS) CC on behalf of the Proponent and submitted to the Environmental Commissioner in the Ministry of Environment, Forestry and Tourism (MEFT) now the Ministry of Environment, Forestry and Tourism (MEFT), together with the application for an ECC in March 2017. An ECC was granted by the Environmental Commissioner on the 27th June 2017 and will expire in June 2020. This updated Environmental Scoping and EMP report has been prepared by Risk-Based Solutions on behalf of the Proponent in order to support the application for the renewal of the ECC granted on the 30th June 2017.

The EPL area cover Mundulea Nature Reserve which is a 120 km^2 of natural habitat of indigenous game species, bush camp and offers specialist walking and hiking tours to local, regional and international tourists. The coexistence of the proposed mineral exploration in the EPL 5897 is likely to be very challenging. The Proponent shall engage the nature reserve owners and operator in order to see if there are opportunity to undertake exploration in certain areas of the reserve while being supported by the local guides. Outside the nature reserve, it is estimated that at least 67 species of reptile, 15 amphibian, 86 mammal, 213 bird species (breeding residents), 131 larger trees and shrubs (>1m in height) and 111 grasses are known to or expected to occur in the general area of which a low proportion are endemics species (e.g. 14.9% for reptiles being the highest).

The EPL area falls within the Otavi Constituency and according to the national census of 2011, has a total population of 12488, which comprises of 46.1% females and 53.9% males. The nearest town to the EPL area is the small town of Otavi. The socioeconomic activities in the surrounding areas are depend on commercial agriculture, tourism, mining (B2 Gold Project) and cement manufacturing by Ohorongo Cement.

Following the public consultation period that was conducted during the months of February and March 2017 as part of the environmental assessment process, the Draft Scoping Report as a source of background information and Terms of Reference (ToR) was prepared and a stakeholder register was opened. Despite the public notices published in the local newspapers, no written comments / objections / inputs with respect to the proposed minerals prospecting in the EPL No. 5897 were received by the Environmental Assessment Practitioner (EAP).

The effect that the proposed / ongoing exploration and associated infrastructure such as access and campsite would have on the receiving environment would depend on the extent of the proposed / ongoing activities over the development area, management of the area and how the proposed mitigations are eventually implemented by the proponent.

Cooperating with the management of Mundulea Nature Reserve and avoiding sensitive habitats such as Ephemeral River channels, rock heads and mountainous terrains as well as track discipline (including no killing/poaching of fauna and unnecessarily cutting down of trees) must be adhered to and/or enforced at all times.

The following is the assessment summary of the likely environmental impacts that the proposed / ongoing exploration / prospecting activities will have on the receiving environment (physical, biological,

socioeconomic environments and ecosystem functions, services, use and non-use values or passive uses) without mitigations:

(i) Initial desktop exploration activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible;

(ii) Regional reconnaissance field-based activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible. Some field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations. Overall significant impacts will be negligible;

(iii) Initial local field-based activities: Initial field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations**.** Overall significant impacts will be negligible**.** All desktop related activities and laboratory assessments will have negligible impacts with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible;

(iv) Detailed local field-based activities: Overall likely negative impact on the receiving environment will be high and localised impacts without mitigations and localised low impacts with mitigations. Overall significant impacts will be medium without mitigations and low with mitigations, and;

(v) Prefeasibility and feasibility studies to be implemented on a site-specific area if the local field-based studies prove positive: Overall likely negative impact on the receiving environment will be high and localised impacts without mitigations and localised medium impacts with mitigations. Overall significant impacts will be high without mitigations and low with mitigations for bulk sampling, test mining and field logistics including exploration camp.

Based on the findings of this Environmental Assessment covering this Environmental Scoping and Environmental Management Assessment (EMP), it's hereby recommended that the proposed / ongoing exploration activities be issued with an Environmental Clearance Certificate (ECC) with the following key conditions:

(i) The proponent shall negotiate an Access Agreements with the land owner/s especially the management of Mundulea Nature Reserve;

(ii) The Proponent shall adhere to all the provisions of the EMP and conditions of the Access Agreement to be entered between the proponent and the land owner/s in line with all applicable national regulations;

(iii) Before entering any private property such as a private farm or Mundulea Nature Reserve, the proponent shall give advance notices and obtain access permission from the land owners at all times;

(iv) Mitigation measures must be implemented as detailed in Section 6 (EMP) of this Scoping and EMP report;

(v) Where possible, and if water is found during the detailed exploration boreholes drilling operations, the proponent shall support other land uses in the area in terms of access to freshwater supply for both human consumption, wildlife and agricultural support as may be requested by the local community / land owners/s. The abstraction of the groundwater resources shall include water levels monitoring, sampling and quality testing on a bi-annual basis, and that the affected landowners must have access to the results of the water monitoring analyses as part of the ongoing stakeholder disclosure requirements on shared water resources as maybe applicable.

Once a viable project has been defined for mining operations (economic resources are discovered), a separate field-based and site-specific Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) shall be undertaken as part of the feasibility study with respect to the test mining or possible mining operations. The site-specific EIA and EMP shall cover the area identified to have potential economic minerals resources including the pit / shaft area/s, waste rock, tailings dump, access, office blocks, mechanical workshop, water and energy infrastructure support areas (water, energy and road / access).

In addition to the Terms of Reference (ToR) to be developed during the prefeasibility study phase for possible test mining / mining stages, the following field-based and site-specific specialist studies shall be undertaken as prat of the site-specific EIA and EMP for possible test mining or mining operations in an event of a discovery of economic minerals resources and possible development of a mining project within the EPL 5880 area:

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

1. BACKGROUND

1.1 Introduction

Fairview Minerals Exploration (Pty) Ltd (the **Proponent**) holds mineral rights under the Exclusive Prospecting Licence (EPL) No. 5897. The license was granted on the 03/02/2016 and will expire on the 14/08/2021. The proponent intends to continue with prospecting for base and rare metals, dimension stones, industrial minerals, precious metals, precious stones and semi-precious stones using techniques such as geological mapping, geophysical surveys, trenching, sampling and drilling, starting with the desktop studies, followed by regional and local field-based activities that are subject to successful discovery of any potential economic minerals resources.

1.2 Regulatory Requirements

The proposed minerals exploration / prospecting activities in the EPL 5897 falls under the activities that are listed in the Environmental Management Act, 2007, (Act No. 7 of 2007) and cannot be undertaken without an Environmental Clearance Certificate (ECC). In order to obtain the ECC for the listed activities, the Proponent was required to have undertaken Environmental Assessment comprising Environmental Scoping and Environmental Management Plan (EMP) for the proposed minerals prospecting programme.

The Environmental Assessment process was undertaken in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). In fulfilment of the environmental requirements, the Proponent appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant, led by Dr Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to undertake the Scoping and EMP in order to support the application for Environmental Clearance Certificate (ECC).

The ECC application together with the supporting Scoping and EMP Report were submitted to the Environmental Commissioner in Ministry of Environment and Tourism (MET) now the Ministry of Environment, Forestry and Tourism (MEFT) in March 2017.

The ECC was granted on the 30th June 2017 to Fairview Minerals Exploration (Pty) Ltd and will be expiring on the 30th June 2020 and need to be renewed (Fig. 1.1). This updated Scoping and EMP Report has been prepared by Risk-Based Solutions (RBS) CC on behalf of the Proponent in order to support the application for the renewal of the ECC as shown in Fig. 1.1.

1.3 Location, Site Description, Land Use and Infrastructure

1.3.1 Location and Site Description

The 49741.2448 Ha EPL area falls within the Otavi / Grootfontein Districts of the Otjozondjupa Region (Fig. 1.2). The EPL 5897 area falls within commercial farmland and Mundulea Nature Reserve which is a 120 km^2 of natural habitat of indigenous game species, bush camp and offers specialist walking and hiking tours to local, regional and international tourists (Figs. 1.2 and 1.3). The EPL area partly borders B2 Gold Namibia EPL No. 2410 to the west, Symbiosis Investments EPL No. 6163 and Welwitchia Resources EPL No. 5903 to the south, Vavali Investments EPL No. 5465 to the northeast and Festus Kondjeni Shilongo EPL No. 5322 to the north (Fig. 1.4). The EPL 5897 area is not pristine and is dominated by land scars associated with the current and previous land uses. Bush thickening is a major challenge to land use productivity in the general area.

1.3.3 Current Land Uses

The EPL area falls within commercial private farmland. The land use in the general area EPL area is dominated commercial agriculture (cattle, game and small stock farming), tourism and conservation. A number of top end game farm and lodges are found in surrounding area with the Mundulea Bush Camp falling within the EPL area. Minerals exploration and mining operations are well known activities in the local area exemplified by the B2 Gold mine and Ohorongo Cement. Bush thickening or encroachment

is viewed as an economic problem in the general area but does not seem to be an issue within the EPL area. The area is not part of the communal conservancy system in Namibia with no protected area nearby the EPL area.

1.3.4 Supporting Infrastructure and Services

The EPL is accessible via the D2809 and the D2808 roads which both comes off the B1. The Town of Otavi is about 30 km from the northwest boundary of the EPL area along the D2809 road and 50 km along the D2808 road passing the B2 Gold Mine area (Figs. 1.2 -1.4). Otjiwarongo, the regional centre of the Otjozondjupa Region and Walvis Bay the main Port are situated about 100 km and 514 km away respectively from the EPL area. Namibia's capital City, Windhoek, is located approximately 350 km south of EPL 5897 Area (Fig. 1.2).

The proposed / ongoing exploration programme will not require major water and energy resources. Water requirements for exploration will be provided from the available local resources supplied by NamWater as well as local water boreholes. Electricity needs will be supplied by generators and solar installations while diesel and petrol will be the main sources of fuels and all readily available in the Towns Otjiwarongo and Otavi.

In an event of a discovery of economic minerals resources, and the subsequent development of a mining project within the EPL Area, there will be a need to have reliable energy and water supply sources. Sources of water supply will be provided by NamWater from possible local and regional groundwater resources still to be determined.

Electricity supply will be provided by NamPower from already existing infrastructure in the region. The assessment of the energy and water resources requirements for mining operations will be evaluated in detail in the environmental assessment that will be undertaken as part of the feasibility study if economic resources are discovered within the EPL 5897 Area.

ECC – ECC0550

Serial: Rgxbh6550

REPUBLIC OF NAMIBIA

MINISTRY OF ENVIRONMENT AND TOURISM

OFFICE OF THE ENVIRONMENTAL COMMISSIONER

ENVIRONMENTAL CLEARANCE CERTIFICATE

ISSUED

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

TO

Fairview Minerals Exploration (Pty) Ltd
P.O. Box 3489, Windhoek, Namibia

TO UNDERTAKE THE FOLLOWING LISTED ACTIVITY

Mineral Exploration Activities Within Exclusive Prospecting License (EPL) No. 5897 In Grootfontein District, Otjozondjupa Region.

MINISTRY OF ENVIRONMENT AND TOURISM
P/Bag 13306
Windhoek, Namibia
Environmental Commissioner

DEPUTY ENVIRONMENTAL COMMISSIONER

Issued on the date: 2017-06-30

Expires on this date: 2020-06-30

(See conditions printed over leaf)

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Figure 1.1: Copy of the ECC granted on the 30th June 2017 to Fairview Minerals Exploration (Pty) Ltd expiring on the 30th June 2020 and need to be renewed.

Figure 1.2: Regional location of the EPL (Source: Updated from Risk-Based Solutions, 2015).

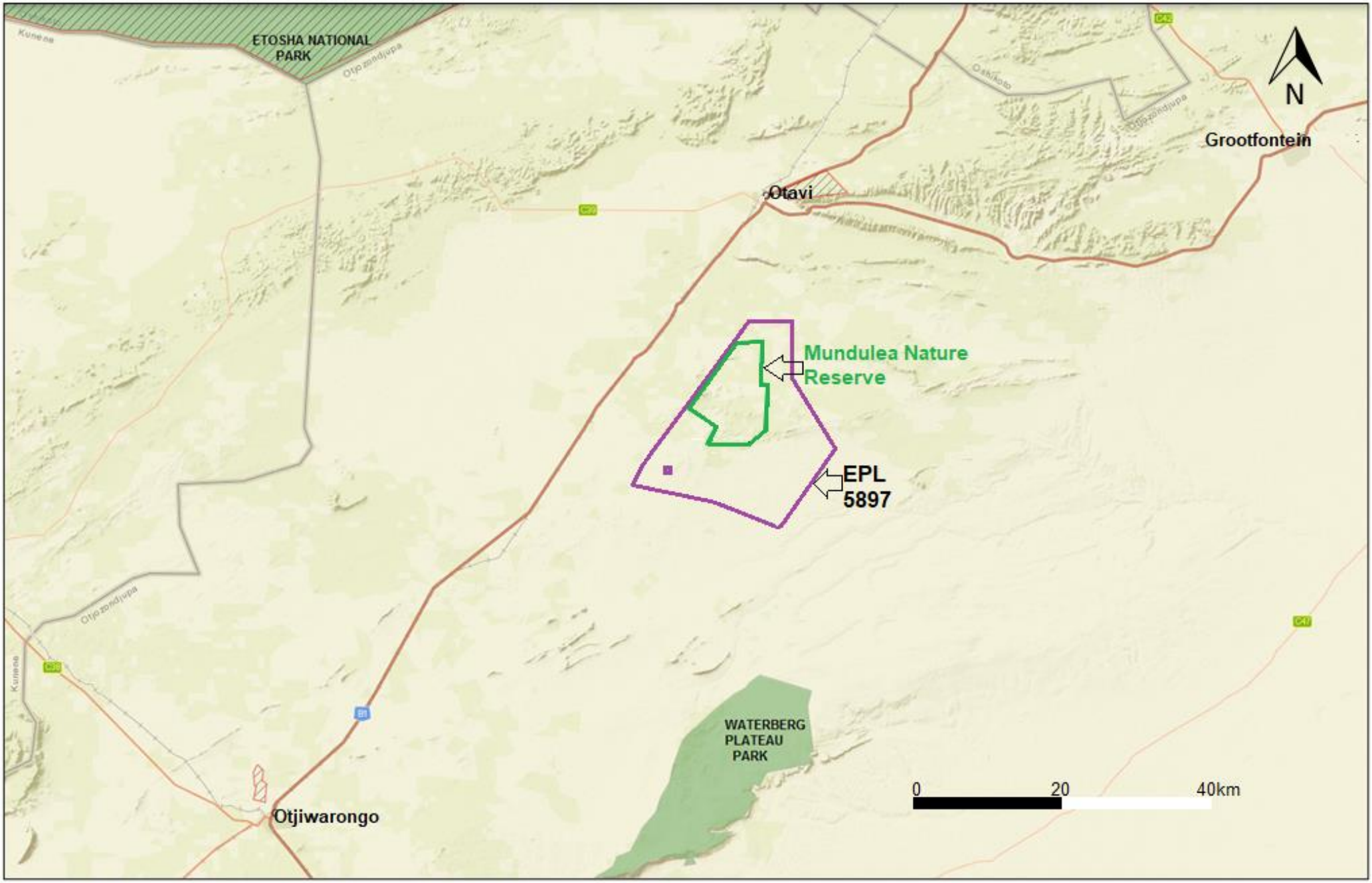


Figure 1.3: Detailed regional location of the EPL 5897 (Data Source: http://portals.flexicadastre.com/Namibia).

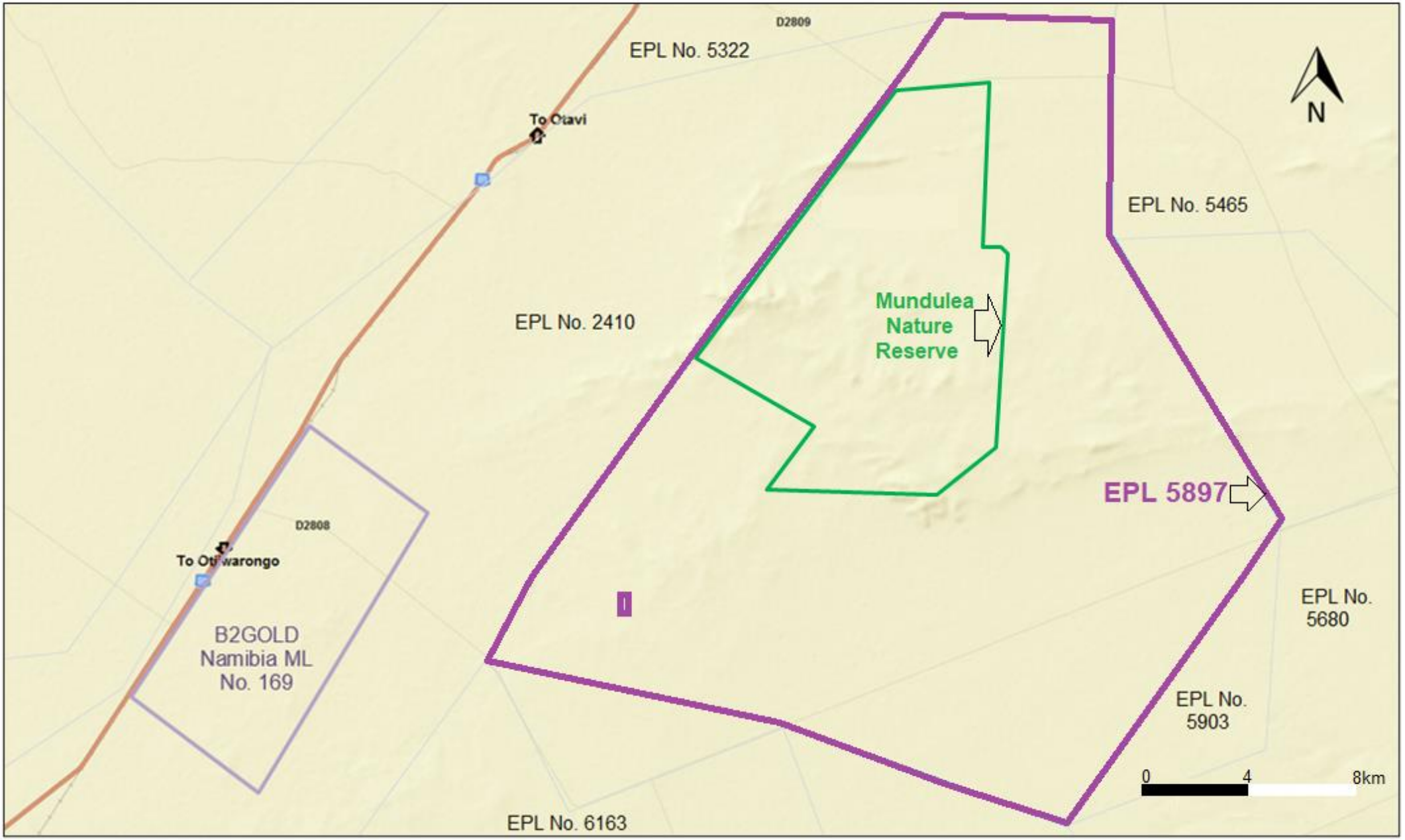


Figure 1.4: Detailed location of the EPL 5897 with respect to supporting road infrastructure and surrounding minerals licenses (Data Source:http://portals.flexicadastre. com /Namibia).

1.4 Project Motivation

The EPL 5897 is situated in a highly prospective area for Base and Rare Metals, Dimension Stones, Industrial Minerals, Precious Metals, Precious Stones and Semi-Precious Stones associated with local Damara Rocks. Gold and associated minerals are known to occur in the general area and mined by B2 Gold Namibia (Fig. 1.4). The proposed / ongoing exploration activities has some limited socioeconomic benefits which are mainly centred around the payment of the annual license rental fees to the Central Government through the Ministry of Mines and Energy (MME) and value addition to the potential underground minerals resources in the area which otherwise would not have been known if the exploration in the EPL 5897 did not take place. The potential discovery of additional economic minerals resources and the development of new mining project in the area will have much greater and positive socioeconomic benefits to the local community Otavi, Otjozondjupa Region and Namibia as a whole. Additional socioeconomic benefits will also be realised at regional and national levels in terms of capital investments, value addition opportunities, license rental fees, royalty taxes payable to Government, direct and indirect contracts and employment opportunities, export earnings, foreign direct investments and various taxes payable to the Government.

1.5 Terms of Reference, Approach and Methodology

Risk-Based Solutions (RBS) was appointed by the proponent to prepare the Environmental Scoping and Environmental Management Plan (EMP) report in order to support the Application for Environmental Clearance Certificate (ECC) for the EPL No. 5897 with respect to the proposed exploration activities. The following is summary of the key guiding principles and objectives of this Environmental Scoping and Environmental Management Plan (EMP)

- Inform the public about the proposed / ongoing exploration / prospecting programme;
- Identify the main stakeholders and their concerns and values;
- Define the reasonable and practical alternatives to the proposed / ongoing project activities;
- Identify the important issues and significant impacts to be addressed in the Scoping and EMP Sections of the Report, and;
- Define the boundaries for Scoping and EMP in time, space and subject matter.

The Scoping desktop study reviewed the receiving environmental settings (physical, biological, socioeconomic and ecosystem services, function, use values and non-use) and proposed / ongoing exploration activities and then assessed the likely impacts (positive and negative) on the receiving environment (Table 1.1). The key deliverable comprised this Environmental Scoping and Environmental Management Plan (EMP) detailing appropriate mitigation measures that will enhance the positive impacts and reduce the likely negative impacts identified.

The Final Environmental Scoping and Environmental Management Plan (EMP) report and the completed Application for Environmental Clearance Certificate (ECC) shall be submitted to the client (Proponent) and the Office of the Environmental Commissioner, Department of Environmental Affairs (DEA), Ministry of Environment, Forestry and Tourism (MEFT) through the Ministry of Mines and Energy (the Competent Authority) for review and final decision.

The Environmental Scoping and EMP has been performed with reasonable skill, care and diligence in accordance with professional standards and practices existing at the date of performance of the assessment and that the guidelines, methods and techniques that have been applied are all in conformity to the national regulatory requirements, process and specifications in Namibia as required by Ministry of Mines and Energy (MME), Ministry of Environment, Forestry and Tourism (MEFT) and the client (Proponent). The Scoping and EMP has been prepared in line with the January 2015 MET Environmental Assessment Reporting Guideline.

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

<table>
<tr><th>PROPOSED / ONGOING PROJECT ACTIVITIES</th><th>ALTERNATIVES TO BE CONSIDERED</th><th colspan="2">KEY ISSUES TO BE EVALUATED AND ASSESSED WITH ENVIRONMENTAL MANAGEMENT PLAN (EMP) / MITIGATION MEASURES DEVELOPED</th></tr>
<tr><td rowspan="8">(i) Initial desktop exploration activities (review of existing information and all previous activities in order identify any potential target/s)

(ii) Regional reconnaissance field-based activities such mapping and sampling to identify areas with potential targets based on the recommendations of the desktop work

(iii) Initial local field-based activities such as widely spaced mapping, sampling, surveying and possible drilling in order to determine the viability of any delineated local target

(iv) Detailed local field-based activities such very detailed mapping, sampling, surveying and possible drilling in order to determine the feasibility of any delineated local target

(v) Prefeasibility and feasibility studies to be implemented on a site-specific area if the local field-based studies prove positive</td><td rowspan="8">(i) Location for Minerals Occurrence: A number of economic deposits are known to exist in different parts of Namibia and some have been explored by different companies over the years. The proponent intends to explore / prospect for possible economic minerals occurrence in the EPL area;

(ii) Other Alternative Land Uses: Game Farming, Tourism and Agriculture

(iii) Ecosystem Function (What the Ecosystem Does;

(iv) Ecosystem Services;

(v) Use Values;

(vi) Non-Use, or Passive Use;

(vii) The No-Action Alternative</td><td colspan="2">Potential land use conflicts / opportunities for coexistence between proposed / ongoing exploration and other existing land uses such as conservation, tourism and agriculture</td></tr>
<tr><td rowspan="3">Impacts on the Physical Environment</td><td>Natural Environment such as air, noise, water, dust etc.</td></tr>
<tr><td>Built Environment such as existing houses, roads, transport systems, Buildings, energy and water and other supporting infrastructure</td></tr>
<tr><td>Socioeconomic, Archaeological and Cultural impacts on the local societies and communities</td></tr>
<tr><td rowspan="4">Impacts on the Biological Environment</td><td>Flora</td></tr>
<tr><td>Fauna</td></tr>
<tr><td>Habitat</td></tr>
<tr><td>Ecosystem functions, services, use values and non-Use or passive use</td></tr>
<tr><td colspan="2">Others to be identified during the public consultation process and preparation of the Scoping and EMP Report</td></tr>
</table>

1.6 Assumptions and Limitations

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

- The proposed exploration activities as well as all the plans, maps, EPL Boundary / coordinates and appropriate data sets received from the proponent, project partners, regulators, Competent Authorities and specialist assessments are assumed to be current and valid at the time of conducting the studies and compilation of this environmental report;

- The impact assessment outcomes, mitigation measures and recommendations provided in this report are valid for the entire duration of the proposed exploration / prospecting activities;

- A precautionary approach has been adopted in instances where baseline information was insufficient or unavailable or site-specific locations of the proposed project activities is not yet available, and;

- Mandatory timeframes as provided for in the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 and the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007) have been observed and will apply to the review and decision of this report by the Competent Authority and the Environmental Commissioner.

1.7 Structure of the Report

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

1. **Section 1: Background** covering the proposed / ongoing project location with available infrastructure and services;

2. **Section 2: Project Description** covering the summary of the proposed / ongoing project exploration activities;

3. **Section 3: Regulatory Framework** covering the proposed / ongoing exploration with respect to relevant legislation, regulations and permitting requirements;

4. **Section 4: Receiving Environment** covering physical, biological and socioeconomic environments of the proposed / ongoing project area;

5. **Section 5: Impact Assessment** covering the likely positive and negative impacts the proposed / ongoing project activities are likely to have on the receiving environment;

6. **Section 6: Environmental Management Plan (EMP)** describing the detailed mitigation measures with respect to the identified likely impacts;

7. **Section 7: Conclusions and Recommendations**- Summary of the findings and way forward, and;

8. **SECTION 8: Annexes.**

2. DESCRIPTION OF THE EXPLORATION

2.1 General Overview

The overall aim of the proposed / ongoing project activities (exploration / prospecting programme) is to search for potential economic minerals resources within the EPL area and in particular base and rare metals, dimension stones, industrial minerals, precious metals, precious stones and semi-precious stones.

The exploration activities to be undertaken as assessed in this environmental assessment are as follows:

(i) Initial desktop exploration activities (no field-work undertaken);

(ii) Regional reconnaissance field-based mapping and sampling activities (Subject to the positive results of (i);

(iii) Initial local field-based mapping and sampling activities (Subject to the positive results of (i) and (ii) above),

(iv) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling (Subject to the positive results of (i) - (iii) above), and;

(v) Prefeasibility and feasibility studies (Subject to the positive results of (i) - (iv) above).

The field-based support and logistical activities will depend on the scale of proposed exploration activities to be undertaken. The proposed exploration activities will be supported by existing tracks and campsites / farmstead as well as existing accommodation in in the area.

In the absences of existing tracks, the field team will create such new tracks with the permission of the land owner/s and depending on the scale of exploration. In the absences of existing suitable campsite / farmstead, temporary camp will be setup at suitable locations in line with the EMP provisions within the EPL area.

The size of the exploration camp will be of very limited footprints during the exploration phase but may be expanded for the test mining and mine development phases in an event of a discovery of economic minerals resources.

2.2 Proposed Detailed Local Field-Based Activities

A number of regional reconnaissance field-based mapping and sampling activities as well as initial local field-based mapping and sampling activities have already been undertaken within the EPL area but will still be extended to other parts of the EPL Area where potential base and rare metals, dimension stones, industrial minerals and precious stones minerals are expected.

Other activities to be undertaken as part of the detailed local field-based activities include the following:

(i) Surface and subsurface geological mapping including boreholes drilling and logging, sampling and laboratory analyses / assessments;

(ii) Trenching, logging, sampling and laboratory analyses of shallow targets;

(iii) Baseline studies such as fauna and flora diversity spanning across the seasons in twelve (12) months and hydrogeological assessments including boreholes drilling and possible groundwater modelling, and;

(iv) Logistical support such as access preparation, exploration and camp sites management.

2.3 Prefeasibility and Feasibility Study

Prefeasibility and feasibility studies will be implemented on site-specific area and is subject to the positive outcomes of the detailed local field-based exploration activities.

The activities to be undertaken as part of the prefeasibility and feasibility will include the following:

(i) Detailed site-specific surveys;

(ii) Detailed geological mapping;

(iii) Bulk sampling and testing;

(iv) Ore reserve calculations;

(v) Geotechnical studies for mine design;

(vi) Detailing technical viability studies including forecasts of estimated expenditure and financial;

(vii) Mine planning and designs including all supporting infrastructures (water, energy and access);

(viii) Environmental Impact Assessment for mining;

(ix) Environmental Management Plan for mining;

(x) Test mining activities, and;

(xi) Preparation of feasibility report and application for Mining License.

Field-based support and logistical activities will be very extensive because the local field-based activities will be undertaken on a specific area for a very long time (up to one year or more in some instances).

The activities will be supported by existing tracks and campsites / lodging facilities available in the area.

3. REGULATORY FRAMEWORK

3.1 Minerals Exploration Legislation and Regulations

The Ministry of Mines and Energy (MME) is the competent authority with respect to minerals prospecting and mining activities in Namibia. The Minerals (Prospecting and Mining) Act (No 33 of 1992) is the most important legal instrument governing minerals prospecting / exploration and mining activities.

Several explicit references to the environment and its protection are contained in the Minerals Act, which provides for environmental impact assessments, rehabilitation of prospecting and mining areas and minimising or preventing pollution.

3.2 Environmental Regulations

3.2.1 Environmental Assessment Requirements and Procedures

Environmental Assessment (EA) process in Namibia is governed by the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007).

The proposed / ongoing field–based exploration activities falls within the categories of listed activities that cannot be undertaken without an Environmental Clearance.

3.2.2 Regulatory Authorities

The environmental regulatory authorities responsible for environmental protection and management in relation to the proposed / ongoing project including their role in regulating environmental protection are listed in Table 3.1.

Table 3.1: Government agencies regulating environmental protection in Namibia.

AGENCY	RESPONSIBILITY
Ministry of Environment, Forestry and Tourism (MEFT)	Issue of Environmental Clearance Certificate (ECC) based on the review and approval of the Environmental Assessments (EA) reports comprising Environmental Scoping, Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) prepared in accordance with the Environmental Management Act (2007) and the Environmental Impact Assessment Regulations, 2012. The National Botanical Research Institute's (NBRI) mandate is to study the flora and vegetation of Namibia, in order to promote the understanding, conservation and sustainable use of Namibia's plants for the benefit of all. The Directorate of Forestry (DOF) is responsible for issuing of forestry permits with respect to harvest, transport, and export or market forest resources.
Ministry of Mines and Energy (MME)	The competent authority for minerals prospecting and mining activities in Namibia. Issues Exclusive prospecting License (EPL), Mining Licenses (ML) and Mining Claims (license) as well as all other minerals related permits for processing, trading and export of minerals resources.
Ministry of Agriculture, Water and Forestry (MAWF)	The Directorate of Resource Management within the Department of Water Affairs (DWA) at the MAWF is currently the lead agency responsible for management of surface and groundwater utilisation through the issuing of abstraction permits and waste water disposal permits. DWA is also the Government agency responsible for water quality monitoring and reporting.

3.3 Recommendations on Permitting Requirements

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

(i) Valid Exclusive Prospecting License (EPL) as maybe applicable from Department of Mines in the Ministry of Mines and Energy (MME);

(ii) Valid Environmental Clearance Certificate (ECC) from the Department of Environmental Affairs in the Ministry of Environment, Forestry and Tourism (MEFT);

(iii) The Proponent shall apply for a fresh water abstraction and waste water discharge permits from the Department of Water Affairs (DWA) in the Ministry of Agriculture, Water and Forestry (MAWF) before drilling a water borehole and discharge wastewater into the environment respectively, and;

(iv) All other permits as maybe become applicable during the proposed exploration operations.

3.4 Standards and Guidelines

Industrial effluent likely to be generated by the proposed activities must comply with provisions of the Government Gazette No 217 dated 5 April 1962 (Table 3.2) while the drinking water quality comparative guideline values are shown in Table 3.3.

Table 3.2: R553 Regional Standards for Industrial Effluent, in Government Gazette No 217 dated 5 April 1962.

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

Table 3.3: Comparison of selected guideline values for drinking water quality (after Department of Water Affairs, 2001).

Parameter and Expression of the results			**WHO** Guidelines for Drinking-Water Quality 2nd edition 1993		**Proposed Council Directive** of 28 April 1995 (95/C/13-1/03) EEC	**Council Directive of 15 July 1980** relating to the quality intended for human consumption 80/778/EEC		**U.S. EPA** Drinking water Standards and Health Advisories Table December 1995		**Namibia, Department of Water Affairs** Guidelines for the evaluation of drinking-water for human consumption with reference to chemical, physical and bacteriological quality July 1991			
			Guideline Value (GV)		**Proposed Parameter Value**	**Guide Level (GL)**	**Maximum Admissible Concentration (MAC)**	**Maximum Contaminant Level (MCL)**		**Group A Excellent Quality**	**Group B Good Quality**	**Group C Low Health Risk**	**Group D Unsuitable**
Temperature	t	°C		-	-	12	25		-	-	-	-	-
Hydrogen ion concentration	pH, 25° C	-	R	<8.0	6.5 to 9.5	6.5 to 8.5	10		-	6.0 to 9.0	5.5 to 9.5	4.0 to 11.0	<4.0 to >11.0
Electronic conductivity	EC, 25° C	mS/m		-	280	45	-		-	150	300	400	>400
Total dissolved solids	TDS	mg/l	R	1000	-	-	1500		-	-	-	-	-
Total Hardness	$CaCO_3$	mg/l		-	-	-	-		-	300	650	1300	>1300
Aluminium	Al	µ g/l	R	200	200	50	200	S	50-200	150	500	1000	>1000
Ammonia	NH_4^+	mg/l	R	1.5	0.5	0.05	0.5		-	1.5	2.5	5.0	>5.0
	N	mg/l		1.0		0.04	0.4		-	1.0	2.0	4.0	>4.0
Antimony	Sb	µ g/l	P	5	3	-	10	C	6	50	100	200	>200
Arsenic	As	µ g/l		10	10	-	50	C	50	100	300	600	>600
Barium	Ba	µ g/l	P	700	-	100	-	C	2000	500	1000	2000	>2000
Berylium	Be	µ g/l		-	-	-	-	C	4	2	5	10	>10
Bismuth	Bi	µ g/l		-	-	-	-		-	250	500	1000	>1000
Boron	B	µ g/l		300	300	1000	-		-	500	2000	4000	>4000
Bromate	BrO_3^-	µ g/l		-	10	-	-	P	10	-	-	-	-
Bromine	Br	µ g/l		-	-	-	-		-	1000	3000	6000	>6000
Cadmium	Cd	µ g/l		3	5	-	5	C	5	10	20	40	>40
Calcium	Ca	mg/l		-	-	100	-		-	150	200	400	>400
	$CaCO_3$	mg/l		-	-	250	-		-	375	500	1000	>1000
Cerium	Ce	µ g/l		-	-	-	-		-	1000	2000	4000	>4000
Chloride	Cl^-	mg/l	R	250	-	25	-	S	250	250	600	1200	>1200
Chromium	Cr	µ g/l	P	50	50	-	50	C	100	100	200	400	>400
Cobalt		µ g/l		-	-	-	-		-	250	500	1000	>1000
Copper after 12 hours in pipe	Cu	µ g/l	P	2000	2	100	-	C	TT##	500	1000	2000	>2000
		µ g/l		-	-	3000[1]	-	S	1000	-	-	-	-
Cyanide	CN^-	µ g/l		70	50	-	50	C	200	200	300	600	>600
Fluoride	F^-	mg/l		1.5	1.5	-	at 8 to 12 °C: 1.5	C	4	1.5	2.0	3.0	>3.0
		mg/l		-	-	-	at 25 to 30 °C: 0.7	P,S	2	-	-	-	-
Gold	Au	µ g/l		-	-	-	-		-	2	5	10	>10
Hydrogen sulphide	H_2S	µ g/l	R	50	-	-	undetectable		-	100	300	600	>600
Iodine	I	µ g/l		-	-	-	-		-	500	1000	2000	>2000
Iron	Fe	µ g/l	R	300	200	50	200	S	300	100	1000	2000	>2000
Lead	Pb	µ g/l		10	10	-	50	C	TT#	50	100	200	>200
Lithium	Li	µ g/l		-	-	-	-		-	2500	5000	10000	>10000
Magnesium	Mg	mg/l		-	-	30	50		-	70	100	200	>200
	$CaCO_3$	mg/l		-	-	7	12		-	290	420	840	>840
Manganese	Mn	µ g/l	P	500	50	20	50	S	50	50	1000	2000	>2000
Mercury	Hg	µ g/l		1	1	-	1	C	2	5	10	20	>20
Molybdenum	Mo	µ g/l		70	-	-	-		-	50	100	200	>200
Nickel	Ni	µ g/l		20	20	-	50		-	250	500	1000	>1000
Nitrate*	NO_3^-	mg/l	P	50	50	25	50		45	45	90	180	>180
	N	mg/l		-	-	5	11	C	10	10	20	40	>40
Nitrite*	NO_2^-	mg/l		3	0.1	-	0.1		3	-	-	-	-
	N	mg/l		-	-	-		C	1	-	-	-	-
Oxygen, dissolved	O_2	% sat.		-	50	-	-		-	-	-	-	-
Phosphorus	P_2O_5	µ g/l		-	-	400	5000		-	-	-	-	-
	PO_4^{3-}	µ g/l		-	-	300	3350		-	-	-	-	-
Potassium	K	mg/l		-	-	10	12		-	200	400	800	>800
Selenium	Se	µ g/l		10	10	-	10	C	50	20	50	100	>100
Silver	Ag	µ g/l		-	-	-	10	S	100	20	50	100	>100
Sodium	Na	mg/l	R	200	-	20	175		-	100	400	800	>800
Sulphate	SO_4^{2-}	mg/l	R	250	250	25	250	S	250	200	600	1200	>1200
Tellurium	Te	µ g/l		-	-	-	-		-	2	5	10	>10
Thallium	Tl	µ g/l		-	-	-	-	C	2	5	10	20	>20
Tin	Sn	µ g/l		-	-	-	-		-	100	200	400	>400
Titanum	Ti	µ g/l		-	-	-	-		-	100	500	1000	>1000
Tungsten	W	µ g/l		-	-	-	-		-	100	500	1000	>1000
Uranium	U	µ g/l		-	-	-	-	P	20	1000	4000	8000	>8000
Vanadium	V	µ g/l		-	-	-	-		-	250	500	1000	>1000
Zinc after 12 hours in pipe	Zn	µ g/l	R	3000	-	100	-	S	5000	1000	5000	10000	>10000
		µ g/l		-	-	5000	-		-	-	-	-	-
			P: Provisional R: May give reason to complaints from consumers					C: Current; P: Proposed; S: Secondary; T#: Treatment technique in lieu of numeric MCL; TT##: treatment technique triggered at action level of 1300 µ g/l					

4. SUMMARY OF NATURAL ENVIRONMENT

4.1 Climate

The EPL area fall in an area of Namibia which receives the highest rainfall ranging between 600 - 700 mm per year and can reach 900 mm per year in good a rainy year (Mwiya and Giles, 2004). The rainy season around the EPL area is from January to March. The moist-rain bearing winds are typically from the north and north-east. The high rainfall around the EPL area is due to the regional surrounding Otavi Mountainland topographic higher areas effect which forces incoming moist air to rise and causes heavy condensation and subsequent high precipitation.

According to Mwiya and Giles, (2004) the average monthly rainfall is in excess of evaporation from January to March. This relationship between rainfall and evaporation indicates that excess rainwater may be available for potential leachate generation around the area during the rainy season. Solar radiation is around 6 kwH/m2/d with highest temperatures generally above 30°C in summer and lowest just below freezing during the winter months (Stankevica, 2015).

The contrasts between the higher regional mountainous terrain and generally flat EPL area terrain has a considerable influence on the local wind patterns. Regional wind velocity reaches up to 2.5 m/s, with the lowest velocities typically being in the morning and afternoon (Mwiya and Giles, 2004). However, wind effects are controlled by topography and vegetation influences and are expected to show considerable local variations around the region and the local EPL area.

4.2 Topography

The regional terrain around the EPL 5897 is rocky and rugged in nature with steep slopes characterising the mountainous sections whilst the foothills of the mountains are flat and gently undulating. Within the EPL area, the drainage of the area is dendritic in nature with ephemeral streams, often steeply incised, forming small early stage tributaries of the Ondangaura Ephemeral Rivers systems (Fig. 4.2).

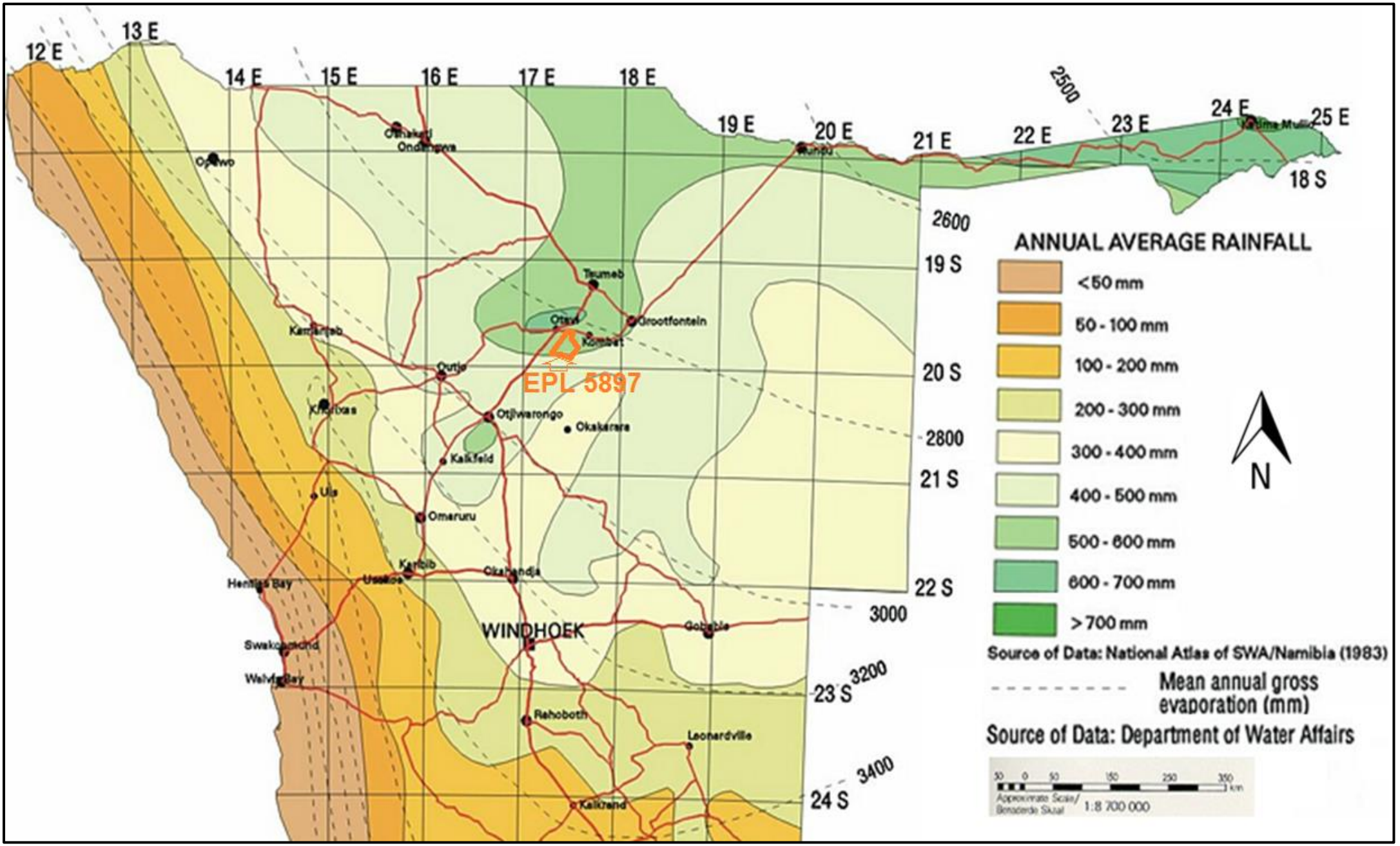


Figure 4.1: Regional climatic patterns of Namibia showing the location of the study area (Directorate of Environmental Affairs, 2002).

4.3 Vertebrate Fauna and Flora Diversity

4.3.1 Reptiles

The overall reptile diversity and endemism in the general area is estimated at between 71-80 species and 5-8 species, respectively (Mendelsohn et al. 2002). Griffin (1998a) presents figures of between 41-50 and 31-40 for lizard and snake diversity, respectively, from the general area in north-central Namibia. According to Griffin (1998a) 11-20 endemic lizards and 9-10 endemic snakes are expected from this area.

At least 67 species of reptiles are expected to occur in the general area with 10 species being endemic (14.9%). These consist of at least 2 tortoise, 1 terrapin, 36 snakes (2 blind snake, 3 thread snake, 2 python, 2 burrowing asps, 1 centipede eater, 1 quill snouted and 25 typical snakes) and 28 lizards (3 worm lizard, 6 skinks, 7 Old World lizards, 2 plated lizards, 1 girdled lizard, 1 monitor lizard, 1 chameleon, 1 agama and 6 geckos). Typical snakes (25 species – 2 species being endemic (8%) and 1 species insufficiently known and rare (4%), Old World lizards (7 species – 1 species being endemic (14.3%) and geckos (6 species – 2 species being endemic (33.3%) are the most numerous reptiles expected from the general area. The burrowing worm lizards are more numerous in the sandier north eastern parts of Namibia. Namibia with approximately 129 species of lizards (Lacertilia) has one of the continents richest lizard fauna (Griffin 1998a). 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 general area than presented above.

4.3.2 Amphibians

According to Mendelsohn et al. (2002), the overall frog diversity in the general area is estimated at between 12-15 species. Griffin (1998b) puts the species richness in the general area at between 14-15 species. According to the literature, at least 15 species of amphibians can occur in suitable habitat in the general. The area is under represented, with 1 rain frog, 3 toads, 1 kassina, 2 rubber frogs, 2 puddle frogs, 1 ornate frog, 1 caco, 1 bullfrog, 2 sand frogs and 1 platanna known and/or expected (i.e. potentially could be found in the area) to occur in the area. None of the amphibians are endemic (Griffin 1998b) while 1 species is classified as “near threatened” due to habitat loss and development (Pyxicephalus adspersus) (Du Preez and Carruthers 2009) – i.e. 6.7% of amphibians of conservation value from the general area. Pyxicephalus adspersus is more common in northern Namibia where their numbers are also declining due to overutilization as food by humans (Griffin pers. com.). The IUCN (2015) lists all the species as “least concern”.

The most important species is Pyxicephalus adspersus although they are widespread in Namibia and not exclusively associated with the area in particular. Permanent water bodies viewed as amphibian habitat in the area include the various fountains known to occur in the Karst formations in the surrounding topographically higher areas. Other potential habitats in the area include farm reservoirs and earth dams although the latter are also dependant on localised showers and temporary of nature.

4.3.3 Mammals

Overall terrestrial diversity and endemism – all species – is classified “average to high” in overall (all terrestrial species) diversity and “high” in endemism in the north-central part of Namibia (Mendelsohn et al. 2002). The overall diversity and abundance of large herbivorous mammals (big game) is viewed as “high” with kudu, springbok and Burchell’s zebra having average densities while the overall diversity and density of large carnivorous mammals (large predators) is “average” with 4 species expected of which leopard and cheetah have high densities (Mendelsohn et al. 2002). The overall mammal diversity in the general area is estimated at between 76-90 species with 3-4 species being endemic to the area (Mendelsohn et al. 2002). Griffin (1998c) puts the species richness distribution of endemics also between 9-11 species.

According to the literature at least 86 species of mammals are known and/or expected to occur in the general area of which 4 species (4.7%) are classified as endemic. The Namibian legislation classifies 8 species as vulnerable, 3 species as rare, 1 species as specially protected game, 9 species as protected game, 4 species as insufficiently known, 1 species as peripheral, 1 species as migrant, 4

species as huntable game, 3 species as problem animals and 4 species not listed. At least 29.1% (25 species) of the mammalian fauna that occur or are expected to occur in general Tsumeb area are represented by rodents of which 3 species (12%) are endemic. This is followed by bats with 25.6% (22 species) of which 1 species (i.e. Cistugo seabrai) is endemic and rare (4.5%) and carnivores with 22.1% (19 species) of which 1 species (4.6%) are endemic.

4.3.4 Avifauna

At least 213 species of terrestrial ["breeding residents"] birds occur and/or could occur in the general area at any time (Hockey et al. 2006, Maclean 1985, Tarboton 2001). All the migrant and aquatic species have been excluded here. Eight of the 14 Namibian endemics are expected to occur in the general area (71.4% of all Namibian endemic species or 3.8% of all the species expected to occur in the area). Seven species are viewed as endangered, 6 species as near threatened and 3 species as vulnerable (Simmons et al. 2015). Furthermore, Simmons et al. (2015) classifies 2 species as near endemic which were previously seen as endemic (i.e. violet wood-hoopoe and Rűppel's parrot). The IUCN (2015) classifies 2 species as endangered (Ludwig's bustard and white-backed vulture), 1 species as near threatened (kori bustard) and 2 species as vulnerable (martial eagle and secretarybird). Sixty one (28.6% of all the birds expected) species have a southern African conservation rating with 13 species classified as endemic (21.3% of southern African endemics or 6.1% of all the birds expected) and 48 species classified as near endemic (78.7% of southern African endemics or 22.5% of all the birds expected) (Hockey et al. 2006).

The most important "endemic" species known/expected to occur in the general area are viewed as Hartlaub's Spurfowl (Pternistis hartlaubi), Monteiro's Hornbill (Tockus monteiri), Damara Hornbill (Tockus damarensis), Carp's tit (Parus carpi), Rockrunner (Achaetops pycnopygius), Bare-cheeked babbler (Turdoides gymnogenys) and Poicephalus rueppellii (Rüppell's Parrot – near-endemic). The 7 species listed by Simmons et al. (2015) as endangered (violet wood-hoopoe, Lűdwigs bustard, white-backed vulture, tawny/booted/martial eagles and bateleur) and 2 species listed by the IUCN (2015) as endangered (Ludwig's bustard and white-backed vulture), near threatened (kori bustard) and vulnerable (martial eagle and secretarybird) are viewed as the most important. The larger raptors (e.g. vultures, eagles, etc.) are often persecuted due to actual and perceived livestock mortalities or succumb when feeding on poisoned carcasses set for problem predators

4.3.5 Trees and Shrubs

According to Curtis and Mannheimer (2005) and Mannheimer and Curtis (2009) between 94 and 130 species of trees and shrubs are known and/or expected to occur in the general area, respectively (total = 131 species). Thirty-seven (28.2%) species of larger trees and shrubs have some kind of protected status in the general area. Three species (2.3%) are endemic, 5 species (3.8%) near-endemic, 23 species (17.6%) protected by the Forestry Act No. 12 of 2001, 6 species (4.6%) protected by various Forestry laws according to Curtis and Mannheimer (2005) and Mannheimer and Curtis (2009), 4 species (3.1%) protected by Nature Conservation Ordinance No. 4 of 1975 with 3 species (2.3%) classified as CITES Appendix 2 species. According to their protective status Cyphostemma juttae (endemic, NC), Erythrina decora (Forestry#, endemic) and Heteromorpha papillosa (endemic) are probably the trees/shrubs most sensitive that are expected to occur in the general area.

4.3.6 Grass Diversity

Up to 111 grasses are expected in the general area of which 4 species are viewed as endemic (Eragrostis omahekensis, Eragrostis scopelophila, Pennisetum foermeranum and Setaria finite). Pennisetum foermeranum is associated with rocky mountainous terrain and consequently only expected is such suitable habitat. Eragrostis omahekensis is virtually only found on disturbed soils – e.g. close to watering points – while Eragrostis scopelophila is associated with mountainous areas under trees and shrubs. The endemic Setaria finite is associated with drainage lines in the general area; never very common and probably the grass species most likely to be affected most by development in the area.

4.3.7 Other Species

The following is a summary of various other species that maybe found in and around the EPL area depending on season (set or dry):

- Aloes;
- Commiphoras;
- Herbs;
- Ferns;
- Lichens;
- Lithops, and;
- Other species with commercial potential that could occur in the general area include Harpagophytum procumbens (Devil's claw) exploited and Citrullus lanatus (Tsamma melon).

4.3.8 Fauna and Flora Conclusions

Species most likely to be adversely affected by the proposed exploration and possible mining operations within the EPL 5897 would be the variety of reptiles and birds specifically associated with the proposed development site(s) as well as the potential effect such development may have on carnivores as well as the protected and unique flora. As all development have potential negative environmental consequences, identifying the most important fauna and flora species including high risk habitats beforehand, coupled with environmentally acceptable mitigating factors, lessens the overall impact of such development. The following is the summary of the most important fauna and flora (habitat) areas within the EPL area:

(i) Topographically higher areas with rocky outcrops [botanical richness and endemic vertebrates], and;

(ii) Local Ephemeral Rivers [biotic richness, large dwelling mammals, high value for human subsistence and tourism].

The following is summary of the key aspect of the proposed exploration programme likely to have some negative impacts on the receiving environment:

(i) Access routes - Localised disruption/destruction of the habitat and thus consequently fauna associated directly with the actual routes. This however, would be a relatively small area with localised implications because the proponent will utilise the already existing extensive access routes;

(i) Excavation, trenching/ drilling sites - Localised disruption/destruction of the habitat and thus consequently fauna associated directly with the actual sites. This however, would be a relatively small area and will depend on scale of the operations resulting in localised implications,and;

(ii) Supporting Infrastructure including campsite - Localised disruption/destruction of the habitat and thus consequently fauna associated directly with the actual sites. This however, would be a relatively small area – especially if the existing (albeit ruins) infrastructure areas are used rather than affecting new sites – with localised implications.

4.3.9 Mundulea Nature Reserve

The EPL area cover Mundulea Nature Reserve which is a 120 km^2 of natural habitat of indigenous game species. The nature reserve has a bush camp and offers specialist walking and hiking tours to local, regional and international tourists.

According to the website of the nature reserve (www.mundulea.com), ancient Leadwood trees, Marulas, Wild Fig, White Syringa, Dombeya, Mearua, Carrot trees, Nettle trees, countless species of aloe, acacia, fern, grewia and combretum are found in the Mundulea Nature Reserve. In addition to those now stable and thriving populations, the nature reserve has re-introduced a considerable number of species which would once have occurred here naturally.

According to the website of the nature reserve (www.mundulea.com), the nature reserve is home to large herds of Eland, Wildebeest, Kudu and Oryx, Hartebeest, Dik Dik, Steenbok, Duiker and Warthogs, Springbok, Giraffe, Black Faced Impala, Roan Antelope, Tsessebe, Hartmann's Zebra, Leopard, Cheetah, Hyena, Honey Badgers, Jackal, Serval, Lynx, Aardvark, Aardwolf, Banded Mongoose, Meerkats, Pangolin and 260 bird species, including raptors and owls.

The coexistence of the proposed mineral exploration in the EPL 5897 is likely to be very challenging. The Proponent shall engage the nature reserve owners and operator in order to see if there are opportunity to under take exploration in certain areas of the reserve while being supported by the local guides.

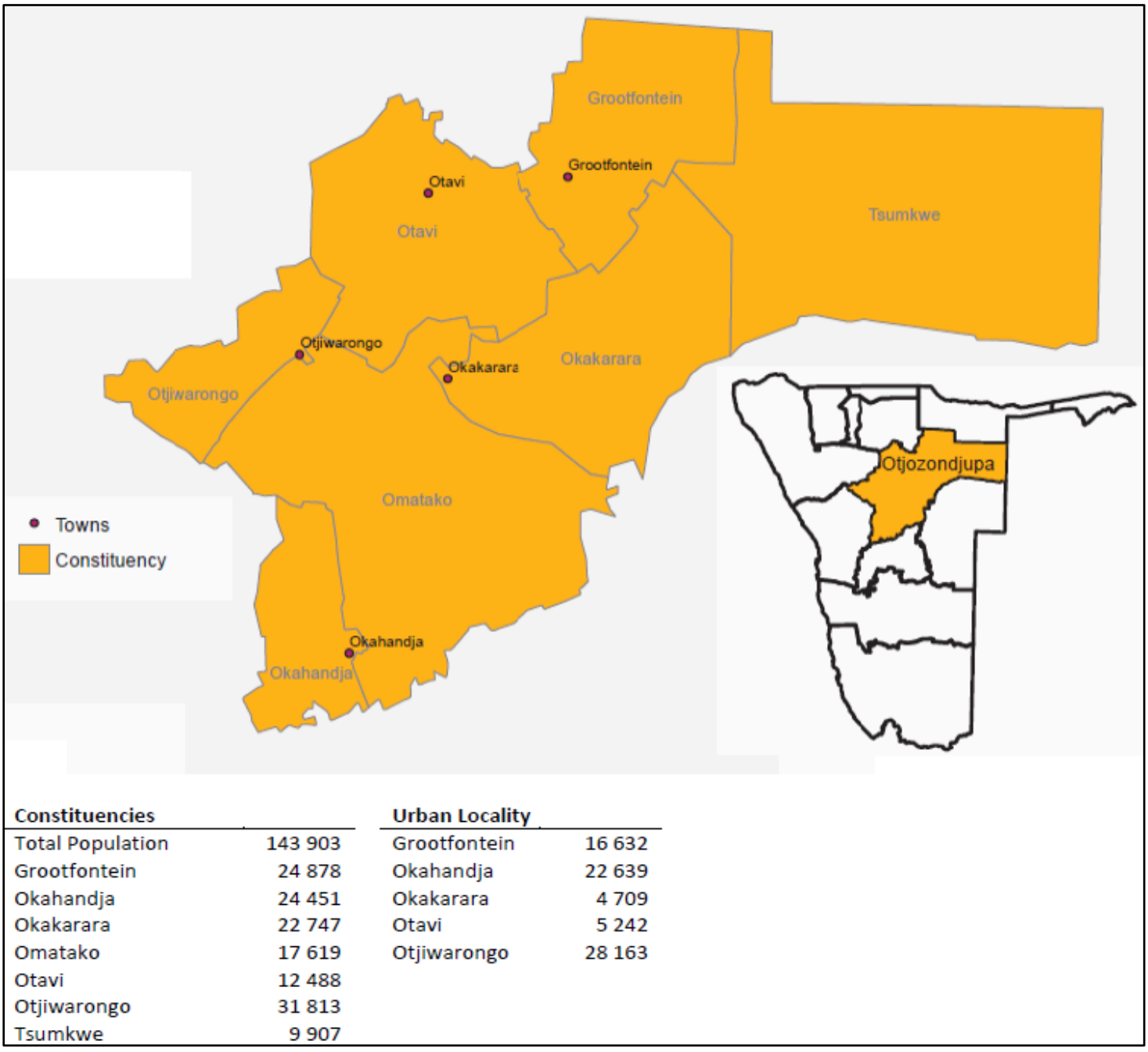
4.4 Socioeconomic Setting

According to the 2011 Population and Housing Census, the project location, Otavi constituency and Town is home to 12488 and 5242 people respectively (Fig. 4.1 and National Statistics Agency, 2014a; 2014b). Otjozondjupa Region has a population of 143,903 with the majority of the population (54%) living in urban areas (National Statistics Agency, 2014b). According to the National Statistics Agency (2013) the population of the Otjozondjupa Region increased from 135,384 in 2001 to 143,903 in 2011. The economy of the region is mainly based on primary activities such as tourism, minerals exploration and mining and agriculture, with limited activities in the manufacturing sector.

According to SPC, 2015, the local economic activities of Otavi are dominated by trading, agriculture and manufacturing. The economy of the town is very much reliant on the surrounding commercial farms, Namib Mills and to some degree Ohorongo Cement and B2Gold Mine operations. The town itself has a small and relatively poor economic and tax base, which means that the income for the Town Council is relatively, low (SPC, 2015).

Otavi is a cattle farming community while cement manufacturing by Ohorongo and the opening the B2 Gold Mine has made the town a key industrial and logistic hub. Although agriculture provide greater numbers of employment opportunities to the local communities of Otavi, unemployment is common locally particularly for people with low to no skills.

Locally, the proposed project development is likely to have very limited direct positive impacts to socioeconomic setting of Otavi, apart from broadly contributing to greener energy security and very limited employment opportunities during the short preconstruction and construction periods. Temporary employment opportunities will be limited.



Constituencies	
Total Population	143 903
Grootfontein	24 878
Okahandja	24 451
Okakarara	22 747
Omatako	17 619
Otavi	12 488
Otjiwarongo	31 813
Tsumkwe	9 907

Urban Locality	
Grootfontein	16 632
Okahandja	22 639
Okakarara	4 709
Otavi	5 242
Otjiwarongo	28 163

Figure 4.2: The Otjozondjupa region and constituencies showing Grootfontein, the project location (National Statistics Agency, 2014b).

4.5 Ground Components

4.5.1 Geology

The EPL 5897 falls within the Central Zone of the Damara Sequence which underlies most of Namibia. The oldest rocks within the Central Zone are the pre-Damaran basement that consists of gneiss and granite lithologies found in different parts of the zone (Miller, 1992). According to Miller, (1983a), the sequence was deposited during successive phases of rifting, spreading, subduction and continental collision. Much of the basal succession (Nosib Group), laid down in or marginal to intracontinental rifts, consists of quartzite, arkose, conglomerate, phyllite, calc-silicate, subordinate, limestone and evaporitic rocks. Local alkaline ignimbrites with associated subvolcanic intrusions ranging from 840 to 720 million years in age also form part of the regional geology (Miller, 1992).

According to Miller, (1992), widespread carbonate deposition followed and overlapped far beyond early rift shoulders (Kudis, Ugab and basal Khomas Subgroups); interbedded mica and graphitic schist, quartzite (some ferruginous), massflow deposits, iron-formation and local within-plate basic lava point

to fairly variable depositional conditions south of a stable platform where only carbonates with very minor clastics occur (Otavi Group). Near the southern margin of the orogen, deep-water fans, facies equivalents of the carbonates were deposited on either side of a Southern Zone ocean separating Kalahari and Congo Cratons (Auas and Tinkas Formations). Thick schistose metagreywacke and metapelite (Kuiseb Formation) overlie the above rocks.

The lithostratigraphy of the Damara Sequence in the Central Zone (CZ) in which the EPL 5897 falls has been reviewed and significantly revised by Badenhorst (1987), who has also correlated the stratigraphy across the Omaruru Lineament. The stratigraphy of the CZ taken from Steven (1993) as slightly modified after Badenhorst, (1987) and (1988) is given in Table 4.1.

Table 4.1: Partial Lithostratigraphy of the Damara Sequence in Central Namibia (Source: Venmyn Deloitte, 2014).

GROUP	SUB-GROUP	FORMATION	THICKNESS (m)	LITHOLOGICAL DESCRIPTION
Swakop	Khomas	Kuiseb	3,000	Biotite-rich quartzo-feldspathic schist, biotite-garnet-cordierite schist, minor amphibolite schist, quartzite, calc-silicate rock and marble.
		Karibib	700	Marble, biotite schist, quartz schist and calc-silicate rock.
		Chuos	700	Diamictite, pebble- and boulder-bearing schist and minor quartzite
	Discordance			
	Ugab	Rössing	200	Very variable marble, quartzite, conglomerate, biotite schist, biotite cordierite schist and gneiss, aluminous gneiss, biotite-hornblende schist and calc-silicate schist.
Unconformity or conformable transition				
Nosib		Khan	1,100	Various gneisses, quartzite, schist, conglomerate, minor marble, amphibolite and calc-silicate rock.
		Etusis	3,500	Layered light-red to greyish-brown quartzites with high feldspar content. In-between para-gneisses, biotite schists and conglomerates occur.

4.5.4 Geotechnical Engineering Considerations

Rocks of varying geotechnical characteristics are expected within the pegmatite zones and alternating bands within the banded dolomitic marble and biotite-quartz schist country rock and covered by a variety of sediments in some places.

No field and laboratory assessment of rock mass and detailed discontinuities survey were undertaken as part of this study. Table 4.2 outlines an indicative classification of the various discontinuities that are likely to be found in the area. Both low and high order discontinuities are likely to be found around the EPL area.

It's highly recommended that a field-based geotechnical engineering assessment followed by laboratory assessments must be undertaken before the implementation deep excavation in order to have accurate figures of all the key geotechnical parameters.

Table 4.2: General rock structure scheme (Source: Mwiya, 2004).

GEOMETRY				CHARACTERISTIC				
DISCONTINUITY	LENGTH m	SPACING m	WIDTH m	TRANSMISSIVITY m^2/s	HYDRAULIC CONDUCTIVITY m/s	INFILLING THICKNESS m	EXAMPLE	INFLUENCE INDICATOR
LOW ORDER DISCONTINUITIES; ZONES OUTCROPS								
1^{ST} ORDER	$>10^4$	$>10^3$	$>10^2$	10^{-5} - 10^{-2}	10^{-7}- 10^{-5} AV. [10^{-6}]	10^0	Regional major fault systems	4 V. High
2^{ND} ORDER	10^3 - 10^4	10^2- 10^3	10^1 – 10^2	10^{-7} - 10^{-4}	10^{-8} – 10^{-6} AV. [10^{-7}]	10^{-1}	Local major fault zones	
3^{RD} ORDER	10^2 – 10^3	10^1 – 10^2	10^0 - 10^1	10^{-9} – 10^{-6}	10^{-9} – 10^{-7} AV. [10^{-8}]	≤10^{-2}	Local minor fault zones	
HIGH ORDER DISCONTINUITIES: INDEPENDENT OUTCROPS								
4^{TH} ORDER	10^1 – 10^2	10^0- 10^1	-	-	10^{-11}-10^{-9} AV.[10^{-10}]	-	Local major joint set or bedding	3 High
5^{TH} ORDER	10^0 - 10^1	10^{-1} - 10^0	-	-	10^{-12}-10^{-10} AV. [10^{-11}]	-	Local minor joints/ fractures	
6^{TH} ORDER	10^{-1} - 10^0	10^{-2} – 10^{-1}	-	-	10^{-13}-10^{-11} AV. [10^{-12}]	-	Local minor fissures / schistosity	2 Low
7^{TH} ORDER	<10^{-1}	<10^{-2}	-	-	<10^{-13}	-	Crystalline voids	1 V. Low

4.5.5 Water Sources

Groundwater as well as surface water (only during the rainy season) from ephemeral river channels is the sources of water supply in the area as well as much of the region. According to the Department of Water Affairs, (2001), the EPL area some groundwater potential (Fig. 4.3). The area with aquifer potential is associated with the carbonate terrain including calcrete. Recharge from rainfall is an important parameter determining the groundwater potential, but the degree of metamorphism affects the groundwater potential too. The groundwater potential of rocks decreases, as the degree of metamorphism increases.

Crystalline rocks normally exhibit a very low tendency to store water, typical of the pegmatite zones and the alternating bands within the banded dolomitic marble and biotite-quartz schist found within the project area (Fig. 4.3). The groundwater potential of these rock units is generally low, to locally moderate. Possible targets for water resources in this area are mainly fractured zones and faults that outcrop on the surface without impermeable infillings as well as solutions holes associated with the carbonates. The area along major ephemeral rivers may be more promising due to well developed fractures and faults that give rise to good recharge potential during the rainy season. A number of boreholes water schemes are operated by NamWater around in the general surrounding area.

4.5.6 Evaluation of Water Vulnerability

Vulnerability assessment of surface water covered possible runoff, the presence of source factors and major flow routes such as major high order discontinuities (Table 4.2), ephemeral river channels, valleys and gullies as pathways and the presence of surface water body as a target (Figs. 4.2 and 4.3). The groundwater assessments covered hydraulic properties and thickness of the unsaturated and saturated zones derived from geological and hydrogeological data. The assessment of the unsaturated characteristics was based on the ability for source factors to influence the system through known pathway factors such as discontinuities. The combined effects of unsaturated and saturated flow probabilities were used as indicator for groundwater vulnerability. However, groundwater

or surface water will only be vulnerable to contamination if the following three (3) component are all present at the same time and at a site-specific area within the EPL:

(i) Contaminant sources resulting from proposed exploration programme;

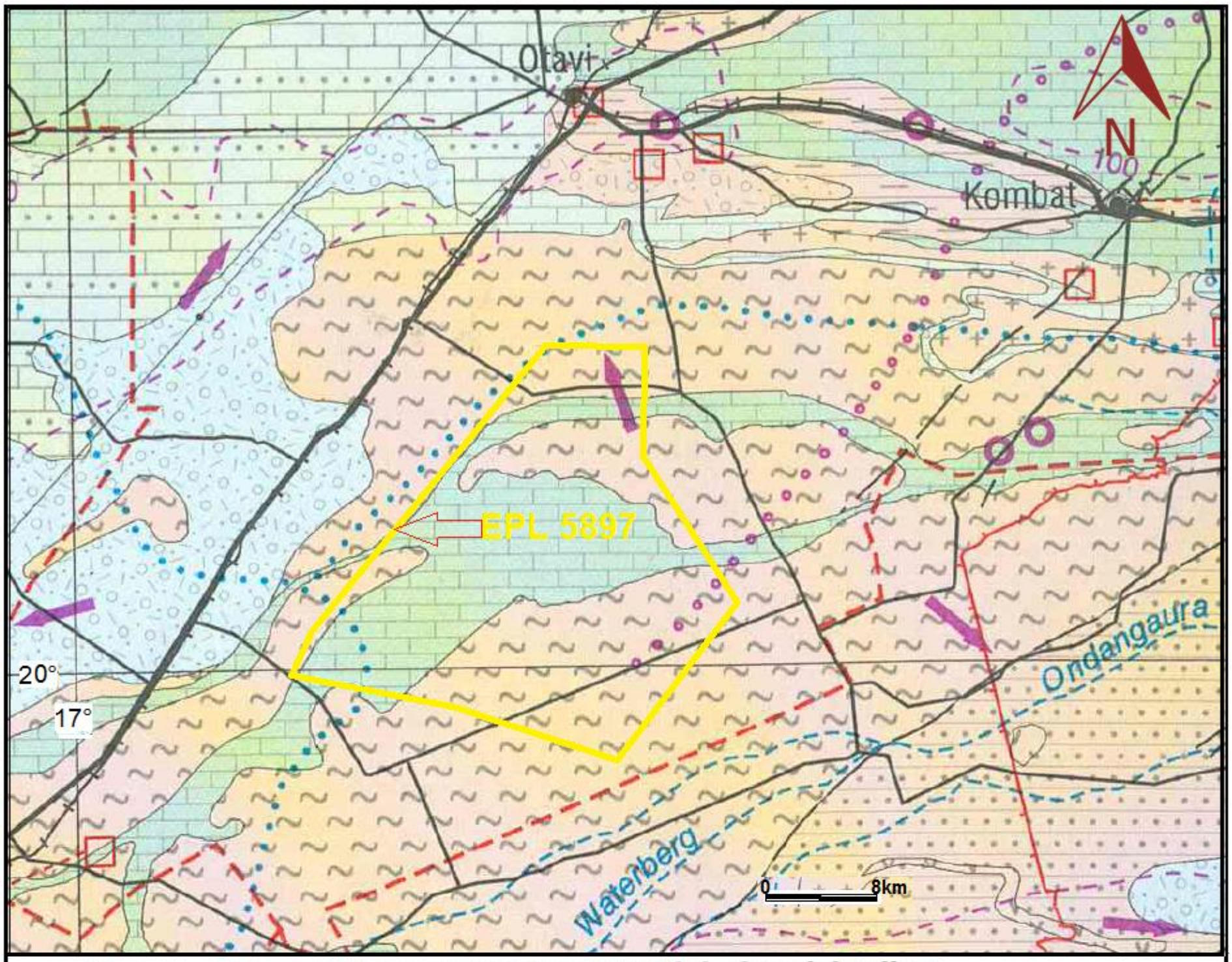
(ii) Potential pathways for contaminant migration such as major high order discontinuities (Table 4.2), ephemeral river channels, valleys and gullies, and;

(iii) Targets (economic water resources) present within the project area.

Overall, the limited local groundwater resources found in the area form part of the poorly developed metamorphic rocks based confined and unconfined aquifer system that is moderately vulnerable to any sources of pollution (Figs. 4.3 and 4.4).

During the rainy season, surface water bodies can be found along the local ephemeral river systems. This surface water often recharges the local groundwater resources along the faults, solutions holes and other discontinuities along these ephemeral rivers in the general surrounding areas (Figs. 4.3 and 4.4).

Therefore, surface and groundwater resources in the local EPL area maybe vulnerable to pollution as a result of activities sources associated with some of the proposed local field-based detailed prospecting / exploration activities such as drilling and trenching as well as supporting activities such as campsite and discharge of liquid and solid waste. It is important that all polluting activities must not be placed or undertaken in areas with high order discontinuities, valleys or gullies in the area (Fig. 4.3). Discharge of waste into a public stream is prohibited.



Hydrogeology and groundwater potential of rock bodies

Porous aquifers

- High potential
- Moderate potential

Fractured, fissured or karstified aquifers

- High potential
- Moderate potential

Rock bodies with little groundwater potential

- Generally low potential; locally moderate potential
- Very low and limited potential

Main rock types

Main rock type of hydrogeological units

- Sand and gravel, valley deposits (alluvium)
- Unconsolidated to semi-consolidated sand and gravel, locally calcrete
- Calcrete
- Limestone, dolomite, marble
- Non-porous sandstone, conglomerate, quartzite
- Volcanic rocks (Karoo and younger)
- Metamorphic rocks, including quartzite and marble bands
- Granite, gneiss, old volcanic rocks

Groundwater features

- Spring
- Thermal spring
- 20 — Depth to groundwater (in m below ground)
- Groundwater flow direction
- Groundwater divide
- Limit of area of artesian flow
- Limit of area of sub-artesian groundwater
- Area of saline groundwater
- Area of poor quality groundwater at depth
- A — B Line of hydrogeological cross-section

Water use and water management features

- Well or borehole (selected)
- J-3 Borehole (only in cross-sections)
- Groundwater supply scheme
- Irrigation scheme using groundwater
- Canal
- Water pipeline
- 12.3 Dam with capacity of reservoir in Mm^3
- Boundary of groundwater control area

Figure 4.3: Regional Hydrogeology of the EPL 5897 (Source: Department of Water Affairs and Forestry, 2001).

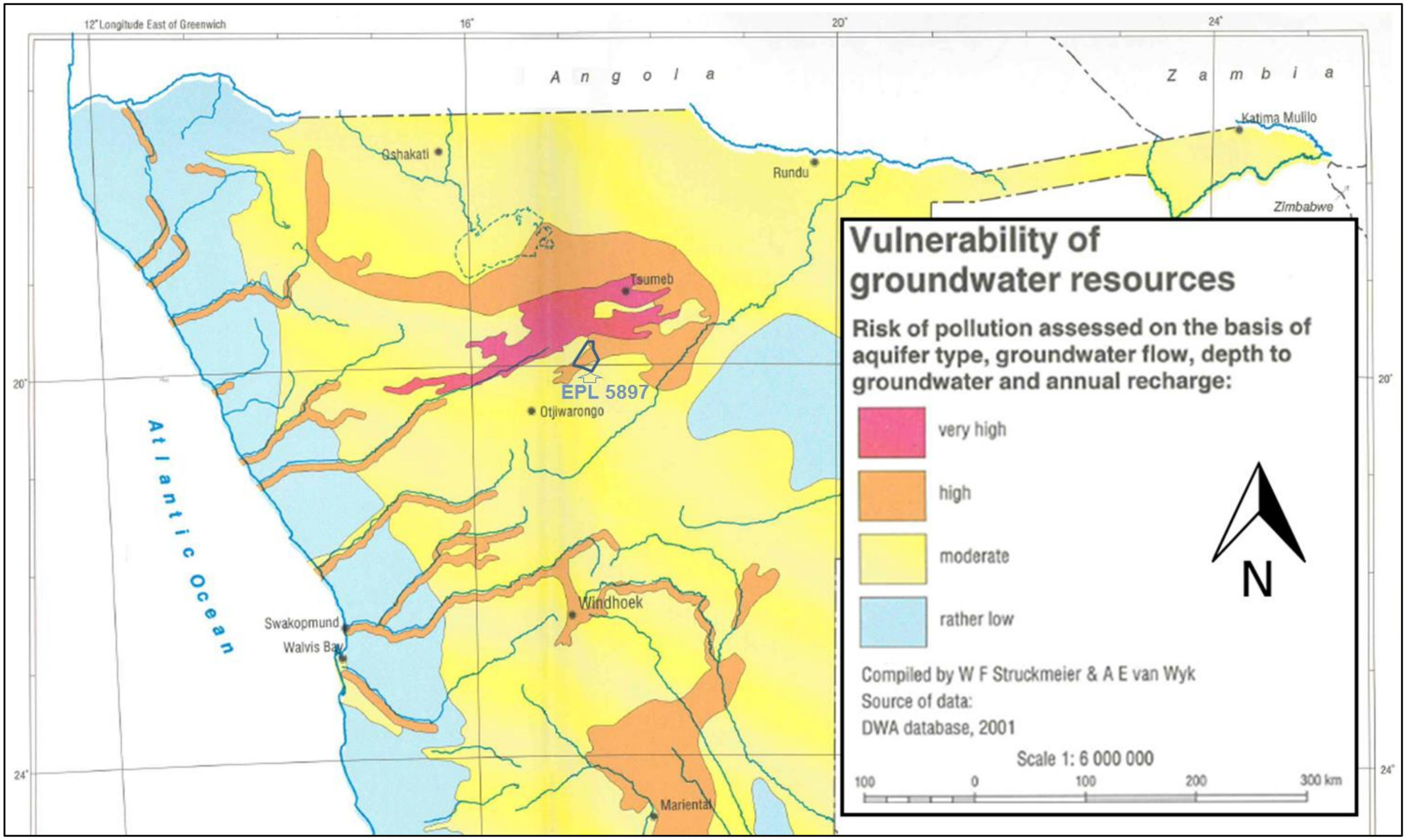


Figure 4.4: Regional groundwater vulnerability around the EPL 5897 (Source: Department of Water Affairs and Forestry, 2001).

4.7 Public Consultations and Engagement

4.7.1 Overview

Public consultation and engagement process have been part of the environmental assessment process for this project. Public notices were published in the local newspapers during the months of November and December 2016 (Figs. 4.5 - 4.7).

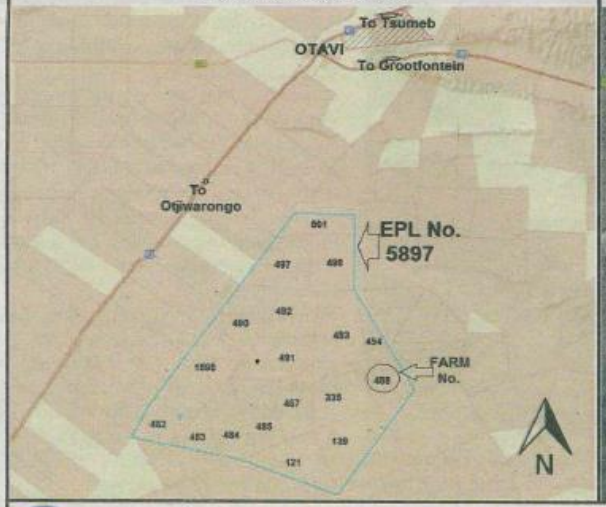
Through the newspaper advertisements as shown in Figs. 4.5 - 4.7 the public were invited to submit written comments / inputs / objections with respect to the proposed / ongoing minerals exploration activities in the EPL 5897.

A stakeholder register was opened and despite telephonic inquiries with respect to contracts and employment opportunities, no written comments / inputs / objections were received during the period from November 2016 to January 2017 that was dedicated for public consultations.

PUBLIC NOTICE BY GIDEON HAMUKWAYA APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) FOR EPL No. 5897, GROOTFONTEIN DISTRICT, OTJOZONDJUPA REGION

Gideon Hamukwaya (the Proponent) holds mineral rights under the Exclusive Prospecting Licence (EPL) No. 5897 covering a total area of 49741.2448 Ha. The EPL No. 5897 was granted on the 03/02/2016 and will expire on the 02/02/2019. The proponent intends to continue with prospecting for Base and Rare Metals, Dimension Stones, Industrial Minerals, Precious Metals, Precious Stones and Semi-Precious Stones using techniques such as geological mapping, geophysical surveys, trenching, sampling and drilling, starting with the desktop studies, followed by regional and local field-based activities that are subject to successful discovery of any potential economic minerals resources. The proponent is required to undertake Environmental Assessment comprising Environmental Scoping and Environmental Management Plan (EMP) for the proposed minerals prospecting activities. The Environmental Assessment process must be undertaken in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). In fulfilment of the environmental requirements, the proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultants led by Dr. Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to prepare the Scoping and EMP Report in order to support the application for Environmental Clearance Certificate (ECC). The public / all Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed minerals exploration activities in the EPL 5897.

REGISTER BY EMAIL: frontdesk@rbs.com.na or FAX 061-306059.
DEADLINE FOR WRITTEN SUBMISSIONS IS: FRIDAY 3rd MARCH 2017



PUBLIC NOTICE BY INNOSUN ENERGY HOLDING (PTY) LTD APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) FOR 0.5MW SOLAR PV PARK, OTAVI TOWNLANDS, OTJOZONDJUPA REGION

InnoSun Energy Holding (PTY) LTD (the Proponent) is in the process of developing a 0.5MW Solar PV Park within the Townlands of Otavi in the Otjozondjupa Region, northcentral Namibia. The proposed Solar PV Park will be serviced by an upgraded road access. An 11kV powerline will be constructed in order to connect the proposed Solar Park PV to the Central North Regional Electricity Distributor (Cenored) substation. The proposed Solar Park PV falls under the activities that are listed in the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007) and cannot be undertaken without an Environmental Clearance Certificate (ECC). In fulfilment of the environmental requirements for the proposed Solar Park PV development, the Proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant and led by Dr. Sindila Mwiya *(PhD, PG Cert, MPhil, BEng (Hons), FGN, CEng, Pr Eng)* as the Environmental Assessment Practitioner (EAP) to prepare the Environmental Scoping, Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports for the proposed Solar PV project in order to support the application for the ECC. The Environmental Assessment process must be undertaken in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). The public / all Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed Solar PV Park.

REGISTER BY EMAIL: frontdesk@rbs.com.na or FAX 061-306059.
DEADLINE FOR WRITTEN SUBMISSIONS IS: FRIDAY 24th FEBRUARY 2017

PUBLIC NOTICE BY INNOSUN ENERGY HOLDING (PTY) LTD APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) FOR 3.5MW SOLAR PV PARK, GROOTFONTEIN OUTSKIRTS, OTJOZONDJUPA REGION

InnoSun Energy Holding (PTY) LTD (the Proponent) is in the process of developing a 3.5MW Solar PV Park on Farm Kranzfontein No. 753 outside Grootfontein Townlands along the B8 Road to Rundu. The proposed Solar Park PV will be serviced by an upgraded road access. An 11kV powerline will be constructed in order to connect the proposed Solar Park PV to the Central North Regional Electricity Distributor (Cenored) substation. The proposed Solar Park PV falls under the activities that are listed in the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007) and cannot be undertaken without an Environmental Clearance Certificate (ECC). In fulfilment of the environmental requirements for the proposed project development, the Proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant and led by Dr. Sindila Mwiya (PhD, PG Cert, MPhil, BEng (Hons), FGN, CEng, Pr Eng) as the Environmental Assessment Practitioner (EAP) to prepare the Environmental Scoping, Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports for the proposed Solar PV project in order to support the application for the ECC. The Environmental Assessment process must be undertaken in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). The public / all Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed Solar PV Park.

REGISTER BY EMAIL: frontdesk@rbs.com.na or FAX 061-306059.
DEADLINE FOR WRITTEN SUBMISSIONS IS: FRIDAY 24th FEBRUARY 2017.

Risk-Based Solutions (RBS) CC - We are Delivering the Solutions

For More Information Please Contact Dr. Sindila Mwiya (*PhD, PG Cert, MPhil, BEng (Hons), Pr Eng) (EAP)*, Tel: 061-306058; Fax: 061-306059; Cell: 081277-2546, Global Office at URL: www.rbs.com.na

Figure 4.5: Copy of the public notice that was published in the Republikein Newspaper dated 16th February 2017.

PUBLIC NOTICE BY GIDEON HAMUKWAYA APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) FOR EPL No. 5897, GROOTFONTEIN DISTRICT, OTJOZONDJUPA REGION

Gideon Hamukwaya (the Proponent) holds mineral rights under the Exclusive Prospecting Licence (EPL) No. 5897 covering a total area of 49741 Ha. The EPL 5897 was granted on the 03/02/2016 and will expire on the 02/02/2019. The proponent intends to continue with prospecting for Base and Rare Metals, Dimension Stones, Industrial Minerals, Precious Metals, Precious Stones and Semi-Precious Stones using techniques such as geological mapping, geophysical surveys, trenching, sampling and drilling, starting with the desktop studies, followed by regional and local field-based activities that are subject to successful discovery of any potential economic minerals resources. The proponent is required to undertake Environmental Assessment comprising Environmental Scoping and Environmental Management Plan (EMP) for the proposed minerals prospecting activities. The Environmental Assessment process must be undertaken in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). In fulfilment of the environmental requirements, the proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultants led by Dr. Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to prepare the Scoping and EMP Report in order to support the application for Environmental Clearance Certificate (ECC). The public / all Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed minerals exploration activities in the EPL 5897.

REGISTER BY EMAIL: frontdesk@rbs.com.na or FAX 061-306059.
DEADLINE FOR WRITTEN SUBMISSIONS IS: FRIDAY 3rd MARCH 2017

PUBLIC NOTICE BY FORESIGHT RESOURCES (FORE) CC APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) FOR EPL No. 5739 REHOBOTH/ WINDHOEK DISTRICTS, HARDAP/ KHOMAS REGIONS

Foresight Resources (FORE) CC (the Proponent) holds mineral rights under the Exclusive Prospecting Licence (EPL) No. 5739 covering a total area of 54,204.2111 Ha. The EPL No. 5739 was granted on the 10/06/2014 and will expire on the 09/06/2018. The proponent intends to continue with prospecting for Base and Rare Metals, Industrial Minerals, Precious Metals and Precious Stones using techniques such as mapping, geophysical surveys, sampling and drilling, starting with the desktop studies, followed by regional and local field-based activities that are subject to successful discovery of any potential economic minerals resources. The proponent is required to undertake Environmental Assessment comprising Environmental Scoping and Environmental Management Plan (EMP) for the proposed minerals prospecting activities. The Environmental Assessment process must be undertaken in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). In fulfilment of the environmental requirements, the proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultants led by Dr. Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to prepare the Scoping and EMP Report in order to support the application for Environmental Clearance Certificate (ECC). The public / all Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed minerals exploration activities in the EPL 5739.

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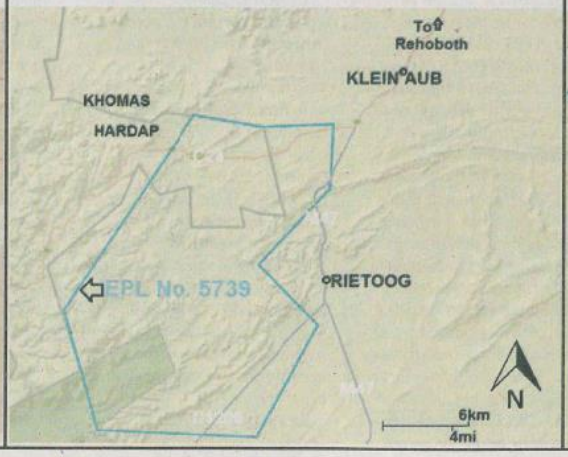
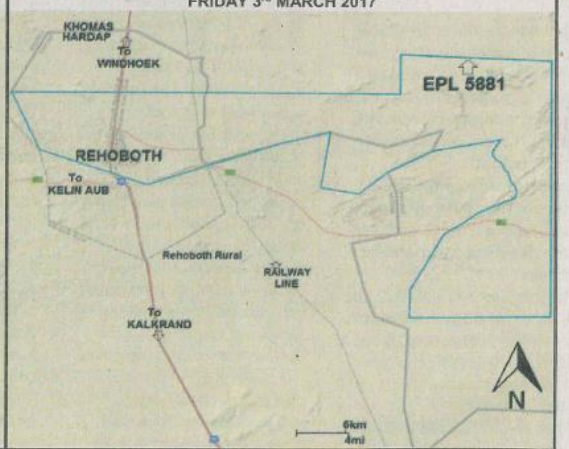
DEADLINE FOR WRITTEN SUBMISSIONS IS: FRIDAY 3rd MARCH 2017



PUBLIC NOTICE BY PRIMARY RESOURCES NAMIBIA CC APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) FOR EPL No. 5881 REHOBOTH DISTRICT, HARDAP REGION

Primary Resources Namibia CC (the Proponent) holds mineral rights under the Exclusive Prospecting Licence (EPL) No. 5881 covering a total area of 97,631.4798 Ha. The EPL No. 5881 was granted on the 25/02/2015 and will expire on the 24/02/2019. The proponent intends to continue with prospecting for Base and Rare Metals, Dimension Stones, Industrial Minerals, Precious Metals and Semi-Precious Stones using techniques such as mapping, geophysical surveys, sampling and drilling, starting with the desktop studies, followed by regional and local field-based activities that are subject to successful discovery of any potential economic minerals resources. The proponent is required to undertake Environmental Assessment comprising Environmental Scoping and Environmental Management Plan (EMP) for the proposed minerals prospecting activities. The Environmental Assessment process must be undertaken in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). In fulfilment of the environmental requirements, the proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultants led by Dr. Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to prepare the Scoping and EMP Report in order to support the application for Environmental Clearance Certificate (ECC). The public / all Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed minerals exploration activities in the EPL No. 5881.

REGISTER BY EMAIL: frontdesk@rbs.com.na or FAX 061-306059.
DEADLINE FOR WRITTEN SUBMISSIONS IS: FRIDAY 3rd MARCH 2017



Risk-Based Solutions (RBS) CC - We are Delivering the Solutions

For More Information Please Contact Dr. Sindila Mwiya (*PhD, PG Cert, MPhil, BEng (Hons), Pr Eng) (EAP)*, Tel: 061-306058; Fax: 061-306059; Cell: 081277-2546, Global Office at URL: www.rbs.com.na

Figure 4.6: Copy of the public notice that was published in the Observer newspaper dated 24th February 2017.

PUBLIC NOTICE BY GIDEON HAMUKWAYA APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) FOR EPL No. 5897, GROOTFONTEIN DISTRICT, OTJOZONDJUPA REGION

Gideon Hamukwaya (the Proponent) holds mineral rights under the Exclusive Prospecting Licence (EPL) No. 5897 covering a total area of 49741 Ha. The EPL 5897 was granted on the 03/02/2016 and will expire on the 02/02/2019. The proponent intends to continue with prospecting for Base and Rare Metals, Dimension Stones, Industrial Minerals, Precious Metals, Precious Stones and Semi-Precious Stones using techniques such as geological mapping, geophysical surveys, trenching, sampling and drilling, starting with the desktop studies, followed by regional and local field-based activities that are subject to successful discovery of any potential economic minerals resources. The proponent is required to undertake Environmental Assessment comprising Environmental Scoping and Environmental Management Plan (EMP) for the proposed minerals prospecting activities. The Environmental Assessment process must be undertaken in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). In fulfilment of the environmental requirements, the proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultants led by Dr. Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to prepare the Scoping and EMP Report in order to support the application for Environmental Clearance Certificate (ECC). The public / all Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed minerals exploration activities in the EPL 5897.

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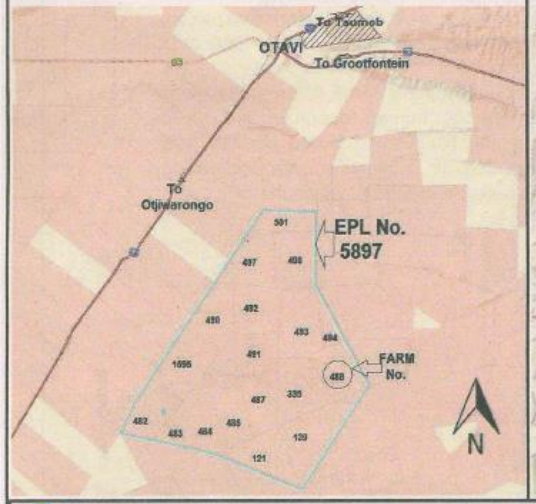
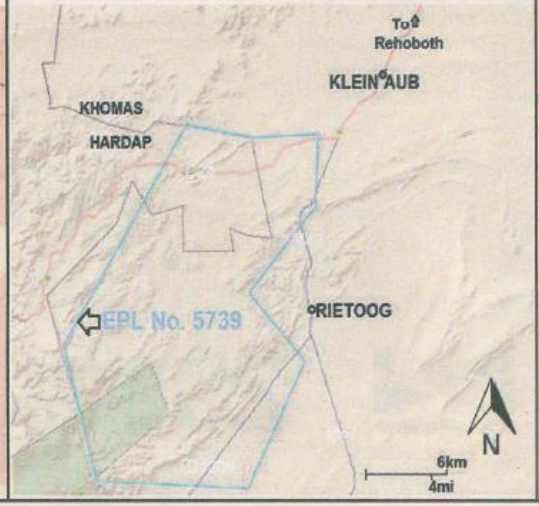
DEADLINE FOR WRITTEN SUBMISSIONS IS:
FRIDAY 3rd MARCH 2017



PUBLIC NOTICE BY FORESIGHT RESOURCES (FORE) CC APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) FOR EPL No. 5739 REHOBOTH/ WINDHOEK DISTRICTS, HARDAP/ KHOMAS REGIONS

Foresight Resources (FORE) CC (the Proponent) holds mineral rights under the Exclusive Prospecting Licence (EPL) No. 5739 covering a total area of 54,204.2111 Ha. The EPL No. 5739 was granted on the 10/06/2014 and will expire on the 09/06/2018. The proponent intends to continue with prospecting for Base and Rare Metals, Industrial Minerals, Precious Metals and Precious Stones using techniques such as mapping, geophysical surveys, sampling and drilling, starting with the desktop studies, followed by regional and local field-based activities that are subject to successful discovery of any potential economic minerals resources. The proponent is required to undertake Environmental Assessment comprising Environmental Scoping and Environmental Management Plan (EMP) for the proposed minerals prospecting activities. The Environmental Assessment process must be undertaken in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). In fulfilment of the environmental requirements, the proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultants led by Dr. Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to prepare the Scoping and EMP Report in order to support the application for Environmental Clearance Certificate (ECC). The public / all Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed minerals exploration activities in the EPL 5739.

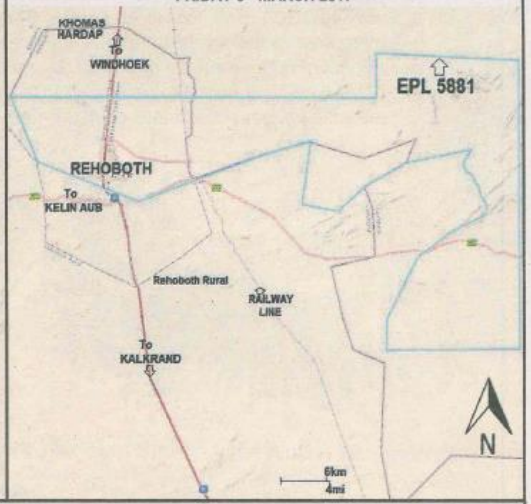
REGISTER BY EMAIL: frontdesk@rbs.com.na or FAX 061-306059.
DEADLINE FOR WRITTEN SUBMISSIONS IS:
FRIDAY 3rd MARCH 2017



PUBLIC NOTICE BY PRIMARY RESOURCES NAMIBIA CC APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) FOR EPL No. 5881 REHOBOTH DISTRICT, HARDAP REGION

Primary Resources Namibia CC (the Proponent) holds mineral rights under the Exclusive Prospecting Licence (EPL) No. 5881 covering a total area of 97,631.4798 Ha. The EPL No. 5881 was granted on the 25/02/2015 and will expire on the 24/02/2019. The proponent intends to continue with prospecting for Base and Rare Metals, Dimension Stones, Industrial Minerals, Precious Metals and Semi-Precious Stones using techniques such as mapping, geophysical surveys, sampling and drilling, starting with the desktop studies, followed by regional and local field-based activities that are subject to successful discovery of any potential economic minerals resources. The proponent is required to undertake Environmental Assessment comprising Environmental Scoping and Environmental Management Plan (EMP) for the proposed minerals prospecting activities. The Environmental Assessment process must be undertaken in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). In fulfilment of the environmental requirements, the proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultants led by Dr. Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to prepare the Scoping and EMP Report in order to support the application for Environmental Clearance Certificate (ECC). The public / all Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed minerals exploration activities in the EPL No. 5881.

REGISTER BY EMAIL: frontdesk@rbs.com.na or FAX 061-306059.
DEADLINE FOR WRITTEN SUBMISSIONS IS:
FRIDAY 3rd MARCH 2017



Risk-Based Solutions (RBS) CC - We are Delivering the Solutions

For More Information Please Contact Dr. Sindila Mwiya (*PhD, PG Cert, MPhil, BEng (Hons), Pr Eng) (EAP)*, Tel: 061-306058; Fax: 061-306059; Cell: 081277-2546, Global Office at URL: www.rbs.com.na

Figure 4.7: Copy of the public notice that was published in the Confidente newspaper dated 23rd February -1st March 2017.

5. IMPACT ASSESSMENT RESULTS

5.1 Assessment Procedure

The Environmental Assessment process that has been undertaken with respect to the proposed exploration programme for the EPL No. 5897 has been conducted in accordance with the provisions of the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007).

5.2 Alternatives and Ecosystem Assessments

The following alternatives have been considered:

(i) **EPL Location:** A number of economic minerals deposits such as the B2 Gold mine are known to exist in in the general area linked to the regional geology of the EPL area. The proponent intends to explore / prospect for all the licensed minerals groups likely to be associated with the regional and local geology. The minerals occurrences are site-specific and related to the regional and local geology of a specific area to which there are no alternatives sites to consider. The only other alternative is the no-action option (no exploration activities are implemented);

(ii) **The No-Action Alternative** - A comparative assessment of the environmental impacts of the 'no-action' alternative (a future in which the proposed / ongoing exploration activities do not take place) has been undertake. An assessment of the environmental impacts of a future, in which the proposed / ongoing exploration and possible discovery of economic minerals resources does not take place, may be good for the receiving environment because there be no negative environmental impacts due to the proposed minerals exploration or possible mining operation that may take place in the EPL area in an event of a discovery of economic minerals resources. The environmental benefits will include no negative environmental impact on the receiving environment. However, it is important to understand that even if the proposed / ongoing exploration activities do not take, to which the likely negative environmental impacts are likely to be low and localised, the current and other future land uses such as agriculture and tourism will still have some negative impacts on the receiving environment. The likely negative environmental impacts of other current and future land use that may still happen in the absence of the proposed / ongoing minerals exploration activities includes: Land degradation due to drought, poor land management practices, erosion and overgrazing. Furthermore, it's also important to understand what benefits might be lost if the proposed / ongoing exploration activities do not take place. Key loses that may never be realised if the proposed / ongoing project activities do not go-ahead include: Loss of potential added value to the unknown underground minerals resources that maybe found within the EPL No. 5897, socioeconomic benefits derived from current and future exploration, direct and indirect contracts and employment opportunities, export earnings, foreign direct investments, license rental fees, royalties and various other taxes payable to the Government;

(iii) **Other Alternative Land Uses:** The EPL area fall within the well commercial agricultural land uses area dominated by crop farming (wheat and maize), game, cattle and small stock farming. The growing game farming is also making tourism a vital socioeconomic opportunity in the general area. Minerals exploration and mining activities are well known land uses options in Namibia and the surrounding EPL. Due to the limited scope of the proposed / ongoing exploration and the implementation of the EMP, it's likely that the proposed / ongoing exploration can coexist with the current land uses;

(iv) **Potential Land Use Conflicts:** Considering the current land use practices (agriculture and tourism) as well as potential other land uses including exploration, it's likely that the economic spin-off from any positive exploration outcomes leading to the development of a mine in the general area can still co-exist with the existing and potential future land use options of the general area. However, much more detail assessment of any likely visual and

other socioeconomic impacts will need to be undertaken as part of the full EIA that must be undertaken as part of the prefeasibility and feasibility studies if economic minerals resources are discovered. The use of thematic mapping thereby delineating zones for specific uses such as conservation, mining or tourism etc, within the EPL area will greatly improve the multiple land use practices and promote coexistence;

(v) **Ecosystem Function** (**What the Ecosystem Does**)**:** There are wildlife habitats, carbon cycling or the trapping of nutrients and characterised by the physical, chemical, and biological processes or attributes that contribute to the self-maintenance of an ecosystem in this area. The proposed / ongoing exploration activities will not affect the ecosystem function due to the limited scope of the proposed / ongoing activities because the ecosystem of this EPL area is part of the larger local and regional ecosystems which are all interlinked;

(vi) **Ecosystem Services:** Food chain, harvesting of animals or plants, and the provision of clean water or scenic views are some of the local ecosystem services associated with the EPL area. However, the proposed / ongoing exploration activities will not affect the ecosystem services due to the limited scope and area of coverage of the proposed / ongoing activities because the ecosystem of this EPL area is part of the larger local and regional ecosystems which are all interlinked;

(vii) **Use Values**: The EPL area has direct use for other land uses such as agriculture, conservation and tourism as well as indirect include watching a television show about the general area and its wildlife, food chain linkages that sustains the complex life within this area and bequest value for future generations to enjoy. The proposed / ongoing exploration activities will not destroy the current use values due to the limited scope of the proposed / ongoing activities as well as the adherence to the provisions of the EMP as detailed in Chapter 6 of this report, and;

(viii) **Non-Use or Passive Use**: The EPL area has an existence value that is not linked to the direct use / benefits to current or future generations. The proposed / ongoing exploration activities will not affect ecosystem current or future none or passive uses due to the limited scope of the proposed / ongoing activities that will leave much of the EPL area untouched because the ecosystem of this EPL area is part of the larger local and regional ecosystems which are all interlinked.

5.2.2 Summary of Key Issues Considered in the Assessment Process

5.2.2.1 Sources of Impacts (Proposed / Ongoing Project Activities)

The ongoing exploration activities being undertaken in the EPL 5897 and as assessed in this environmental assessment covering Environmental Scoping and Environmental Management Plan (EMP) are as follows:

(i) Initial desktop exploration activities (no field-work undertaken);

(ii) Regional reconnaissance field-based mapping and sampling activities;

(iii) Initial local field-based mapping and sampling activities;

(iv) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling, and;

(v) Prefeasibility and feasibility studies leading to test mining and mining if proves positive.

5.2.2.2 Likely Environmental Impacts

The likely negative impacts that the proposed / ongoing project activities (exploration / prospecting) would have on the receiving environment would depend on the extent of the proposed / ongoing

exploration, management of the area and how the proposed mitigations are eventually implemented by the proponent. The following is the summary of the likely key components of the receiving environment (physical, biological, socioeconomic environments and ecosystem functions, services, use and non-use values or passive uses) that have been assessed in this report and are likely to be impacted by the proposed / ongoing exploration / prospecting activities:

(i) Impacts on the Physical Environment such as the following:

- ❖ Natural Environment such as air quality, surface water, groundwater, dust noise, waste water management and solid waste management etc;
- ❖ Built Environment such as Land Use and User Conflicts (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure, and;
- ❖ Socioeconomic and Cultural / Archaeological–Characteristics of the local societies and communities' matters.

(ii) Impacts on the Biological Environment such as the following:

- ❖ Flora and fauna;
- ❖ Habitat, and;
- ❖ Ecosystem functions, services, use values and non-use or passive use.

5.3 Impact Assessment Criteria

5.3.1 Approach

The impact assessment methodology adapted for this EPL are in line with the Terms of Reference (ToR) and the national environmental regulatory requirements. The overall impact assessment approach has adopted the Leopold matrix framework which is one of the internationally best-known matrix assessment methodology available for predicting the impact of a project on the receiving environment (Table 5.1).

Table 5.1: The impact matrix for the proposed / ongoing exploration in the EPL No. 5897.

ENVIRONMENTAL IMPACT KEY Likely Impact No Impacts			RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES)						
			PHYSICAL ENVIRONMENT			BIOLOGICAL ENVIRONMENT			
SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES	Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	Flora	Fauna	Habitat	Ecosystem [Services, Function, Use and Non Use Values
	1. INITIAL DESKTOP EXPLORATION ACTIVITIES	(i) General evaluation of the EPL area covering satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment							
		(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data							
		(iii) Purchase and analysis of existing Government aerial hyperspectral data if available							
		(iv) Interpretation of the results and delineating of potential targets for future reconnaissance regional field-based activities if potential targets have been delineated							
	2. REGIONAL RECONNAISSANCE FIELD-BASED ACTIVITIES	(i) Regional geological, topographical and remote sensing mapping and data analysis							
		(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken							
		(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken							
		(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days							
		(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets							

Table 5.1: *Cont.*

ENVIRONMENTAL IMPACT KEY Likely Impact No Impacts			RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES)						
			PHYSICAL ENVIRONMENT			BIOLOGICAL ENVIRONMENT			
EXPLORATION STAGES		ACTIVITIES	Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
SOURCES OF POTENTIAL IMPACT	**3. INITIAL LOCAL FIELD-BASED ACTIVITIES**	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional geochemical sampling and analysis undertaken							
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken							
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)							
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)							
		(v) Field-based support and logistical activities will be very limited because the local field-based activities will only focus on a site-specific area for a very short time (maximum five (5) days)							
		(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets							

Table 5.1: *Cont.*

ENVIRONMENTAL IMPACT KEY Likely Impact No Impacts			RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES)						
			PHYSICAL ENVIRONMENT			BIOLOGICAL ENVIRONMENT			
SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES	Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure)	Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
	4. DETAILED LOCAL FIELD-BASED ACTIVITIES	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional geochemical sampling and analysis undertaken							
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken							
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above);							
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)							
		(v) Drilling of boreholes (Subject to the outcomes of i - vi above)							
		(vi) Sampling (Subject to the outcomes of i -vi above)							
		(vii) Access preparation and related logistics to support activities							
		(viii) Laboratory analysis's of collected samples							

Table 5.1: *Cont.*

ENVIRONMENTAL IMPACT KEY Likely Impact No Impacts			RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES)						
			PHYSICAL ENVIRONMENT			BIOLOGICAL ENVIRONMENT			
EXPLORATION STAGES		ACTIVITIES	Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
SOURCES OF POTENTIAL IMPACT	**5. PREFEASIBILITY AND FEASIBILITY STUDIES**	(i) Detailed site-specific surveys							
		(ii) Detailed geological mapping							
		(iii) Additional detailed drilling and bulk sampling and testing							
		(iv) Ore reserve calculations							
		(v) Geotechnical studies for mine design							
		(vi) Detailing technical viability studies including forecasts of estimated expenditure and financial							
		(vii) Mine planning and designs including all supporting infrastructures (water, energy and access							
		(viii) Environmental Impact Assessment for mining							
		(ix) Environmental Management Plan for mining							
		(x) Test mining activities							
		(xi) Preparation of feasibility report and application for Mining License							
		(xii) Field-based support and logistical activities will be very extensive because the local field-based activities will on a specific area for a very long time (up to one year or more in some instances)							

5.4 Evaluation of Impacts

5.4.1 Impact Factors (Project Activities)

The proposed / ongoing exploration activities have been characterised as sources of impact and have been classified into impact factors resulting in key issues in order to assess the likely impacts of the proposed / ongoing individual project activities on the natural, built, socioeconomic, cultural, flora, fauna, habitat and ecosystem services, function, use and non-use values components of the receiving environment. Impact factors (proposed / ongoing exploration activities) have been evaluated separately for each environmental component relevant for the scope of this study.

5.4.2 Evaluation of Project Activities Impacts

5.4.2.1 Summary Overview

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

(i) Impact Severity: The severity of an impact is a function of a range of considerations;

(ii) Likelihood of Occurrence (Probability): How likely is the impact to occur?

5.4.2.2 Severity Criteria for Environmental Impacts

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

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

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

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

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

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

SCALE		DESCRIPTION
T		Temporary
P		Permanent

Table 5.4: Scored geographical extent of the induced change.

SCALE		DESCRIPTION
L		limited impact on location
O		impact of importance for municipality;
R		impact of regional character
N		impact of national character
M		impact of cross-border character

5.4.2.3 Likelihood (Probability) of Occurrence

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

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

SCALE		DESCRIPTION
A		Extremely unlikely (e.g. never heard of in the industry)
B		Unlikely (e.g. heard of in the industry but considered unlikely)
C		Low likelihood (egg such incidents/impacts have occurred but are uncommon)
D		Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)
E		High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)

5.4.3 Project Activities Summary of Impacts Results

The results of the impacts assessment and evaluation has adopted a matrix framework similar to the Leopold matrix. Assessment results of the magnitude, duration, extent and probability of the potential impacts due to the proposed / ongoing project activities interacting with the receiving environment are presented in form of a matrix table as shown in Tables 5.6-5.9. The overall severity of potential environmental impacts of the proposed / ongoing project activities on the receiving environment will be of low magnitude (Table 5.6), temporally duration (Table 5.7), localised extent (Table 5.6) and low probability of occurrence (Table 5.9) due to the limited scope of the proposed activities and the use of step progression approach in advancing exploration.

The step progressional approach will allow the proponent to the results of exploration success and the implementation of the next stage of exploration will be subject to the positive outcomes of previous activities as graded (Tables 5.6-5.9). It is important to note that the assessment of the likely impacts as shown in Tables 5.6-5.9 have been considered without the implementation of mitigation measures detailed in Section 6 of this Report. The need for implementation of the appropriate mitigation measures as presented in the Section 6 of this report have be determined on the results of the impact assessment (Tables 5.6-5.9) and the significant impacts as detailed in Tables 5.10 and 5.11.

Table 5.6: Results of the scored on a scale from 0 to 5 for negative impact magnitude.

ENVIRONMENTAL IMPACT KEY

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

SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	BIOLOGICAL ENVIRONMENT: Flora	Fauna	Habitat	Ecosystem [Services, Function, Use and Non Use Values
	1. INITIAL DESKTOP EXPLORATION ACTIVITIES	(i) General evaluation of the EPL area covering satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment	0	0	0	0	0	0	0
		(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	0	0	0	0	0	0	0
		(iii) Purchase and analysis of existing Government aerial hyperspectral data if available	0	0	0	0	0	0	0
		(iv) Interpretation of the results and delineating of potential targets for future reconnaissance regional field-based activities if potential targets have been delineated	0	0	0	0	0	0	0
	2. REGIONAL RECONNAISSANCE FIELD-BASED ACTIVITIES	(i) Regional geological, topographical and remote sensing mapping and data analysis	0	0	0	0	0	0	0
		(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	0	0	0	0	0	0	0
		(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	0	0	0	0	0	0	0
		(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	2	2	2	2	2	2	2
		(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	0	0	0	0	0	0	0

Table 5.6: *Cont.*

ENVIRONMENTAL IMPACT KEY

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

EXPLORATION STAGES		ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	BIOLOGICAL ENVIRONMENT: Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
SOURCES OF POTENTIAL IMPACT	**3. INITIAL LOCAL FIELD-BASED ACTIVITIES**	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional geochemical sampling and analysis undertaken	2	0	0	2	2	2	2
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	0	0	0	0	0	0	0
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	2	2	2	2	2	2	2
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	2	2	2	2	2	2	2
		(v) Field-based support and logistical activities will be very limited because the local field-based activities will only focus on a site-specific area for a very short time (maximum five (5) days)	2	2	2	2	2	2	2
		(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	0	0	0	0	0	0	0

Table 5.6: *Cont.*

ENVIRONMENTAL IMPACT KEY

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

SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment –Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological–Characteristics of the local societies and communities matters	BIOLOGICAL ENVIRONMENT: Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
	4. DETAILED LOCAL FIELD-BASED ACTIVITIES	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional geochemical sampling and analysis undertaken	1	1	1	1	1	1	1
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	0	0	0	0	0	0	0
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above);	2	2	2	2	2	2	2
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	2	2	2	2	2	2	2
		(v) Drilling of boreholes (Subject to the outcomes of i - vi above)	3	3	3	3	3	3	3
		(vi) Sampling (Subject to the outcomes of i -vi above)	3	3	3	3	3	3	3
		(vii) Access preparation and related logistics to support activities	3	3	3	3	3	3	3
		(viii) Laboratory analysis's of collected samples	0	0	0	0	0	0	0

Table 5.6: *Cont.*

ENVIRONMENTAL IMPACT KEY

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

EXPLORATION STAGES	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment –Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological–Characteristics of the local societies and communities matters	PHYSICAL ENVIRONMENT: Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
SOURCES OF POTENTIAL IMPACT								
5. PREFEASIBILITY AND FEASIBILITY STUDIES	(i) Detailed site-specific surveys	0	0	0	0	0	0	0
	(ii) Detailed geological mapping	0	0	0	0	0	0	0
	(iii) Additional detailed drilling and bulk sampling and testing	2	0	3	3	3	3	3
	(iv) Ore reserve calculations	0	0	0	0	0	0	0
	(v) Geotechnical studies for mine design	0	0	0	0	0	0	0
	(vi) Detailing technical viability studies including forecasts of estimated expenditure and financial	0	0	0	0	0	0	0
	(vii) Mine planning and designs including all supporting infrastructures (water, energy and access	0	0	0	0	0	0	0
	(viii) Environmental Impact Assessment for mining	0	0	0	0	0	0	0
	(ix) Environmental Management Plan for mining	0	0	0	0	0	0	0
	(x) Test mining activities	4	4	4	4	4	4	4
	(xi) Preparation of feasibility report and application for Mining License	0	0	0	0	0	0	0
	(xii) Field-based support and logistical activities will be very extensive because the local field-based activities will on a specific area for a very long time (up to one year or more in some instances)	3	3	3	3	3	3	3

Table 5.7: Results of the scored time period over which the impact is expected to last.

ENVIRONMENTAL IMPACT KEY			SOURCES OF POTENTIAL IMPACT		RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES)						
					PHYSICAL ENVIRONMENT			BIOLOGICAL ENVIRONMENT			
SCALE		DESCRIPTION	EXPLORATION STAGES	ACTIVITIES	Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	Flora	Fauna	Habitat	Ecosystem [Services, Function, Use and Non Use Values
T		Temporary	1. INITIAL DESKTOP EXPLORATION ACTIVITIES	(i) General evaluation of the EPL area covering satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment	T	T	T	T	T	T	T
P		Permanent		(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	T	T	T	T	T	T	T
				(iii) Purchase and analysis of existing Government aerial hyperspectral data if available	T	T	T	T	T	T	T
				(iv) Interpretation of the results and delineating of potential targets for future reconnaissance regional field-based activities if potential targets have been delineated	T	T	T	T	T	T	T
			2. REGIONAL RECONNAISSANCE FIELD-BASED ACTIVITIES	(i) Regional geological, topographical and remote sensing mapping and data analysis	T	T	T	T	T	T	T
				(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	T	T	T	T	T	T	T
				(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	T	T	T	T	T	T	T
				(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	T	T	T	T	T	T	T
				(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	T	T	T	T	T	T	T

Table 5.7: *Cont.*

ENVIRONMENTAL IMPACT KEY			RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES)						
SCALE		DESCRIPTION	PHYSICAL ENVIRONMENT			BIOLOGICAL ENVIRONMENT			
T		Temporary	Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
P		Permanent							

SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES							
	3. INITIAL LOCAL FIELD-BASED ACTIVITIES	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional geochemical sampling and analysis undertaken	T	T	T	T	T	T	T
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	T	T	T	T	T	T	T
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	T	T	T	T	T	T	T
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	T	T	T	T	T	T	T
		(v) Field-based support and logistical activities will be very limited because the local field-based activities will only focus on a site-specific area for a very short time (maximum five (5) days)	T	T	T	T	T	T	T
		(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	T	T	T	T	T	T	T

Table 5.7: *Cont.*

ENVIRONMENTAL IMPACT KEY

SCALE		DESCRIPTION
T		Temporary
P		Permanent

SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	BIOLOGICAL ENVIRONMENT: Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
	4. DETAILED LOCAL FIELD-BASED ACTIVITIES	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional geochemical sampling and analysis undertaken	T	T	T	T	T	T	T
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	T	T	T	T	T	T	T
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above);	T	T	T	T	T	T	T
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	T	T	T	T	T	T	T
		(v) Drilling boreholes (Subject to the outcomes of i - vi above)	T	T	T	T	T	T	T
		(vi) Bulk Sampling (Subject to the outcomes of i -vi above)	P	P	P	P	P	P	P
		(vii) Access preparation and related logistics to support activities	T	T	T	T	T	T	T
		(viii) Laboratory analysis's of collected samples	T	T	T	T	T	T	T

Table 5.7: *Cont.*

ENVIRONMENTAL IMPACT KEY

SCALE		DESCRIPTION
T		Temporary
P		Permanent

	EXPLORATION STAGES	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	PHYSICAL ENVIRONMENT: Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
SOURCES OF POTENTIAL IMPACT	**5. PREFEASIBILITY AND FEASIBILITY STUDIES**	(i) Detailed site-specific surveys	T	T	T	T	T	T	T
		(ii) Detailed geological mapping	T	T	T	T	T	T	T
		(iii) Additional detailed drilling and bulk sampling and testing	T	T	T	T	T	T	T
		(iv) Ore reserve calculations	T	T	T	T	T	T	T
		(v) Geotechnical studies for mine design	T	T	T	T	T	T	T
		(vi) Detailing technical viability studies including forecasts of estimated expenditure and financial	T	T	T	T	T	T	T
		(vii) Mine planning and designs including all supporting infrastructures (water, energy and access	T	T	T	T	T	T	T
		(viii) Environmental Impact Assessment for mining	T	T	T	T	T	T	T
		(ix) Environmental Management Plan for mining	T	T	T	T	T	T	T
		(x) Test mining activities	P	P	P	P	P	P	P
		(xi) Preparation of feasibility report and application for Mining License	T	T	T	T	T	T	T
		(xii) Field-based support and logistical activities will be very extensive because the local field-based activities will on a specific area for a very long time (up to one year or more in some instances)	T	T	T	T	T	T	T

Table 5.8: Results of the scored geographical extent of the induced change.

ENVIRONMENTAL IMPACT KEY

SCALE		DESCRIPTION
L		limited impact on location
O		impact of importance for municipality
R		impact of regional character
N		impact of national character
M		impact of cross-border character

SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES)						
			PHYSICAL ENVIRONMENT			BIOLOGICAL ENVIRONMENT			
			Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	Flora	Fauna	Habitat	Ecosystem [Services, Function, Use and Non Use Values
	1. INITIAL DESKTOP EXPLORATION ACTIVITIES	(i) General evaluation of the EPL area covering satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment	L	L	L	L	L	L	L
		(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	L	L	L	L	L	L	L
		(iii) Purchase and analysis of existing Government aerial hyperspectral data if available	L	L	L	L	L	L	L
		(iv) Interpretation of the results and delineating of potential targets for future reconnaissance regional field-based activities if potential targets have been delineated	L	L	L	L	L	L	L
	2. REGIONAL RECONNAISSANCE FIELD-BASED ACTIVITIES	(i) Regional geological, topographical and remote sensing mapping and data analysis	L	L	L	L	L	L	L
		(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	L	L	L	L	L	L	L
		(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	L	L	L	L	L	L	L
		(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	L	L	L	L	L	L	L
		(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	L	L	L	L	L	L	L

Table 5.8: *Cont.*

ENVIRONMENTAL IMPACT KEY

SCALE		DESCRIPTION
L		limited impact on location
O		impact of importance for municipality
R		impact of regional character
N		impact of national character
M		impact of cross-border character

EXPLORATION STAGES		ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment –Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management etc	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological–Characteristics of the local societies and communities matters	BIOLOGICAL ENVIRONMENT: Flora	BIOLOGICAL ENVIRONMENT: Flora	BIOLOGICAL ENVIRONMENT: Habitat	BIOLOGICAL ENVIRONMENT: Ecosystem [Services, Function, Use and Non Use Values
SOURCES OF POTENTIAL IMPACT	**3. INITIAL LOCAL FIELD-BASED ACTIVITIES**	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional geochemical sampling and analysis undertaken	L	L	L	L	L	L	L
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	L	L	L	L	L	L	L
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	L	L	L	L	L	L	L
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	L	L	L	L	L	L	L
		(v) Field-based support and logistical activities will be very limited because the local field-based activities will only focus on a site-specific area for a very short time (maximum five (5) days)	L	L	L	L	L	L	L
		(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	L	L	L	L	L	L	L

Table 5.8: *Cont.*

ENVIRONMENTAL IMPACT KEY

SCALE		DESCRIPTION
L		limited impact on location
O		impact of importance for municipality
R		impact of regional character
N		impact of national character
M		impact of cross-border character

SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management etc	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological–Characteristics of the local societies and communities matters	BIOLOGICAL ENVIRONMENT: Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
	4. DETAILED LOCAL FIELD-BASED ACTIVITIES	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional geochemical sampling and analysis undertaken	L	L	L	L	L	L	L
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	L	L	L	L	L	L	L
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above);	L	L	L	L	L	L	L
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	L	L	L	L	L	L	L
		(v) Drilling boreholes (Subject to the outcomes of i - vi above)	L	L	L	L	L	L	L
		(vi) Bulk Sampling (Subject to the outcomes of i -vi above)	L	L	L	L	L	L	L
		(vii) Access preparation and related logistics to support activities	L	L	L	L	L	L	L
		(viii) Laboratory analysis's of collected samples	L	L	L	L	L	L	L

Table 5.8: *Cont.*

ENVIRONMENTAL IMPACT KEY

SCALE		DESCRIPTION
L		limited impact on location
O		impact of importance for municipality
R		impact of regional character
N		impact of national character
M		impact of cross-border character

EXPLORATION STAGES		ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES)						
			PHYSICAL ENVIRONMENT			PHYSICAL ENVIRONMENT			
			Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management etc	Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
SOURCES OF POTENTIAL IMPACT	**5. PREFEASIBILITY AND FEASIBILITY STUDIES**	(i) Detailed site-specific surveys	L	L	L	L	L	L	L
		(ii) Detailed geological mapping	L	L	L	L	L	L	L
		(iii) Additional detailed drilling and bulk sampling and testing	L	L	L	L	L	L	L
		(iv) Ore reserve calculations	L	L	L	L	L	L	L
		(v) Geotechnical studies for mine design	L	L	L	L	L	L	L
		(vi) Detailing technical viability studies including forecasts of estimated expenditure and financial	L	L	L	L	L	L	L
		(vii) Mine planning and designs including all supporting infrastructures (water, energy and access	L	L	L	L	L	L	L
		(viii) Environmental Impact Assessment for mining	L	L	L	L	L	L	L
		(ix) Environmental Management Plan for mining	L	L	L	L	L	L	L
		(x) Test mining activities	L	L	L	L	L	L	L
		(xi) Preparation of feasibility report and application for Mining License	L	L	L	L	L	L	L
		(xii) Field-based support and logistical activities will be very extensive because the local field-based activities will on a specific area for a very long time (up to one year or more in some instances)	L	L	L	L	L	L	L

Table 5.9: Results of the qualitative scale of probability occurrence.

ENVIRONMENTAL IMPACT KEY

SCALE		DESCRIPTION
A		Extremely unlikely (e.g. never heard of in the industry)
B		Unlikely (e.g. heard of in the industry but considered unlikely)
C		Low likelihood (egg such incidents/impacts have occurred but are uncommon)
D		Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)
E		High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)

SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management etc	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological–Characteristics of the local societies and communities matters	BIOLOGICAL ENVIRONMENT: Flora	BIOLOGICAL ENVIRONMENT: Fauna	BIOLOGICAL ENVIRONMENT: Habitat	BIOLOGICAL ENVIRONMENT: Ecosystem [Services, Function, Use and Non Use Values
	1. INITIAL DESKTOP EXPLORATION ACTIVITIES	(i) General evaluation of the EPL area covering satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment	A	A	A	A	A	A	A
		(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	A	A	A	A	A	A	A
		(iii) Purchase and analysis of existing Government aerial hyperspectral data if available	A	A	A	A	A	A	A
		(iv) Interpretation of the results and delineating of potential targets for future reconnaissance regional field-based activities if potential targets have been delineated	A	A	A	A	A	A	A
	2. REGIONAL RECONNAISSANCE FIELD-BASED ACTIVITIES	(i) Regional geological, topographical and remote sensing mapping and data analysis	A	A	A	A	A	A	A
		(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	A	A	A	A	A	A	A
		(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	A	A	A	A	A	A	A
		(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	A	A	A	A	A	A	A
		(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	A	A	A	A	A	A	A

Table 5.9: *Cont.*

ENVIRONMENTAL IMPACT KEY

SCALE		DESCRIPTION
A		Extremely unlikely (e.g. never heard of in the industry)
B		Unlikely (e.g. heard of in the industry but considered unlikely)
C		Low likelihood (egg such incidents/impacts have occurred but are uncommon)
D		Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)
E		High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)

EXPLORATION STAGES		ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management etc	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological–Characteristics of the local societies and communities matters	BIOLOGICAL ENVIRONMENT: Flora	BIOLOGICAL ENVIRONMENT: Flora	BIOLOGICAL ENVIRONMENT: Habitat	BIOLOGICAL ENVIRONMENT: Ecosystem [Services, Function, Use and Non Use Values
SOURCES OF POTENTIAL IMPACT	**3. INITIAL LOCAL FIELD-BASED ACTIVITIES**	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional geochemical sampling and analysis undertaken	C	C	C	C	C	C	C
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	A	A	A	A	A	A	A
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	C	C	C	C	C	C	C
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	C	C	C	C	C	C	C
		(v) Field-based support and logistical activities will be very limited because the local field-based activities will only focus on a site-specific area for a very short time (maximum five (5) days)	C	C	C	C	C	C	C
		(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	A	A	A	A	A	A	A

Table 5.9: *Cont.*

ENVIRONMENTAL IMPACT KEY

SCALE		DESCRIPTION
A		Extremely unlikely (e.g. never heard of in the industry)
B		Unlikely (e.g. heard of in the industry but considered unlikely)
C		Low likelihood (egg such incidents/impacts have occurred but are uncommon)
D		Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)
E		High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)

SOURCES OF POTENTIAL IMPACT			RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES)						
			PHYSICAL ENVIRONMENT			BIOLOGICAL ENVIRONMENT			
	EXPLORATION STAGES	ACTIVITIES	Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management etc	Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
	4. DETAILED LOCAL FIELD-BASED ACTIVITIES	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional geochemical sampling and analysis undertaken	C	C	C	C	C	C	C
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	A	A	A	A	A	A	A
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above);	C	C	C	C	C	C	C
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	C	C	C	C	C	C	C
		(v) Drilling boreholes (Subject to the outcomes of i - vi above)	C	C	C	C	C	C	C
		(vi) Bulk Sampling (Subject to the outcomes of i -vi above)	C	C	C	C	C	C	C
		(vii) Access preparation and related logistics to support activities	C	C	C	C	C	C	C
		(viii) Laboratory analysis's of collected samples	A	A	A	A	A	A	A

Table 5.9: *Cont.*

ENVIRONMENTAL IMPACT KEY

SCALE		DESCRIPTION
A		Extremely unlikely (e.g. never heard of in the industry)
B		Unlikely (e.g. heard of in the industry but considered unlikely)
C		Low likelihood (egg such incidents/impacts have occurred but are uncommon)
D		Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)
E		High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)

SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management etc	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological–Characteristics of the local societies and communities matters	PHYSICAL ENVIRONMENT: Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
	5. PREFEASIBILITY AND FEASIBILITY STUDIES	(i) Detailed site-specific surveys	B	B	B	B	B	B	B
		(ii) Detailed geological	A	A	A	A	A	A	A
		(iii) Additional detailed drilling and bulk sampling and testing	D	D	D	D	D	D	D
		(iv) Ore reserve calculations	A	A	A	A	A	A	A
		(v) Geotechnical studies for mine design	A	A	A	A	A	A	A
		(vi) Detailing technical viability studies including forecasts of estimated expenditure and financial	A	A	A	A	A	A	A
		(vii) Mine planning and designs including all supporting infrastructures (water, energy and access	A	A	A	A	A	A	A
		(viii) Environmental Impact Assessment for mining	A	A	A	A	A	A	A
		(ix) Environmental Management Plan for mining	A	A	A	A	A	A	A
		(x) Test mining activities	D	D	D	D	D	D	D
		(xi) Preparation of feasibility report and application for Mining License	A	A	A	A	A	A	A
		(xii) Field-based support and logistical activities will be very extensive because the local field-based activities will on a specific area for a very long time (up to one year or more in some instances)	D	D	D	D	D	D	D

5.5 Evaluation of Significant Impacts

5.5.1 Overview

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

5.5.2 Significance Criteria

Significance criteria for negative/adverse impacts (i.e., relative ranking of importance) are defined in Table 5.10. It is important to note that impacts have been considered without the implementation of mitigation measures. The need for and appropriate mitigation measures as presented in the EMP Section 6 of this report have be determined on the basis of the impact assessment presented in this report.

Table 5.10: Scored impact significance criteria.

	IMPACT LIKELIHOOD				
IMPACT SEVERITY	Extremely Unlikely **[0]**	Unlikely **[1]**	Low Likelihood **[2]**	Medium Likelihood **[3]**	High Likelihood **[4]**
Negligible **[A]**	Negligible Impact **[A0]**	Negligible Impact **[A1]**	Negligible Impact **[A2]**	Negligible Impact **[A3]**	Negligible Impact **[A4]**
Low **[B]**	Negligible Impact **[B0]**	Negligible Impact **[B1]**	Negligible Impact **[B2]**	Negligible to Low Impact **[B3]**	Low Impact **[B4]**
Medium **[C]**	Negligible Impact **[C0]**	Negligible Impact **[C1]**	Low Impact **[C2]**	Low to Medium Impact **[C3]**	Medium Impact **[C4]**
High **[D]**	Negligible to Low Impact **[D0]**	Low Impact **[D1]**	Medium Impact **[D2]**	High Impact **[D3]**	High to Unacceptable Impact **[D4]**

5.5.3 Assessment Likely Significant Impacts

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

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

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

Table 5.11: Significant impact assessment matrix for the proposed / ongoing exploration activities.

ENVIRONMENTAL IMPACT KEY

IMPACT SEVERITY	IMPACT LIKELIHOOD: Extremely Unlikely [0]	Unlikely [1]	Low Likelihood [2]	Medium Likelihood [3]	High Likelihood [4]
Slight [A]	[A0]	[A1]	[A2]	[A3]	[A4]
Low [B]	[B0]	[B1]	[B2]	[B3]	[B4]
Medium [C]	[C0]	[C1]	[C2]	[C3]	[C4]
High [D]	[D0]	[D1]	[D2]	[D3]	[D4]

SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological–Characteristics of the local societies and communities matters	BIOLOGICAL ENVIRONMENT: Flora	Fauna	Habitat	Ecosystem [Services, Function, Use and Non Use Values
	1. INITIAL DESKTOP EXPLORATION ACTIVITIES	(i) General evaluation of the EPL area covering satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(iii) Purchase and analysis of existing Government aerial hyperspectral data if available	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(iv) Interpretation of the results and delineating of potential targets for future reconnaissance regional field-based activities if potential targets have been delineated	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
	2. REGIONAL RECONNAISSANCE FIELD-BASED ACTIVITIES	(i) Regional geological, topographical and remote sensing mapping and data analysis	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]

Table 5.11: *Cont.*

ENVIRONMENTAL IMPACT KEY

IMPACT SEVERITY	IMPACT LIKELIHOOD				
	Extremely Unlikely [0]	Unlikely [1]	Low Likelihood [2]	Medium Likelihood [3]	High Likelihood [4]
Slight [A]	[A0]	[A1]	[A2]	[A3]	[A4]
Low [B]	[B0]	[B1]	[B2]	[B3]	[B4]
Medium [C]	[C0]	[C1]	[C2]	[C3]	[C4]
High [D]	[D0]	[D1]	[D2]	[D3]	[D4]

EXPLORATION STAGES		ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES)						
			PHYSICAL ENVIRONMENT			BIOLOGICAL ENVIRONMENT			
			Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management etc	Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
SOURCES OF POTENTIAL IMPACT	**3. INITIAL LOCAL FIELD-BASED ACTIVITIES**	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional geochemical sampling and analysis undertaken	[B2]	[B2]	[B2]	[B2]	[B2]	[B2]	[B2]
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	[B2]	[B2]	[B2]	[B2]	[B2]	[B2]	[B2]
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	[B2]	[B2]	[B2]	[B2]	[B2]	[B2]	[B2]
		(v) Field-based support and logistical activities will be very limited because the local field-based activities will only focus on a site-specific area for a very short time (maximum five (5) days)	[B2]	[B2]	[B2]	[B2]	[B2]	[B2]	[B2]
		(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]

Table 5.11: *Cont.*

ENVIRONMENTAL IMPACT KEY

IMPACT SEVERITY	IMPACT LIKELIHOOD: Extremely Unlikely [0]	Unlikely [1]	Low Likelihood [2]	Medium Likelihood [3]	High Likelihood [4]
Slight [A]	[A0]	[A1]	[A2]	[A3]	[A4]
Low [B]	[B0]	[B1]	[B2]	[B3]	[B4]
Medium [C]	[C0]	[C1]	[C2]	[C3]	[C4]
High [D]	[D0]	[D1]	[D2]	[D3]	[D4]

SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) — PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment –Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management etc	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological– Characteristics of the local societies and communities matters	BIOLOGICAL ENVIRONMENT: Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
	4. DETAILED LOCAL FIELD-BASED ACTIVITIES	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional geochemical sampling and analysis undertaken	[D2]	[D2]	[D2]	[D2]	[D2]	[D2]	[D2]
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above);	[D2]	[D2]	[D2]	[D2]	[D2]	[D2]	[D2]
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	[D2]	[D2]	[D2]	[D2]	[D2]	[D2]	[D2]
		(v) Drilling boreholes (Subject to the outcomes of i - vi above)	[D2]	[D2]	[D2]	[D2]	[D2]	[D2]	[D2]
		(vi) Bulk Sampling (Subject to the outcomes of i -vi above)	[D2]	[D2]	[D2]	[D2]	[D2]	[D2]	[D2]
		(vii) Access preparation and related logistics to support activities	[D2]	[D2]	[D2]	[D2]	[D2]	[D2]	[D2]
		(viii) Laboratory analysis's of collected samples	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]

Table 5.11: *Cont.*

ENVIRONMENTAL IMPACT KEY

IMPACT SEVERITY	IMPACT LIKELIHOOD: Extremely Unlikely [0]	Unlikely [1]	Low Likelihood [2]	Medium Likelihood [3]	High Likelihood [4]
Slight [A]	[A0]	[A1]	[A2]	[A3]	[A4]
Low [B]	[B0]	[B1]	[B2]	[B3]	[B4]
Medium [C]	[C0]	[C1]	[C2]	[C3]	[C4]
High [D]	[D0]	[D1]	[D2]	[D3]	[D4]

SOURCES OF POTENTIAL IMPACT	EXPLORATION STAGES	ACTIVITIES	RECEPTORS / TARGETS THAT MAY BE IMPACTED (RESOURCES) – PHYSICAL ENVIRONMENT: Land Use (Agriculture, Tourism, Conservation) and Built Environment (Houses, Roads, Transport Systems, Buildings, Infrastructure	PHYSICAL ENVIRONMENT: Natural Environment – Air Quality, Surface Water, Groundwater, Dust Noise, Waste Water Management, Solid Waste Management etc	PHYSICAL ENVIRONMENT: Socioeconomic and Cultural / Archaeological–Characteristics of the local societies and communities matters	PHYSICAL ENVIRONMENT: Flora	Flora	Habitat	Ecosystem [Services, Function, Use and Non Use Values
	5. PREFEASIBILITY AND FEASIBILITY STUDIES	(i) Detailed site-specific surveys	[B2]	[B2]	[B2]	[B2]	[B2]	[B2]	[B2]
		(ii) Detailed geological	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(iii) Additional detailed drilling and bulk sampling and testing	[D3]	[D3]	[D3]	[D3]	[D3]	[D3]	[D3]
		(iv) Ore reserve calculations	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(v) Geotechnical studies for mine design	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(vi) Detailing technical viability studies including forecasts of estimated expenditure and financial	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(vii) Mine planning and designs including all supporting infrastructures (water, energy and access	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(viii) Environmental Impact Assessment for mining	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(ix) Environmental Management Plan for mining	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(x) Test mining activities	[D3]	[D3]	[D3]	[D3]	[D3]	[D3]	[D3]
		(xi) Preparation of feasibility report and application for Mining License	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]	[A0]
		(xii) Field-based support and logistical activities will be very extensive because the local field-based activities will on a specific area for a very long time (up to one year or more in some instances)	[D3]	[D3]	[D3]	[D3]	[D3]	[D3]	[D3]

5.6 Assessment of Overall Impacts

5.6.1 Summary of the Results of the Impact Assessment

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

(i) Initial desktop exploration activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[A0]**;

(ii) Regional reconnaissance field-based activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[A0]**. Some field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations. Overall significant impacts will be negligible **[B2].**

(iii) Initial local field-based activities: Initial field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations**.** Overall significant impacts will be negligible **[B2]**. All desktop related activities and laboratory assessments will have negligible impacts with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[A0]**;

(iv) Detailed local field-based activities: Overall likely negative impact on the receiving environment will be high and localised impacts without mitigations and localised low impacts with mitigations. Overall significant impacts will be medium **[D2]** without mitigations and low with mitigations**;**

(v) Prefeasibility and feasibility studies to be implemented on a site-specific area if the local field-based studies prove positive: Overall likely negative impact on the receiving environment will be high and localised impacts without mitigations and localised medium impacts with mitigations. Overall significant impacts will be high **[D3]** without mitigations and low with mitigations for bulk sampling, test mining and field logistics including exploration camp).

6. THE EMP

6.1 Summary of the EMP Objectives

The Environmental Management Plan (EMP) provides a detailed plan of action required in the implementation of the mitigation measures for minimising and maximising the identified negative and positive impacts respectively. The EMP gives commitments including financial and human resources provisions for effective management of the likely environmental liabilities during and after the exploration. Regular assessments and evaluation of the environmental liabilities during the exploration will need to be undertaken and will ensure adequate provision of the necessary resources towards good environmental management at various stages of the project development.

6.2 Implementation of the EMP

6.2.1 Roles and Responsibilities

Management of the environmental elements that may be affected by the different activities of the proposed / ongoing exploration is an important element of the proposed / ongoing exploration activities. The EMP also identifies the activity groups / environmental elements, the aspects / targets, the indicators, the schedule for implementation and who should be responsible for the management to prevent major impacts that the different exploration activities may have on the receiving environment (physical and biological environments).

6.2.2 Proponent's Representative (PR) / Project Manager (PM)

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

- Act as the site project manager and implementing agent;
- Ensure that the proponent's responsibilities are executed in compliance with the relevant legislation;
- Ensure that all the necessary environmental authorizations and permits have been obtained;
- Assist the exploration contractor/s in finding environmentally responsible solutions to challenges that may arise;
- Should the PR be of the opinion that a serious threat to, or impact on the environment may be caused by the exploration activities, he/she may stop work; the proponent must be informed of the reasons for the stoppage as soon as possible;
- The PR has the authority to issue fines for transgressions of basic conduct rules and/or contravention of the EMP;
- Should the Contractor or his/her employees fail to show adequate consideration for the environmental aspects related to the EMP, the PR can have person(s) and/or equipment removed from the site or work suspended until the matter is remedied;
- Maintain open and direct lines of communication between the landowners and proponent, as well as any other identified Interested and Affected Parties (I&APs) with regards to environmental matters; and
- Attend regular site meetings and inspections as may be required for the proposed / ongoing exploration programme.

6.2.3 Project Health, Safety and Environment (Project HSE)

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

- Assist the PR in ensuring that the necessary environmental authorizations and permits have been obtained;
- Assist the PR and Contractor in finding environmentally responsible solutions to challenges that may arise;
- Conduct environmental monitoring as per EMP requirements;
- Carry out regular site inspections (on average once per week) of all exploration areas with regards to compliance with the EMP; report any non-compliance(s) to the PR as soon as possible;
- Organize for an independent internal audit on the implementation of and compliance to the EMP to be carried out half way through each field-based exploration activity; audit reports to be submitted to the PR;
- Continuously review the EMP and recommend additions and/or changes to the EMP document;
- Monitor the Contractor's environmental awareness training for all new personnel coming onto site;
- Keep records of all activities related to environmental control and monitoring; the latter to include a photographic record of the exploration activities, rehabilitation process, and a register of all major incidents; and
- Attend regular site meetings.

6.2.4 Contractors and Subcontractors

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

- Comply with the relevant legislation and the EMP provision;
- Preparation and submission to the proponent through the Project HSE of the following Management Plans:
    - Environmental Awareness Training and Inductions;
    - Emergency Preparedness and Response;
    - Waste Management; and;
    - Health and Safety.
- Ensure adequate environmental awareness training for senior site personnel;
- Environmental awareness presentations (inductions) to be given to all site personnel prior to work commencement; the Project HSE is to provide the course content and the following topics, at least but not limited to, should be covered:
    - The importance of complying with the EMP provisions;
    - Roles and Responsibilities, including emergency preparedness;

- Basic Rules of Conduct (Do's and Don'ts);
- EMP: aspects, impacts and mitigation;
- Fines for Failure to Adhere to the EMP;
- Health and Safety Requirements.

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

❖ Attend regular site meetings and environmental inspections.

6.3 Specific Mitigation Measures

6.3.1 Hierarchy of Mitigation Measures Implementation

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

(i) Enhancement, e.g. provision of new habitats;

(ii) Avoidance, e.g. sensitive design to avoid effects on ecological receptors;

(iii) Reduction, e.g. limitation of effects on receptors through design changes; and

(iv) Compensation, e.g. community benefits.

6.3.2 Mitigation Measures Implementation

The Environmental Management Plan (EMP) provides a detailed plan of action required in the implementation of the mitigation measures for minimising and maximising the identified negative and positive impacts respectively. The EMP also provides the management actions with roles and responsibilities requirements for implementation of environmental management strategies by the proponent through the Contractors and Subcontractors who will be undertaking the exploration activities. The EMP gives commitments including financial and human resources provisions for effective management of the likely environmental liabilities during and after the implementation of the proposed / ongoing exploration programme.

Based on the findings of the Scoping work, Table 6.1 – 6.18 provides the detailed specific mitigations measures to be implemented by the proponent with respect to the proposed / ongoing exploration programme activities and in particular for the field-based exploration activities. The following is the summary of the key areas of the migration measures provided in Tables 61-6.18:

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

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

Table 6.1: Project planning and implementation.

OBJECTIVES	INDICATOR	SCHEDULE	RESPONSIBILITY
Establish a strong environmental awareness protocol from project implementation to final closure in order to ensure the least possible impact to the environment.	1. Resources (Human and Financial) are provided for the Environmental Awareness and Training, Regular Safety, Health and Environment meetings and for internal and external Environmental Monitoring Costs as well as for any rehabilitation costs that may arise. 2. Appointment of a senior and experienced persons as Proponent's Representative (PR), Project Manager (PM) and Project HSE to assume responsibility for environmental issues. 3. All individuals including sub-contractors who work on, or visit, the sites are aware of the contents of the Environmental Policy and the EMP. 4. The EMP and Environmental Policy will be included in Tender Documents. 5. Field visit will take place during which main access tracks will be discussed in cooperation with the land owner/s	1. Regional reconnaissance field-based mapping and sampling activities; 2. Initial local field-based mapping and sampling activities; 3. Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; 4. Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.2: Implementation of the EMP.

OBJECTIVES	INDICATOR	SCHEDULE	RESPONSIBILITY
1. Define roles and responsibilities in terms of the EMP. To make all personnel, contractors and subcontractors aware of these roles and responsibilities to ensure compliance with the EMP provisions. 2. Implement environmental management that is preventative and proactive. 3. Establish the resources, skills, etc. required for effective environmental management.	1. Senior staff and senior contractors are aware of, and practice the EMP requirements. These persons shall be expected to know and understand the objectives of the EMP and will, by example, encourage suitable environmentally friendly behaviour to be adopted during the exploration 2. Recognition will be given to appropriate environmentally acceptable behaviour. 3. Inappropriate behaviour will be corrected. An explanation to why the behaviour is unacceptable must be given, and, if necessary, the person will be disciplined. e.g. fees set out for non-compliance	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.3: Public and stakeholders relations.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Maintain sound relationships with the Other land users/ land owner/s and another stakeholders / public	1. No littering or any other activity prohibited 2. Permission to utilise water as well as all applicable permits are obtained.	1. Regional reconnaissance field-based mapping and sampling activities; 2. Initial local field-based mapping and sampling activities; 3. Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; 4. Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.4: Measures to enhance positive socioeconomic impacts.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Measures to enhance positive socioeconomic impacts in order to: 1. Avoid exacerbating the influx of unemployed people to the area. 2. Develop a standardised recruitment method for sub-contractor and field workers.	1. Stipulate a preference for local contractors in its tender policy. Preference to local contractors should still be based on competitive business principles and salaries and payment to local service providers should still be competitive; 2. Develop a database of local businesses that qualify as potential service providers and invite them to the tender process; 3. Scrutinise tender proposals to ensure that minimum wages were included in the costing; 4. Stipulate that local residents should be employed for temporary unskilled/skilled and where possible in permanent unskilled/skilled positions as they would reinvest in the local economy; 5. Must ensure that potential employees are from the area, they need submit proof of having lived in the area for a minimum of 5 years; 6. Must ensure that contractors adhere to Namibian Affirmative Action, Labour and Social Security, Health and Safety laws. This could be accomplished with a contractual requirement stipulating that monthly proof should be submitted indicating payment of minimum wages to workers, against their ID numbers, payment of social security and submission of affirmative action data; 7. Encouraged to cater for the needs of employees to increase the spending of wages locally.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.5: Environmental awareness briefing and training.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Implement environmental awareness briefing / training for individuals who visit, or work, on site.	1. Every senior/supervisory member of the team shall familiarise themselves with the contents of the EMP. They shall understand their roles and responsibilities with regard to personnel and project compliance with the EMP. 2. Subject to agreement of the parties, the Environmental Coordinator will hold an Environmental Awareness Briefing meeting, which shall be attended by all contractors before the start of the mineral exploration activities. 3. Briefings on the EMP and Environmental Policy shall discuss the potential dangers to the environment of the following activities: public relations, littering, off-road driving, waste management, poaching and plant theft etc. The need to preserve soil, conserve water and implement water saving measures shall be presented. 4. Individuals can be questioned on the Environmental Philosophy and EMP and can recall contents.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.6: Erection of supporting exploration infrastructure.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
1. Get Environmental Clearance before implementation 2. Establishment of the supporting exploration infrastructure done on an area with the least disturbance to the environment and within the non-sensitive areas	1. Documented Environmental Clearance from MET. 2. All on site exploration infrastructure (e.g. water tanks, sewage tanks, waste disposal) are not situated on environmental sensitive area and have disturbed as less as possible. 3. No littering.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.7: Use of existing access roads, tracks and general vehicle movements.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
1. Plan a road/track network that considers the environmental sensitivity of the area and a long-term tourism potential, and which is constructed in a technically and environmentally sound manner. 2. Stick to the recommended track and sensitivity management zones.	1. Avoid unnecessary affecting areas viewed as important habitat – i.e. Ephemeral River and its network of tributaries of ephemeral rivers; rocky outcrops; clumps of protected tree species; 2. Make use of existing tracks/roads as much as possible throughout the area; 3. Do not drive randomly throughout the area (could cause mortalities to vertebrate fauna and unique flora; accidental fires; erosion related problems, etc.); 4. Avoid off-road driving at night as this increase's mortalities of nocturnal species; 5. Implement and maintain off-road track discipline with maximum speed limits (e.g.30km/h) as this would result in fewer faunal mortalities and limit dust pollution; 6. Use of "3-point-turns" rather than "U-turns"; 7. Where tracks have to be made to potential exploration sites off the main routes, the routes should be selected causing minimal damage to the environment – e.g. use the same tracks; cross drainage lines at right angles; avoid placing tracks within drainage lines; avoid collateral damage (i.e. select routes that do not require the unnecessary removal of trees/shrubs, especially protected species); 8. Leave vehicles on tracks and walk to point of interest, when possible; 9. Rehabilitate all new tracks created.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.8: Mitigation measures for preventing flora and ecosystem destruction and promotion of conservation.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
1. Prevent flora and ecosystem destruction and promote conservation	1. Limit the development and avoid rocky outcrops throughout the entire area; 2. Avoid development and associated infrastructure in sensitive areas – e.g. Ephemeral River, in/close to drainage lines, cliffs, boulder and rocky outcrops in the area, etc. This would minimise the negative effect on the local environment especially unique features serving as habitat to various species; 3. Avoid placing access routes (roads and tracks) trough sensitive areas – e.g. over rocky outcrops/ridges and along drainage lines. This would minimise the effect on localised potentially sensitive habitats in the area; 4. Avoid driving randomly through the area (i.e. "track discipline"), but rather stick to permanently placed roads/tracks – especially during the construction phase. This would minimise the effect on localised potentially sensitive habitats in the area; 5. Stick to speed limits of maximum 30km/h as this would result in less dust pollution which could affect certain flora – e.g. lichen species. Speed humps could also be used to ensure the speed limit; 6. Remove unique and sensitive flora (e.g. all Aloe sp.) before commencing with the development activities and relocate to a less sensitive/disturbed site if possible; 7. Prevent and discourage the collecting of firewood as dead wood has an important ecological role – especially during the development phase(s). Such collecting of firewood, especially for economic reasons, often leads to abuses – e.g. chopping down of live and/or protected tree species such as Acacia erioloba which is a good quality wood; 8. Attempt to avoid the removal of bigger trees during the development phase(s) – especially with the development of access routes – as these serve as habitat for a myriad of fauna; 9. Prevent and discourage fires – especially during the development phase(s) – as this could easily cause runaway veld fires causing problems (e.g. loss of grazing and domestic stock mortalities, etc.) for the neighbouring farmers; 10. Rehabilitation of the disturbed areas – i.e. initial development access route "scars" and associated tracks as well as temporary accommodation sites. Preferably workers should be transported in/out to the construction sites on a daily basis to avoid excess damage to the local environment (e.g. fires, wood collection, poaching, etc.). Such rehabilitation would not only confirm the company's environmental integrity, but also show true local commitment to the environment; 11. Implement erosion control. The area(s) towards and adjacent the drainage line(s) are easily eroded and further development may exacerbate this problem. Avoid construction within 20m of the main drainage line(s) to minimise erosion problems as well as preserving the riparian associated fauna; 12. Conduct a thorough investigation on the flora associated with the proposed / ongoing exploration site(s); 13. Prevent the introduction of potentially invasive alien plant species (e.g. Tecoma stans, Pennisetum setaceum, etc.) for ornamental purposes as part of the landscaping should mining activities eventually commence. Alien species often "escape" and become invasive causing further ecological damage; 14. A thorough investigation of water use and ground water extraction should take place before actual mining activities commence as this would affect the local flora, especially the ephemeral riparian vegetation, not only locally, but downstream as well.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.9: Mitigation measures for preventing faunal and ecosystem destruction and promotion of conservation.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Prevent faunal and ecosystem destruction and promote conservation	1. Limit the development and avoid rocky outcrops throughout the entire area; 2. Avoid development & associated infrastructure in sensitive areas – e.g. in/close to drainage lines, cliffs, boulder and rocky outcrops in the area, etc. This would minimise the negative effect on the local environment especially unique features serving as habitat to various species; 3. Avoid placing access routes (roads & tracks) trough sensitive areas – e.g. over rocky outcrops/ridges and along drainage lines. This would minimise the effect on localised potentially sensitive habitats in the area; 4. Avoid driving randomly through the area (i.e. "track discipline"), but rather stick to permanently placed roads/tracks – especially during the construction phase. This would minimise the effect on localised potentially sensitive habitats in the area; 5. Stick to speed limits of maximum 30km/h as this would result in fewer faunal road mortalities. Speed humps could also be used to ensure the speed limit; 6. Remove (e.g. capture) unique fauna and sensitive fauna before commencing with the development activities and relocate to a less sensitive/disturbed site if possible; 7. Prevent and discourage the setting of snares (poaching), illegal collecting of veld foods (e.g. tortoises, etc.), indiscriminate killing of perceived dangerous species (e.g. snakes, etc.) and collecting of wood as this would diminish and negatively affect the local fauna – especially during the development phase(s); 8. Attempt to avoid the removal of bigger trees during the development phase(s) – especially with the development of access routes – as these serve as habitat for a myriad of fauna; 9. Prevent and discourage fires – especially during the development phase(s) – as this could easily cause runaway veld fires affecting the local fauna, but also causing problems (e.g. loss of grazing & domestic stock mortalities, etc.) for the neighbouring farmers; 10. Rehabilitation of the disturbed areas – i.e. initial development access route "scars" and associated tracks as well as temporary accommodation sites. Preferably workers should be transported in/out to the construction sites on a daily basis to avoid excess damage to the local environment (e.g. fires, wood collection, poaching, etc.). Such rehabilitation would not only confirm the company's environmental integrity, but also show true local commitment to the environment; 11. Implement erosion control. The area(s) towards & adjacent the drainage line(s) are easily eroded and further development may exacerbate this problem. Avoid construction within 20m of the main drainage line(s) to minimise erosion problems as well as preserving the riparian associated fauna; 12. Conduct a thorough investigation on the fauna associated with the proposed / ongoing exploration site(s); 13. Prevent the number of domestic pets – e.g. cats & dogs – accompanying the workers during the construction phase as cats decimate the local fauna and interbreed & transmit diseases to the indigenous African Wildcat found in the area. Dogs often cause problems when bonding on hunting expeditions thus negatively affecting the local fauna. The indiscriminate and wanton killing of the local fauna by such pets should be avoided at all costs.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.10: Mitigation measures to be implemented with respect to the exploration camps and exploration sites.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Promotion of conservation through preservation of flora, fauna and ecosystem around the exploration camps and exploration sites	1. Select camp sites and other temporary lay over sites with care – i.e. avoid important habitats; 2. Use portable toilets to avoid faecal pollution around camp and exploration sites; 3. Initiate a suitable and appropriate refuse removal policy as littering could result in certain animals becoming accustomed to humans and associated activity and result in typical problem animal scenarios – e.g. baboon, black-backed jackal, etc.; 4. Avoid and/or limit the use of lights during nocturnal exploration activities as this could influence and/or affect various nocturnal species – e.g. bats and owls, etc. Use focused lighting for least effect; 5. Prevent the killing of species viewed as dangerous – e.g. various snakes – when on site; 6. Prevent the setting of snares for ungulates (i.e. poaching) or collection of veld foods (e.g. tortoises) and unique plants (e.g. various Aloe and Lithop) or any form of illegal hunting activities; 7. Avoid introducing dogs and cats as pets to camp sites as these can cause significant mortalities to local fauna (cats) and even stock losses (dogs); 8. Remove and relocate slow moving vertebrate fauna (e.g. tortoises, chameleon, snakes, etc.) to suitable habitat elsewhere on property; 9. Avoid the removal and/or damaging of protected flora potentially occurring in the general area – e.g. various Aloe, Commiphora and Lithop species; 10. Avoid introducing ornamental plants, especially potential invasive alien species, as part of the landscaping of the camp site, etc., but rather use localised indigenous species, should landscaping be attempted, which would also require less maintenance (e.g. water); 11. Remove all invasive alien species on site, especially Prosopis sp., which is already becoming a major ecological problem along various water courses throughout Central Namibia. This would not only indicate environmental commitment, but actively contribute to a better landscape; 12. Inform contractors/workers regarding the above-mentioned issues prior to exploration activities and monitor for compliance thereof throughout; 13. Rehabilitate all areas disturbed by the exploration activities – i.e. camp sites, exploration sites, etc.; 14. Implement a policy of replacing 2 tree species (preferably the same species) for every 1 protected tree species having to be removed (if necessary); 15. Although fires are not expected to be a major issue in the general area due to the overall lack of grass cover, some years it may be necessary to consider fire prevention. Ensure that adequate firefighting equipment (e.g. fire beaters; extinguishers, etc.) is available at camp sites and clear kitchen areas to avoid accidental fires; 16. Employ an independent environmental auditor to ensure compliance, especially of the rehabilitation of all the affected areas.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.11: Mitigation measures for surface and groundwater protection as well as general water usage.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Effective management / protection of surface and groundwater resources and general water resources usage	1. Always use as little water as possible. Reduce, reuse and re-cycle water where possible; 2. All leaking pipes / taps must be repaired immediately they are noticed; 3. Never leave taps running. Close taps after you have finished using them. 4. Never allow any hazardous substance to soak into the soil; 5. Immediately tell your Contractor or Environmental Control Officer / Site Manager when you spill, or notice any hazardous substance being spilled anywhere in the solar park areas; 6. Report to your Contractor or Environmental Control Officer / Site Manager when you notice any container, which may hold a hazardous substance, overflow, leak or drip; 7. Immediately report to your Contractor or Environmental Control Officer / Site Manager when you notice overflowing problems or unhygienic conditions at the ablution facilities; 8. No washing of vehicles, equipment and machinery, containers and other surfaces; 9. Limit the operation to a specific site and avoid sensitive areas and in particular the Ephemeral River Channel. This would sacrifice the actual area for other adjacent Ephemeral River areas and thus minimise any likely negative effect on water resources; 10. Disposal of wastewater into any public stream is prohibited; 11. The Proponent must obtain permission of the land owners before utilising any water resources or any associated infrastructure; 12. If there is a need to drilling a water borehole to support the exploration programme the proponent (Proponent) must obtain permission form the land owner and Department of Water Affairs in the Ministry of Agriculture and Forestry. In an event of discovery of economic minerals resources, the sources of water supply for the mining related operations will be supplied by NamWater; 13. If there are any further (larger scale) exploration/drilling activities and/or mining activities to follow from the initial planned drill holes, groundwater monitoring must be implemented to include water level monitoring and also water sampling on a bi-annual basis. In order to have greater transparency on the water monitoring activities, the affected landowners / farmers must be given full access to the results of the water monitoring analyses.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.12: Mitigation measures to minimise negative socioeconomic impacts.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Effective management of socioeconomic benefits of the proposed / ongoing project activities	1. The employment of local residents and local companies should be a priority. To ensure that potential employees are from the area, they need submit proof of having lived in the area for a minimum of 5 years; 2. Providing information such as the number and types of jobs available, availability of accommodation facilities and rental costs and living expenses, could make potential job seekers wary of moving to the area; 3. Addressing unrealistic expectations about large numbers of jobs would be created; 4. Exploration camp if required should be established in close consultation with the land owners; 5. Exploration camp should consider provision of basic services; 6. When employees' contracts are terminated or not renewed, contractors should transport the employees out of the area to their hometowns within two days of their contracts coming to an end; 7. Tender documents could stipulate that contractors have HIV/Aids workplace policies and programmes in place and proof of implementation should be submitted with invoicing; 8. Develop strategies in coordination with local health officers and NGO's to protect the local communities, especially young girls. 9. Contract companies could submit a code of conduct, stipulating disciplinary actions where employees are guilty of criminal activities in and around the vicinity of the EPL. Disciplinary actions should be in accordance with Namibian legislation; 10. Contract companies could implement a no-tolerance policy regarding the use of alcohol and workers should submit to a breathalyser test upon reporting for duty daily; 11. Request that the Roads Authority erect warning signs of heavy exploration vehicles on affected public roads; 12. Ensure that drivers adhere to speed limits and that speed limits are strictly enforced; 13. Ensure that vehicles are road worthy and drivers are qualified; 14. Train drivers in potential safety issues.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.13: Mitigation measures to minimise health and safety impacts.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Promotion of health and safe working environment in line with national Labour Laws	1. Physical hazards: Follow national and international regulatory and guidelines provisions, use of correct Personal Proactive Clothing at all times, training programme, as well as the implementation of a fall protection program in accordance with the Labour Act; 2. Some of the public access management measures that may be considered in an event of vandalism occurring are: • All exploration equipment must be in good working condition and services accordingly; • Control access to the exploration site through using gates on the access road(s) if required; • The entire site, must be fenced off; the type of fencing to be used would, however, be dependent on the impact on the visual resources and/or cost; and; • Notice or information boards relating to public safety hazards and emergency contact details to be put up at the gate(s) to the exploration area. 3. There is a comprehensive First Aid Kit on site and that suitable anti-histamine for bee stings / snake bites should be available. 4. Rubber gloves are used in case of an accident to reduce the risk of contracting HIV/AIDS; 5. All individuals have received instructions concerning the dangers of dehydration or hyperthermia. Encourage all to drink plenty of clean water not directly from the surface water bodies. 6. No person under the influence of alcohol or drugs is allowed to work on site. 7. The Exploration Manager ensures compliance with the requirements of the relevant Namibian Labour, Mining and Health and Safety Regulations. 8. Dangerous or protected / sensitive areas are clearly marked and access to these areas is controlled or restricted. 9. Due care must be taken when driving any vehicles on any roads particularly the gravel roads. ALL Drivers must drive with their headlights switched on when travelling on the gravel roads (day and night). 10. Persons driving a vehicle must be in possession of a valid driver's license 11. Awareness on HIV/AIDS among workers is raised	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.14: Mitigation measures to minimise visual impacts.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Preserve the landscape character in the development of supporting infrastructure and choice of visual screening	1. Consider the landscape character and the visual impacts of the exploration area including camp site from all relevant viewing angles, particularly from public roads; 2. Use vegetation screening where applicable. Do not cut down vegetation unnecessary around the site and use it for site screening; 3. Avoid the use of very high fencing; 4. Minimise access roads and no off-road that could result in land scarring is allowed; 5. Minimise the presence of secondary structures: remove inoperative support structures; 6. Remove all infrastructure and reclaim, or rehabilitate the project site after exploration activities are completed.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.15: Mitigation measures to minimise vibration, noise and air quality.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Promote of effective management of vehicle movement, drilling and blasting operations and use of Personal Protective Equipment (PPE) in mitigating air quality and vibrations impacts in line with national laws	1. Limit vehicle movements and adhere to the speed of 60 km/h; 2. Vehicles and all equipment must be properly serviced to minimise noise pollution; 3. Use of Personal Protective Equipment (PPE) to minimise Occupational Health Safety impacts dues to noise pollution around the site; 4. National or international acoustic design standards must be followed. 5. Drilling and blasting operations can major sources of vibration, noise and dust and where required the following mitigation measure shall be implemented; • Drilling and blasting operations shall only be done by a qualified person who must at all times adhere to the required blasting protocol; • Prior warning shall be given to all persons, neighbours and visitors before the blasting takes place; • Careful planning and timing of the blast program to minimise the size of the charge; • Where practicable, use of explosive products with lower detonation velocities, but noting that this would require more explosives to achieve the same blast result; • Use of detonating caps with built-in time delays, as this effectively reduces each detonation into a series of small explosions; • Use of a procedure ("decking the charge") which subdivides the charge in one blast hole into a series of smaller explosions, with drill patterns restricted to a minimum separation from any other loaded hole; • Over-drilling the holes to ensure fracturing of the rock; • Staggering the detonation for each blast hole in order to spread the explosive's total overpressure over time; • Matching, to the extent possible, the energy needed in the “work effort” of the borehole to the rock mass to minimise excess energy vented into the receiving environment.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent’s Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.16: Mitigation measures for waste (solid and liquid) management.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Promotion of effective waste (solid and liquid) management through the adoption of sound and hierarchical approach to waste management, which would include waste minimisation, re-use, recovery, recycling, treatment, and proper disposal.	1. Burial of waste on anywhere within the EPL area is not allowed and all generated solid waste must be disposed at the at an approved municipal waste disposal site; 2. Toilet and ablution facilities must be provided on site and should not be located close to Ephemeral Rivers or visible discontinuities (fractures, joints or faults); 3. Provide site information on the difference between the two main types of waste, namely: • General Waste; and • Hazardous Waste. 4. Sealed containers, bins, drums or bags for the different types of wastes must be provided. Never dispose of hazardous waste in the bins or skips intended for general waste or construction rubble; 5. All solid and liquid wastes generated from the proposed / ongoing project activities shall be reduced, reused, or recycled to the maximum extent practicable; 6. Trash may not be burned or buried, except at approved sites under controlled conditions in accordance with the municipal regulations; 7. Never overfill any waste container, drum, bin or bag. Inform your Contractor or the Environmental Control Officer / Site Manager if the containers, drums, bins or skips are nearly full; 8. Never litter or throwaway any waste on the site, in the field or along any road. No illegal dumping; 9. Littering is prohibited. 10. Latrines and French drains built >100m from watercourses or pans to avoid pollution of primary and secondary aquifers. 11. Chemical toilets or suitable waste water management system shall be provided on site and around the camp as may be required.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.17: Rehabilitation plan.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
Contributions toward environmental preservation and sustainability through rehabilitation of disturbed areas such as exploration sites and remove all unwanted part of the fixtures and restore the sites to close an approximation of the pristine state as is technically, financially and reasonably possible.	1. The following rehabilitation actions are practiced: • Small samples are preferably removed from site to avoid additional scars in the landscape; • Litter from the site has been taken to the appropriate disposal site. • Debris, scrap metal, etc is removed before moving to a new site or closure of the mine. • Water tanks are dismantled and removed if not need for after use. • Tracks on site and the access road are rehabilitated by smoothing the 'middle mannetjie'(middle ridge between the tracks) and raking the surface. 2. The following should be undertaken at all disturbed areas that require further rehabilitation: • if applicable the stockpiled subsoil to be replaced (spread) and/or the site is neatly contoured to establish effective wind supported landscape patterns; • Replace the stored topsoil seed bank layer. • Five (5) years after rehabilitation the sites are not visible from 500 m away.	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

Table 6.18: Environmental data collection.

OBJECTIVES	MITIGATION MEASURES	SCHEDULE	RESPONSIBILITY
1. Collect data that will add value to environmental monitoring and reporting to the regulators 2. Collect data that will add to the general scientific and geographic knowledge of the environment in which the exploration process takes place. 3. Acknowledged that the required skills and knowledge to collect all the suggested data may not be available within the mine /exploration team, however, as much data as is practical should be collected.	1. Environmental Monitoring Report Compiled and submitted by the Environmental Coordinator to the regulators 2. The following types of information should be gathered: • Fauna. What tracks or signs of animal activity have been seen? (photographs and GPS recording) What animals, birds etc were identified? Alternatively provide a description and/ or photo if unidentified. • Unusual weather conditions, e.g. records of the prevailing wind direction and the direction from which storm events come. Was there fog or rain, frost overnight or intense heat? Preferably have a thermometer and rain gauge on site. • Vegetation. Record trees, shrubs, grass, etc. that are found in the vicinity along each of the profiles. Some plants do only occur after rainfall and might not have been seen for decades. • Any archaeological, cultural or historical sites that may be found. GPS coordinates, photograph and plot the position on a 1: 50 000 maps. • other including surface water, spring, large scale geological features etc	(i) Regional reconnaissance field-based mapping and sampling activities; (ii) Initial local field-based mapping and sampling activities; (iii) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling; (iv) Prefeasibility and feasibility studies.	(i) Proponent's Representative (PR) (ii) Project Manager (PM) (iii) Project HSE (iv) Contractor (v) Subcontractors

6.4 Rehabilitation Commitments

6.4.1 Rehabilitation Process

The following is the summary of key rehabilitation process to be implemented by the proponent:

- **Step 1: Backfilling the mining void:**
    - Transporting all stockpiled overburden, whether being stockpiled or used as berms, back to the mining voids;
    - Backfilling the trenches, pits and quarries using this material;
    - If applicable, backfill the various layers of overburden in the reverse order in which they were removed, i.e. Last out should be first in as far as possible, and;
    - When backfilling, bear in mind that some space must be left for the backfilling of the soil on top of the overburden.
- **Step 2: Remove all waste and unwanted materials:**
    - Once the slimes ponds have dried sufficiently, scrape out the slimes and transporting back to the mining voids during the overburden backfilling stage;
    - Bulldoze the slimes pond walls over and contour;
    - Allow the pollution control dam to evaporate completely, scrape all waste that has collected in the pond and dispose of these and the pond lining at a suitable site;
    - Bulldoze the walls of the pollution control pond over and contour;
    - Collect remaining domestic waste on site and transport to an approved municipal waste disposal site;
    - Clean out the oil traps, collect the waste material in drums and transport to a suitable site for disposal, and;
    - Manually remove all weedy species that are present at the site (the entire plant can easily be removed because the plants tend not to root deeply).
- **Step 3: Remove all structures:**
    - Sell all permanent structures such as houses to the farmer or another private person for using as a tourist camp;
    - Disassemble all building structures including the washing plant structures and pre-fabricated buildings and transport them to a new exploration /mining test site or storage facility or sell by auction;
    - Remove all building materials from the exploration / test mining site and either:
        - Transporting to a new site if it is to be used or stored elsewhere; or
        - Disposing at a suitable approved municipal waste disposal site; or
        - Making them available to the farmer or local persons; or
        - Selling at an auction.

- Remove all machinery from the site and transport to a new site where it is to be used or stored or sell at an Auction;
- Remove all fences that have been constructed and either make the material available to the local persons/farmer, dispose at a suitable site or sell at an Auction;
- Remove the generators from the sites from site and either transport to a new site for storage or sell it to the farmer or an Auction;
- Seal all petrol, diesel, oil and grease containers and remove from the site to a storage facility or make it available to the farmer;
- Collect all scrap metal and dispose at a suitable site or sell at an Auction;
- Break up all concrete slabs and structures on site and transport the fragments to a suitable site for disposal;
- The concrete reservoirs can probably remain intact provided that the farmer wishes to utilize them at some stage - this will need to be negotiated;
- The future of the water pipeline can be negotiated with the farmer or a new owner/lender of the site, because if he chooses to use the pipeline it will not be necessary to remove it and rehabilitate the route, and;
- If the pipeline is to be removed, disassemble and transport the component parts to a storage site or sell at an Auction.

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

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

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

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

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

- Compaction of the substrate will result from utilisation of these areas or the pressure of overlying structures;
- Rip the surfaces to a depth of 40 cm to 50 cm using a multi-toothed ripper and tractor;
- Cover with a layer of topsoil to a depth of about 10 cm, and;
- Cap the topsoil containing the seedbank with a layer of gravel by manually spreading the fragments across the surface using a rake.

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

  - Compaction of the road will result from the continuous passage of heavy vehicles so it will be necessary to break up the road surface;
  - Rip the road surface to a depth of at least 50 cm using a multi-toothed ripper and tractor;
  - Disk the ripped surface to break up the clods;
  - Cover with a layer of topsoil to a depth of about 10 cm, and;
  - Cap the topsoil containing the seedbank with a gravel layer by manually spreading the fragments across the surface using a rake.

6.5 Monitoring of the Environmental Performance

6.5.1 Rehabilitation Evaluation and Performance Monitoring

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

- Monitoring: Monitoring program is instituted to ensure that the requirements of the mining site rehabilitation program are met. Rehabilitation program may be subjected to various natural or man-made forces that can hinder the progress and lead to problems or failure or the rehabilitation program. Regular monitoring will ensure that these factors are identified early so they may be resolved through appropriate recommendations;
- Frequency: All rehabilitated areas should be monitored over a three (3) years period from the onset of the rehabilitation procedures. The frequency of monitoring suggested above is dependent on satisfactory performance. If, however, the requirements are not being met, the frequency of monitoring can be increased. It is suggested that the monitoring be conducted once a year around September when the grasses and forbs are flowering;
- Methods: The rehabilitated areas might be monitored by the sampling randomly located $1m^2$ quadrates. Approximately 10 quadrates per hectare (or a minimum of 3) should be sampled per plant community. The factors that will be examined in each quadrate include:
  - Percentage basal cover;
  - Percentage aerial cover;
  - Species composition and diversity;
  - Vigor and health of plants;
  - Presence of and evidence of fauna, and;
  - Nature of the substrate.
- Controls: To enable a comparison, control plots located within the surrounding un-mining areas should also be monitored. This will give an indication of the progress of rehabilitated areas versus the natural vegetation and will set the goals, which ultimately should be achieved. By monitoring the natural vegetation annually, it will also be possible to assess the natural changes that are taking place. These findings can then be applied to the rehabilitated areas so as to account for the changes, which may have resulted from natural events. Approximately 5 to 10 quadrates of $1m^2$ should be sampled per community type to set the controls;

- ❖ Maintenance: Maintenance requirements may include seeding (if there is poor germination of the seedbank), fertiliser applications, correcting erosion problems, removing weeds, etc. Maintenance of the rehabilitated areas will be necessary periodically. The need for and extent of maintenance activities will be determined during the regular monitoring of the site, and;

- ❖ Qualified Personnel: The rehabilitation procedures from implementation to monitoring should be overseen by qualified personnel. Any persons involved in the rehabilitation of the mining site should be trained in the techniques involved.

6.5.2 Overall Environmental Performance Monitoring and Reporting

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

(i) Routine / ongoing daily monitoring activities to be undertaken by the Project HSE Officer with the support of the external specialist consultants as maybe required, and;

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

The proponent will be required to report regularly (twice in a year or as the case maybe) to the Environmental Commissioner in the Ministry of Environment, Forestry and Tourism (MEFT), the environmental performances as part of the ongoing environmental monitoring programme. Environmental monitoring programme is part of the EMP performances assessments and will need to be compiled and submitted as determined by the Environmental Commissioner. The process of undertaking appropriate monitoring as per specific topic (such as fauna and flora) and tracking performances against the objectives and documenting all environmental activities is part of internal and external auditing to be coordinated by the Project HSE Officer.

The second part of the monitoring of the EMP performance will require a report outlining all the activities related to effectiveness of the EMP at the end of the planned mineral exploration to be undertaken by the Project HSE Officer with the support of the external specialist consultants as maybe required. The objective will be to ensure that corrective actions are reviewed and steps are taken to ensure compliance for future EIA and EMP implementation.

The report shall outline the status of the environment and any likely environmental liability after the completion of the proposed / ongoing project activities. The report shall be submitted to the Environmental Commissioner in the Ministry of Environment and Tourism and will represent the final closure and fulfilment of the conditions of the Environmental Clearance Certificate (ECC) issued by the Environmental Commissioner and the conditions of the Pro-Forma Environmental Contract signed by the Proponent, Environmental Commissioner and the Mining Commissioner.

7. CONCLUSION AND RECOMMENDATION

7.1 Conclusions

Fairview Minerals Exploration (Pty) Ltd (**the Proponent**) intends to undertake exploration activities in the Exclusive Prospecting Licence (EPL) No. 5897, with special focus on base and rare metals, dimension stones, industrial minerals and precious stones. The exploration activities to be undertaken as assessed in this environmental assessment are as follows:

(i) Initial desktop exploration activities;

(ii) Regional reconnaissance field-based activities;

(iii) Initial local field-based activities including detailed mapping, sampling and drilling operations;

(iv) Detailed local field-based activities including detailed mapping, sampling and drilling operations, and;

(v) Prefeasibility and feasibility studies including possible test mining.

The overall severity of potential environmental impacts of the proposed / ongoing project activities on the receiving environment (physical, biological, socioeconomic environments and ecosystem functions, services, use and non-use values or passive uses) will be of low magnitude, temporally duration, localised extent and low probability of occurrence. Mitigation measures must be implemented as detailed in Section 6 (EMP) of this report. The proponent must obtain permission of the land owners (surface rights holders) before exercising their subsurface rights in all the farms covered by the EPL 5897.

7.2 Recommendations

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

(i) The proponent shall negotiate an Access Agreement with the land owner/s;

(ii) The Proponent shall adhere to all the provisions of the EMP and conditions of the Access Agreement to be entered between the proponent and the land owner/s in line with all applicable national regulations;

(iii) Before entering any private property such as a private farm, the proponent must give advance notices and obtain access permission from the land owners at all times;

(iv) Mitigation measures shall be implemented as detailed in Section 6 (EMP) of this Scoping and EMP report;

(v) Where possible, and if water is found during the detailed exploration boreholes drilling operations, the proponent shall support other land uses in the area in terms of access to freshwater supply for both human consumption, wildlife and agricultural support as may be requested by the local community / land owners/s. The abstraction of the groundwater resources shall include water levels monitoring, sampling and quality testing on a bi-annual basis, and that the affected landowners must have access to the results of the water monitoring analyses as part of the ongoing stakeholder disclosure requirements on shared water resources as maybe applicable.

The proponent must take all the necessary steps to implement all the recommendations of the EMP for the successful implementation and completion of the proposed / ongoing exploration programme

covering the EPL 5897. Recommended actions to be implemented by the proponent as part of the management of the likely impacts through implementations of the EMP are:

1. The proponent shall obtain permission from the land including the management of Mundulea Nature Reserve in order to undertake field-based exploration / prospecting activities in the EPL area;

2. The proponent must implement precautionary measures / approach to environmental management;

3. Before detailed site-specific exploration activities such as extensive drilling operations and access routes are selected, the Project HSE Officer with the support of the external specialist consultants as may be required, shall consider the flora, fauna and archaeological sensitivity of the area and commission a field survey in advance of any site development as may be required based on the assessment undertaken;

4. The Project HSE Officer shall lead, implement and promote environmental culture through awareness raising of the workforce, contractors and sub-contractors in the field during the whole duration of the proposed / ongoing exploration period;

5. The Proponent shall provide all the necessary support including human and financial resources, for the implementation of the proposed / ongoing mitigations and effective environmental management during the planned exploration activities for the EPL 5897;

6. Project HSE Officer with the support of the external specialist consultants as may be required shall develop a simplified environmental induction and awareness programme for all the workforce, contractors and sub-contractors that shall take into considerations the management requirements for Mundulea Nature Reserve;

7. Where contracted service providers are likely to cause environmental impacts, these shall be identified and contract agreements shall be developed with costing provisions for environmental liabilities and rehabilitation requirements;

8. Implement internal and external monitoring of the actions and management strategies developed during the mineral exploration process. Final Environmental Monitoring report shall be prepared by the Project HSE Officer with the support of the external specialist consultants as may be required and submitted to the regulators, and;

9. Develop and implement a monitoring programme that shall fit into the overall company's Environmental Management Systems (EMS) in support of any future EIA that may be undertaken for possible mining projects.

7.3 Summary ToR for Test Mining and Mining Stages

Once a viable project has been identified (economic resources are discovered) and a separate field-based and site-specific Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) must be implemented as part of the prefeasibility and feasibility study with respect to the test mining or possible mining operations.

The site-specific EIA and EMP shall cover the area identified to have potential economic minerals resources as well as all areas to be used for infrastructural support areas such as pit / shaft area/s, waste rock, tailings dump, access, office blocks, water and energy infrastructure support areas (water, energy and road / access).

In addition to the Terms of Reference (ToR) to be developed during the Environmental Scoping study phase for the test mining / mining stages, the following field-based and site-specific specialist studies shall be undertaken as prat of the EIA and EMP for possible test mining or mining operations in an event of a discovery of economic minerals resources and possible development of a mining project:

(i) Groundwater studies including modelling as maybe applicable;

(ii) Field-based flora and fauna diversity;

(iii) Noise and Sound modelling linked to engineering studies;

(iv) Socioeconomic assessment, and;

(v) Others as may be identified / recommended by the stakeholders/ land owners/ Environmental Commissioner or specialists.

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

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

(ii) The development of appropriate mitigation measures that will enhance the positive impacts and reduce the likely negative influences of the negative impacts identified or anticipated. Such mitigation measures shall be contained in a detailed EMP report covering the entire project lifecycle.

8. BIBLIOGRAPHY / REFERENCES

1. FURTHER GENERAL READING

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

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

Günzel, A. 2000. Personal communication during the discussion on the geology of Tsumeb area, Tsumeb.

Lombaard, A.F., Günzel, A., Innes, J. and Krüger, T.L. 1986. The Tsumeb-lead-copper-zinc-silver deposits, South West Africa/Namibia. In: Anhaeusser, C.R. and Maske, S. (eds), Mineral deposits of Southern Africa vol. 2, Geol. Soc. S.Afr., Johannesburg, 1761-1787.

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

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

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

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

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

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

Mwiya, S. 2003. Development of a knowledge-based system methodology for design of solid waste disposal sites in arid and semiarid environments. Unpublished PhD thesis, University of Portsmouth, UK, 348 pp.

Mwiya and Giles, 2004. A knowledge-based approach to Municipal Solid Waste Disposal Site Development in the Karstified Dolomitic Terrain around the town of Tsumeb in North-Central Namibia Communications, Geological Survey of Namibia, 13 (2004), 9-22, Windhoek, Namibia.

National Planning Commission (NPC) (2013). Policy Brief: Trends and Impacts of Internal Migration in Namibia. National Planning Commission: Windhoek.

National Statistic Agency (NSA) (2012). Poverty Dynamics in Namibia: A Comparative Study Using the 1993/94, 2003/04 and the 2009/2010 NHIES Surveys. National Statistics Agency: Windhoek.

National Statistics Agency (NSA) (2013). Profile of Namibia: Facts, Figures and other Fundamental Information. National Statistics Agency: Windhoek.

National Statistics Agency (NSA) (2014a). Namibia 2011 Population and Housing Census Main Report. National Statistics Agency: Windhoek.

National Statistics Agency (NSA) (2014b). 2011 Population and Housing Census: Oshikoto Regional Profile. National Statistics Agency: Windhoek.

National Statistics Agency (NSA) (2014c). Namibia 2011 Census Atlas. National Statistics Agency: Windhoek.

National Statistics Agency (NSA) (2014d). The Namibia Labour Force Survey 2013 Report. National Statistics Agency: Windhoek

National Statistics Agency (NSA) (2014e). Gross Domestic Product: First Quarter 2014. National Statistics Agency: Windhoek

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

Schneider, G.I.C. and Seeger, K.G. 1992. Copper, 2.3,118 pp. In: The Mineral Resources of Namibia, Geological Survey of Namibia, Windhoek.

Seeger, K.G. 1990. An evaluation of the groundwater resources of the Grootfontein karst area. Department of Water Affairs, Windhoek, Namibia.

Stankevica, V., 2015. Development of mining settlements in Namibia: an investigation into prospects for Rosh Pinah, Klein Aub and Tsumeb., PhD Thesis, University of Namibia, Windhoek,

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

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

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

World Travel and Tourism Council, 2013, Travel and Tourism Economic impact 2013, Namibia, London, United Kingdom.

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

2. REFERENCES AND FURTHER READING ON FAUNA AND FLORA

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

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

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

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

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

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

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

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

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

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

Carruthers, V.C. 2001. Frogs and frogging in southern Africa. Struik Publishers, Cape Town, RSA.

Channing, A. 2001. Amphibians of Central and Southern Africa. Protea Bookhouse, Pretoria, RSA.

Channing, A. and Griffin, M. 1993. An annotated checklist of the frogs of Namibia. *Madoqua* 18(2): 101-116.

Coats Palgrave, K. 1983. Trees of Southern Africa. Struik Publishers, Cape Town, RSA.

Cole, D.T. and Cole, N.A. 2005. Lithops Flowering Stones. Cactus and Co. Libri

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

Craven, P. (ed.). 1999. A checklist of Namibian plant species. Southern African Botanical Diversity Network Report No. 7, SABONET, Windhoek.

Crouch, N.R., Klopper, R.R., Burrows, J.E. and Burrows, S. M. 2011. Ferns of southern Africa – a comprehensive guide. Struik Nature, Cape Town, RSA.

Cunningham, P.L. 1998. Potential wood biomass suitable for charcoal production in Namibia. *Agri-Info* 4(5): 4-8.

Cunningham, P.L. 2006. A guide to the tortoises of Namibia. Polytechnic of Namibia, Windhoek, Namibia.

Curtis, B. and Barnard, P. 1998. Sites and species of biological, economic or archaeological importance. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.

Curtis, B. and Mannheimer, C. 2005. Tree Atlas of Namibia. National Botanical Research Institute, Windhoek, Namibia.

De Graaff, G. 1981. The rodents of southern Africa. Buterworths, RSA.

Du Preez, L. and Carruthers, V. 2009. A complete guide to the frogs of southern Africa. Struik Publishers, Cape Town, RSA.

Estes, R.D. 1995. The behaviour guide to African mammals. Russel Friedman Books, Halfway House, RSA.

Giess, W. 1971. A preliminary vegetation map of South West Africa. *Dinteria* 4: 1 – 114.

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

Griffin, M. 1998b. Amphibian diversity. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.

Griffin, M. 1998c. Mammal diversity. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.

Griffin, M. 2003. Annotated checklist and provisional national conservation status of Namibian reptiles. Ministry of Environment and Tourism, Windhoek.

Griffin, M. and Coetzee, C.G. 2005. Annotated checklist and provisional national conservation status of Namibian mammals. Ministry of Environment and Tourism, Windhoek.

Hebbard, S. n.d. A close-up view of the Namib and some of its fascinating reptiles. ST Promotions, Swakopmund, Namibia.

Hockey, P.A.R., Dean, W.R.J. and Ryan, P.G. 2006. Roberts Birds of Southern Africa VII Edition. John Voelcker Bird Book Fund.

IUCN, 2015. IUCN red list of threatened animals, IUCN, Gland, Switserland.

Joubert, E. and Mostert, P.M.K. 1975. Distribution patterns and status of some mammals in South West Africa. *Madoqua* 9(1): 5-44.

Komen, L. n.d. The Owls of Namibia – Identification and General Information. NARREC, Windhoek.

Maclean, G.L. 1985. Robert's birds of southern Africa. John Voelcker Bird Book Fund.

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

Mannheimer, C. and Curtis, B. (eds) 2009. Le Roux and Müller's field guide to the trees and shrubs of N amibia. Macmillan Education Namibia, Windhoek.

Marais, J. 1992. A complete guide to the snakes of southern Africa. Southern Book Publishers, Witwatersrand University Press, Johannesburg, RSA.

Mendelsohn, J., Jarvis, A., Roberts, A. and Robertson, T. 2002. Atlas of Namibia. A portrait of the land and its people. David Philip Publishers, Cape Town, RSA.

Monadjem, A., Taylor, P.J., F.P.D. Cotterill and M.C. Schoeman. 2010. Bats of southern and central Africa. Wits University press, Johannesburg, RSA.

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

Müller, M.A.N. 2007. Grasses of Namibia. John Meinert Publishers (Pty) Ltd, Windhoek, Namibia.

NACSO, 2010. Namibia's communal conservancies: a review of progress and challenges in 2009. NACSO, Windhoek.

Passmore, N.I. and Carruthers, V.C. 1995. South African Frogs - A complete guide. Southern Book Publishers, Witwatersrand University Press, Johannesburg, RSA.

Rothmann, S. 2004. Aloes, aristocrats of Namibian flora. ST promotions, Swakopmund.

SARDB, 2004. CBSG Southern Africa. In: Griffin, M. 2005. Annotated checklist and provisional national conservation status of Namibian mammals. Ministry of Environment and Tourism, Windhoek.

Schultz, M. and Rambold, G. 2007. Diversity shifts and ecology of soil lichens in central Namibia. Talk, Ecological Society of Germany, Austria and Switzerland (GfÖ), 37th Annual Meeting, Marburg: 12/9/2007 to 15/9/2007.

Schultz, M., Zedda, L. and Rambold, G. 2009. New records of lichen taxa from Namibia and South Africa. *Bibliotheca Lichenologica* 99: 315-354.

Simmons, R.E. 1998a. Important Bird Areas (IBA's) in Namibia. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.

Simmons, R.E. 1998b. Areas of high species endemism. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.

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

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

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

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

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

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

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

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

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

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