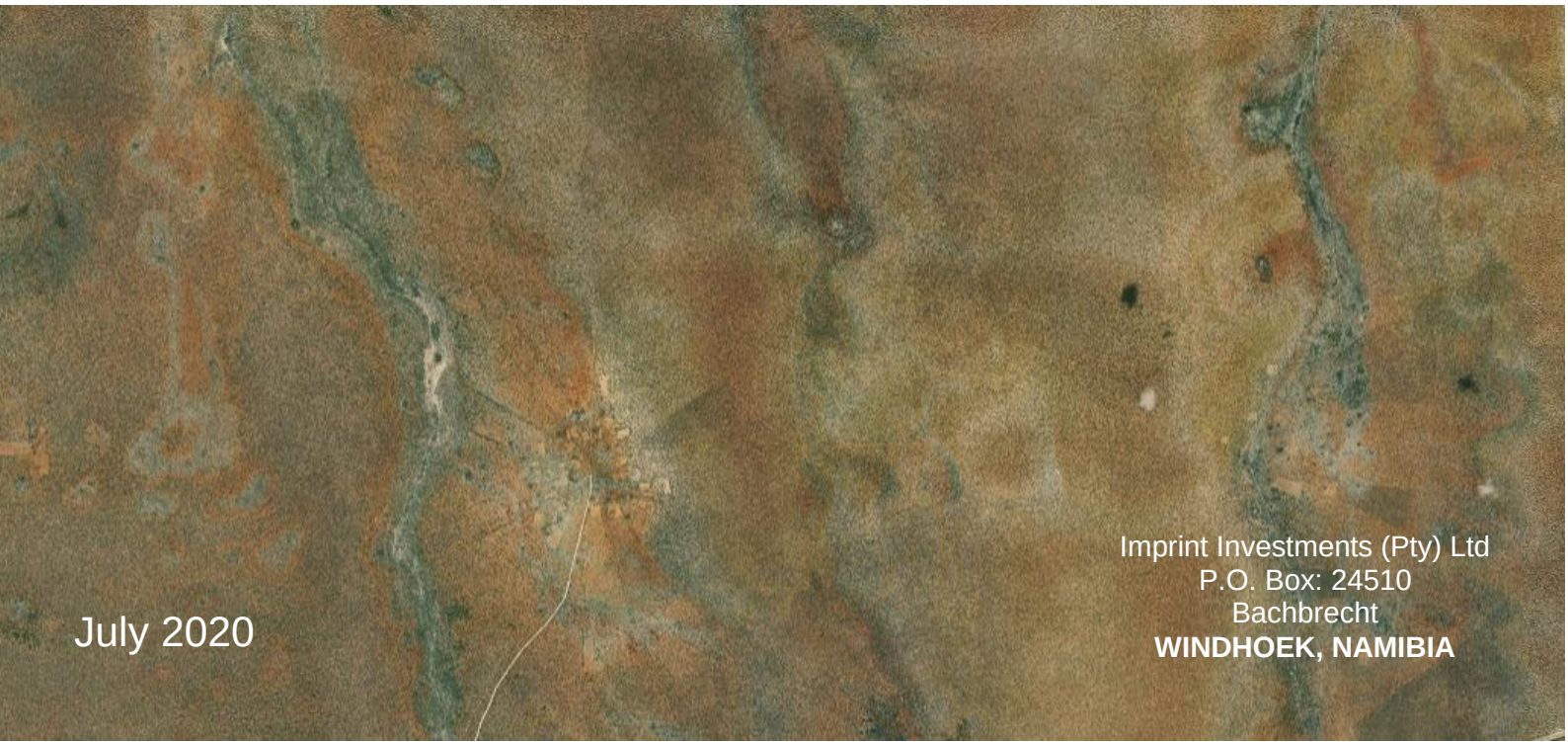
Imprint Investments (Pty) Ltd

Final Environmental Impact Assessment (EIA) Report to Support the Application for Environmental Clearance Certificate (ECC) for the Proposed Minerals Exploration / Prospecting in the Exclusive Prospecting License (EPL) No. 3963, Okahandja/ Gobabis Districts,
OTJOZONDJUPA/ OMAHEKE REGIONS
NORTH CENTRAL NAMIBIA



July 2020

Imprint Investments (Pty) Ltd
P.O. Box: 24510
Bachbrecht
WINDHOEK, NAMIBIA

PROPONENT, LISTED ACTIVITIES AND RELATED INFORMATION SUMMARY

MINISTRY OF ENVIRONMENT, FORESTRY AND TOURISM (MEFT)
ECC APPLICATION REFERENCE No.
APP-001642

TYPE OF AUTHORISATIONS REQUIRING ECC
Exclusive Prospecting License (EPL) No. 3963

NAME OF THE PROPONENT
Imprint Investments (Pty) Ltd

COMPETENT AUTHORITY
Ministry of Mines and Energy (MME)

ADDRESS OF THE PROPONENT AND CONTACT PERSON
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WINDHOEK, NAMIBIA

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PROPOSED PROJECT
Proposed Minerals Exploration / Prospecting in the Exclusive Prospecting License (EPL) No. 3963, Okahandja / Gobabis Districts, Otjozondjupa/ Omaheke Regions, North Central Namibia

PROJECT LOCATION
Okahandja / Otjiwarongo Districts,
Otjozondjupa/ Omaheke Regions, North Central Namibia
(Latitude: -20.963611 S, Longitude: 18.352222E)

ENVIRONMENTAL CONSULTANTS
Risk-Based Solutions (RBS) CC
(Consulting Arm of Foresight Group Namibia (FGN) (Pty) Ltd)
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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 continues to work for Global, Continental and Namibian based reputable resources (petroleum and mining / minerals) and energy companies such as EMGS (UK/ Norway), CGG (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, EMS) and overall industry specific HSE, cleaner production programmes, Geoenvironmental, geological and geotechnical engineering specialist fields.

Dr Sindila Mwiya has undertaken and continues to undertake and manage high value projects on behalf of global and local resources and energy companies. Currently, (2020-2023) Dr Sindila Mwiya is responsible for permitting planning through to operational and completion compliance monitoring, HSE and engineering technical support for multiple major upstream onshore and offshore petroleum, minerals and mining projects, Solar and Wind Energy Projects, manufacturing and environmentally sustainable, automated / smart and Climate Change resilient homes developments in different parts of the World including Namibia. 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 continues to work 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, Forestry and Tourism (MEFT) / DANIDA – Cleaner Production Component) and Chief Geologist for Engineering and Environment Division, Geological Survey of Namibia, Ministry of Mines and Energy and a Field-Based Geotechnician (Specialised in Magnetics, Seismic, Gravity and Electromagnetics Exploration and Survey Methods) under the Federal Institute for Geoscience and Natural Resources (BGR) German Mineral Exploration Promotion Project to Namibia, Geophysics Division, Geological Survey of Namibia, Ministry of Mines and Energy.

He has supervised and continues to support 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. From 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, Namibia July 2020

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NON-TECHNICAL SUMMARY

Imprint Investments (Pty) Ltd, the **Proponent**, holds mineral rights under Exclusive Prospecting License (EPL) No. 3963. The EPL 3963 was granted on the 20/12/2008 and expired on the 19/12/2019. A renewal application is current pending with the Competent Authority, the Ministry of Mines and Energy (MME). Under the EPL 3963, the Proponent holds minerals rights for base and rare metals, industrial minerals, non-nuclear fuels, precious metals and precious stones.

The EPL 3963 falls within the Okahandja / Gobabis Districts of the Otjozondjupa/ Omaheke Regions, in the northcentral Namibia. Locally, the EPL area totalling 52531 Ha covers parts of the following private commercial farmlands: Ongorussengo-Ost No.400, EndelikNo. 399, Brabgno No. 403, Vergenoeg No. 402, Okamatangara No. 280 and Brakewater No.391.

The Proponent intends to continue with exploration activities covering desktop studies, followed by site-specific activities on targets that have been delineated and using exploration techniques/ methods such as geophysical surveys, geological mapping, trenching, drilling and bulk sampling. The proposed / ongoing minerals exploration activities are listed in the Environmental Impact Assessment (EIA) Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007) and cannot be undertaken without an Environmental Clearance Certificate (ECC).

This Environmental Impact Assessment (EIA) report has been prepared by Risk-Based Solutions (RBS) CC in order to support the application for the renewal of the ECC issued in November 2009 and already expired under the current EIA Regulations, 2012.

The impacts that the proposed / ongoing exploration activities and associated infrastructure such as access and exploration campsite will have on the receiving environment (physical, biological and socioeconomic) will depend on the extent of the proposed / ongoing activities over the development area, management of the area and how the mitigations as detailed in the EMP Report are eventually implemented and monitored by the Proponent.

Based on the findings of this EIA Report, it's hereby recommended that the proposed / ongoing exploration activities be issued with an Environmental Clearance Certificate (ECC). The Proponent shall take into consideration the following key requirements for implementing the proposed exploration programme:

(i) The Proponent shall negotiate Access Agreements with the land owner/s as may be applicable.

(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 or protected property/ area such as a private farm, the Proponent must give advance notices and obtain permission to access the EPL area at all times, and.

(iv) 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 and if economic minerals resources are discovered, a separate field-based and site-specific Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports shall be prepared 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, 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 considered in the TOR for 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 within the EPL No. 3963:

(i) Groundwater studies including modelling as maybe applicable.

(ii) Field-based flora and fauna diversity.

(iii) Dust, 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.

1. BACKGROUND

1.1 Introduction

Imprint Investments (Pty) Ltd, the Proponent, holds mineral rights under Exclusive Prospecting License (EPL) No. 3963. The following is the summary of the EPL 3963:

- **Type of License:** Exclusive Prospecting License (EPL) No. 3963.
- **EPL Holder and Proponent:** Imprint Investments (Pty) Ltd.
- **Granted Date:** 20/12/2008.
- **Expiry Date:** 19/12/2019.
- **License Status**: Renewal application currently pending with the Competent Authority, the Ministry of Mines and Energy (MME).
- **Commodities:** Base and rare metals, industrial minerals, no-nuclear fuels, precious metals and precious stones, and.
- **Size of the EPL:** 52531 Ha.

The Proponent intends to undertake exploration activities covering desktop studies, followed by site-specific activities using techniques such as geophysical surveys, geological mapping, trenching, drilling and bulk sampling.

1.2 Regulatory Requirements

The proposed prospecting activities are listed in the Environmental Management Act, 2007, (Act No. 7 of 2007) and the EIA Regulations, 2012 and cannot be undertaken without an Environmental Clearance Certificate (ECC). The Proponent is required to have undertaken Environmental Assessment comprising this Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports for the proposed minerals prospecting activities to support the application for the renewal of the expired ECC shown in Fig. 1.1 and granted in November 2009.

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

1.3 Location, Land Use, Infrastructure and Services

1.3.1 Location and Land Use

The EPL 3963 falls within the Okahandja / Gobabis Districts of the Otjozondjupa/ Omaheke Regions, in the northcentral Namibia (Figs. 1.1 and 1.2). Locally, the EPL area totalling 52531 Ha covers parts of the following private commercial farmlands: Ongorussengo-Ost No.400, Endelik No. 399, Brabgno No. 403, Vergenoeg No. 402, Okamatangara No. 280 and Brakewater No.391 (Figs. 1.4).

The general topography is dominated by topographic high area with adulating landscapes characterised by dendritic ephemeral river networks. The general land use of the area is mainly dominated by agriculture (cattle and small stock) and game (wildlife) farming with conservation, tourism and hospitality as some of the other land uses options in the general area.

1.3.2 Supporting Infrastructure and Services

The EPL area accessible via the C31 coming off the B1 Road north of Okahandja and connects to the M59 to Otjosundu and the M112 to Okondjatu where the EPL area is situated (Figs. 1.2-1.4). Alternatively, the license area can also be accessed through the C22 which cuts across the EPL area connecting the license area through Okakarara (Figs. 1.3 and 1.4). A number of other minor local gravel roads interconnect the EPL area to the major gravel roads.

Okakarara situated about 110 km to the northwest, from the centre of the EPL along the C22 of the EPL area is the nearest major town. Other settlements closer to the EPL area are Okondjatu and Otjinene. The EPL area has patchy mobile telecommunication coverage along the key main roads and minor settlements. Fixed telecommunication infrastructure as well as all the related business services is available in the region.

The EPL area has limited to no mobile services with no national or local water and electricity infrastructure network. However, the proposed exploration programme will not require major water and energy supplies. Sources of water supply for exploration will be obtained from local boreholes or supplied by a water tanker collecting water from existing services in the area.

Electricity supply will be provided by diesel generators and solar as may be required.

However, in an event of a discovery of economic minerals deposit that could be developed into a mining project, the sources of water supply will be provided by NamWater from possible limited local borehole to be drilled in the short-term and from pipeline from any nearby NamWater Scheme.

Electricity supply will be provided by NamPower from already existing infrastructure in the region.

Republic of Namibia

MINISTRY OF ENVIRONMENT AND TOURISM

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Enquiries: Ms. Saima Angula

OFFICE OF THE PERMANENT SECRETARY

Imprint Investments (PTY) Ltd
P.O. Box 1839
Windhoek
Namibia

Dear Sir / Madam

RE: ENVIRONMENTAL CLEARANCE FOR THE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT PLAN FOR THE PROPOSED EXPLORATION AND POSSIBLE TEST MINING FOR EXCLUSIVE PROSPECTING LICENCE 3963, SITUTATED IN OTJOZONJUPA REGION, NAMIBIA

Thank you for the submission of Environmental Assessment and Management Plan for the above mentioned project. The assessment done is considered sufficient as it takes into account the key environmental issues concerning the proposed activities. It is recommended that once the project is implemented, regular environmental monitoring of performance and possible improvements should be conducted.

On the basis of the above, this letter serves as an environmental clearance for the project to proceed. However, this clearance letter does not in anyway hold the Ministry of Environment and Tourism accountable of any wrong doing, insufficient information, nor any adverse effects that may arise from this project activity. Instead, full accountability rests with the proponent and his/ her consultants.

Yours sincerely,

Dr. Kalumbi Shangula
Permanent Secretary

Ministry of Environment & Tourism
16 NOV 2009
Office of the

All official correspondence must be addressed to the Permanent Secretary

Figure 1.1: Copy of the expired ECC issued in November 2009.

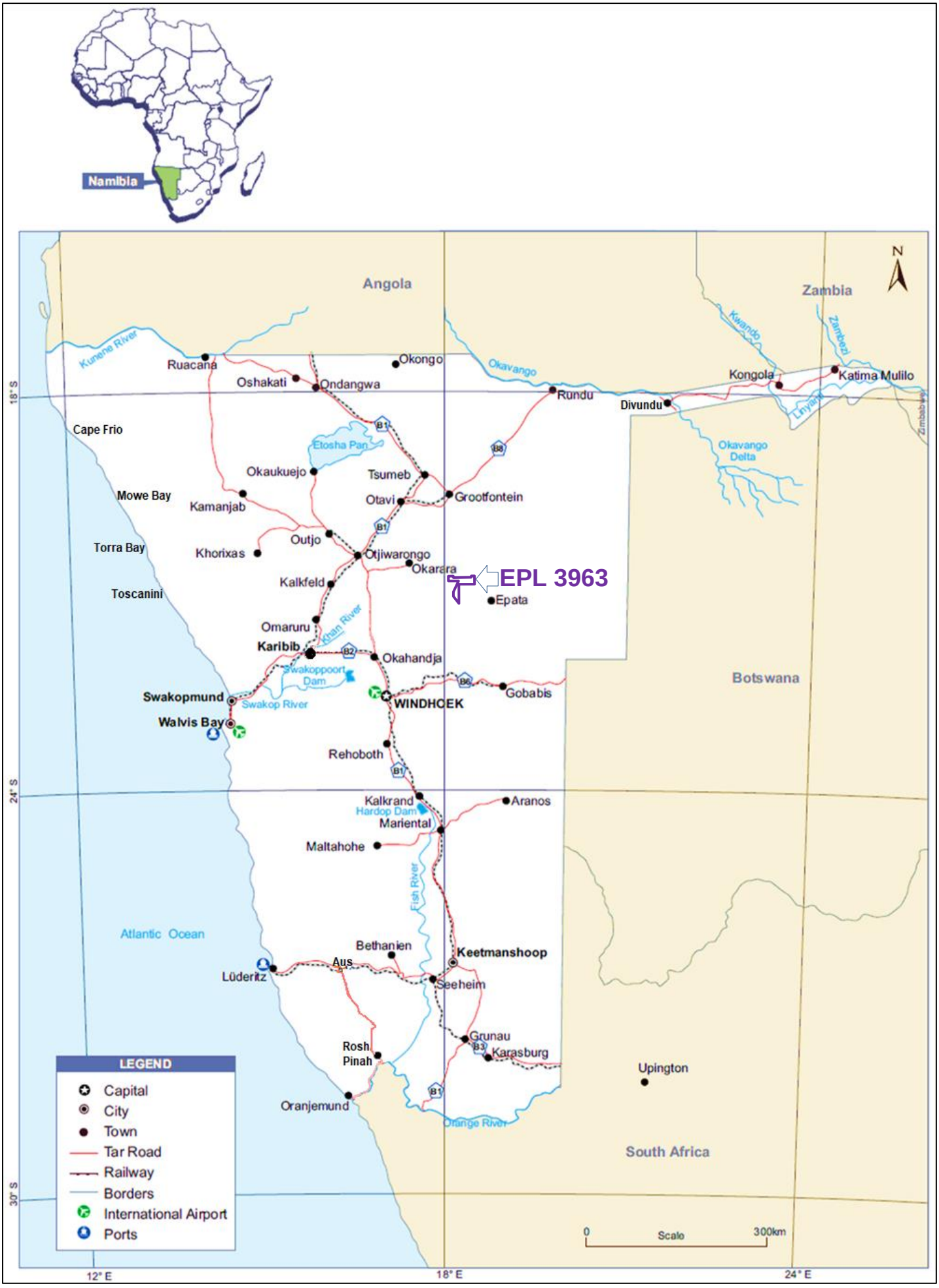


Figure 1.2: Regional location of the EPL No 3963.

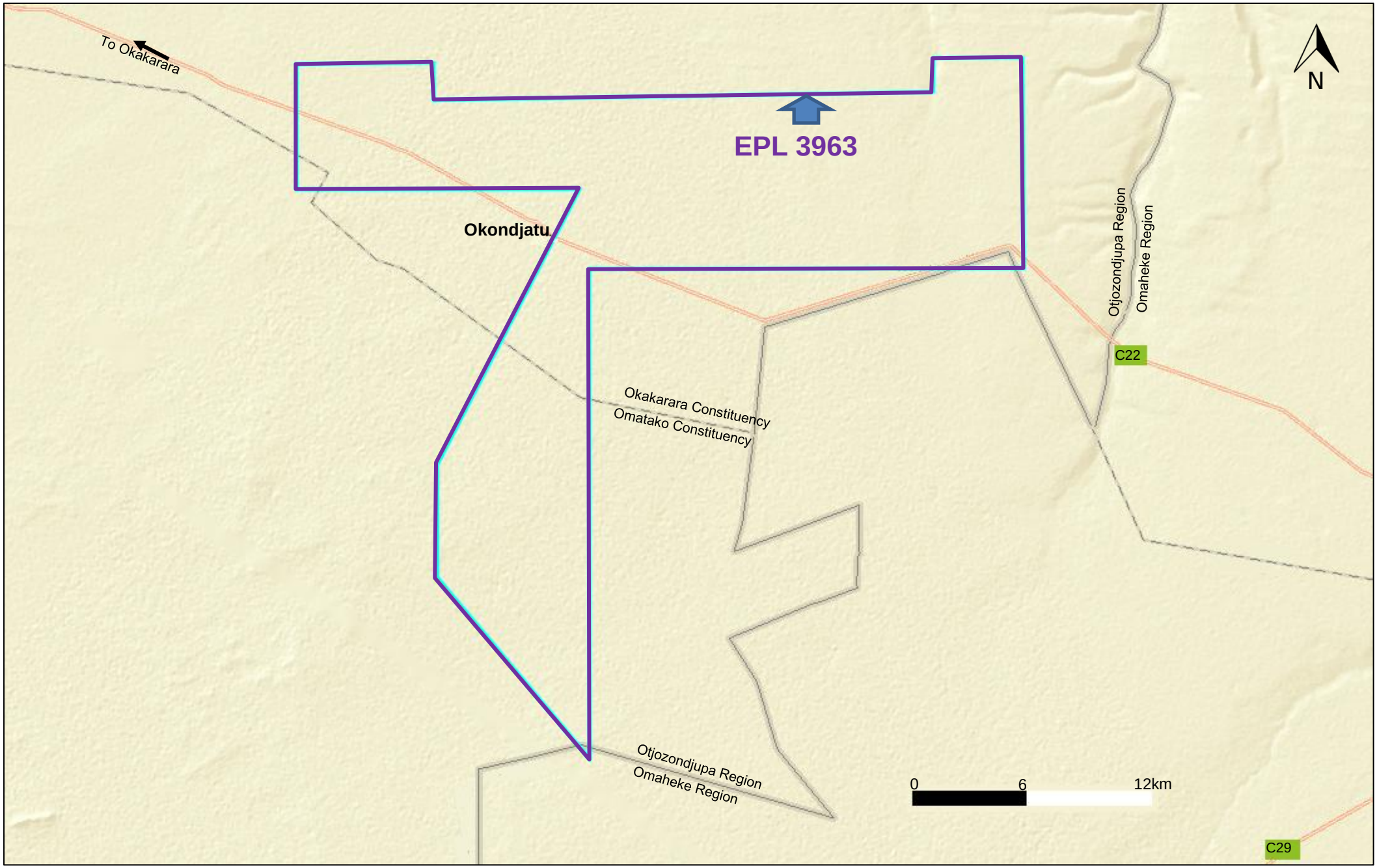


Figure 1.3: Detailed regional location of the EPL 3963 (Source: http://portals.flexicadastre.com/Namibia).

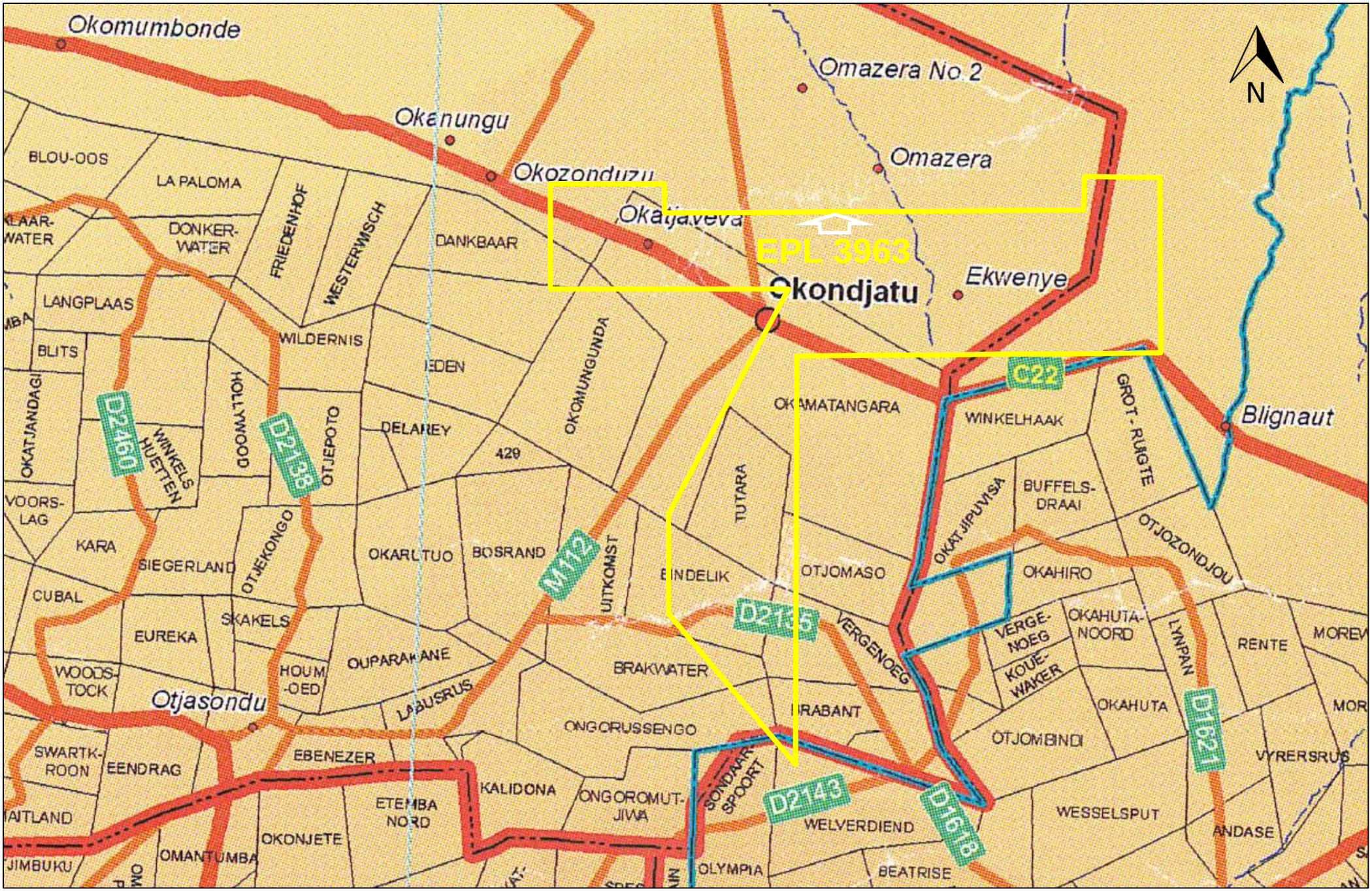


Figure 1.4: Communal / commercial farmland covered by the EPL 3963 and access (Source: Namibia 1:1000000 Registration Divisions Extract).

1.4 Project Motivation

The EPL 3963 falls within the central Damara Belt which is regarded one of the highly prospective areas for base and rare metals, industrial minerals, non-nuclear fuels, precious metals and precious stones in Namibia. The EPL 3963 falls within the well-known Otjosondu manganese field. The manganese deposits of Otjosondu have been known since 1904 (Roper, 1956), with the first exploration activities involving sampling was undertaken in 1939. Geological Survey of the Union of South Africa only sampled the area in 1940, and the first claim was pegged in 1941 (Dickson, 1940 and Schneider, 1992). In 1949, prospector J. Paulsen claimed that he had discovered the largest manganese deposit in Southern Africa (Buhn, 1991). He subsequently sold his claims to the South African Minerals Corporation Ltd, which obtained large concessions over the entire area around Otjosondu. Its these claims that were later converted into mining areas named Ann, Cheri, Dale, Eric, Cathy, Lucy, Hettie, Furman, Gauntlett and Jeppe and were eventually consolidated into the two large eastern and central mining areas (Vermaak, 1969). Open-pit mining started in October 1950, utilising the removal of overburden materials. The mine was originally opened from surface to exploit steeply dipping manganese rich deposits. The surface workings were late extended underground in some places and number of vertical hoist shaft were also sunk.

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 3963 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 and regional communities as well as 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 Approach, Alternatives, Key Issues and Methodology

1.5.1 Terms of Reference (ToR) and Approach

Risk-Based Solutions (RBS) was appointed by the Proponent to prepare the EIA and EMP Reports in order to support the application for renewal of the Environmental Clearance Certificate (ECC) for the EPL No. 3963 with respect to the proposed exploration activities (Annex 1).

The EIA process reviewed the receiving environmental settings (physical, biological, socioeconomic and ecosystem services, function, use values and non-use) and proposed / ongoing exploration activities, identified the impacts and then assessed the likely impacts (positive and negative) on the receiving environment (Table 1.1).

The key deliverable comprised this EIA Report and a separate Environmental Management Plan (EMP) report detailing appropriate mitigation measures that will enhance the positive impacts and reduce the likely negative impacts identified.

The EIA and 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 issue of the Records of Decisions (RDs).

The EIA and EMP processes have 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 MME, MEFT and Ministry of Agriculture, Water and Land Reform (MAWLR).

Both the EIA and EMP Reports have 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, EIA and EMP Processes.

<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="10">(i) Initial desktop exploration activities (review of existing information and all previous activities in order identify any potential target/s)

(ii) Regional reconnaissance field-based activities such mapping and sampling to identify areas with potential targets

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

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

(v) Prefeasibility and feasibility studies to be implemented on a site-specific area if the local field-based studies prove positive</td><td rowspan="10">(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.

(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>
</table>

1.5.2 Environmental Assessment Process and Steps

The environmental assessment process adopted for this project took into considerations the provisions of the Environmental Impact Assessment (EIA) Regulations, 2012 and the Environmental Management Act (EMA), 2007, (Act No. 7 of 2007) as outlined in Fig. 1.5.

The steps to be taken are summarised as follows:

(i) Project screening process was undertaken in June 2020.

(ii) A Draft BID / Scoping Report prepared in June 2020 (Annex 1).

(iii) Prepared the Draft EIA and EMP Reports in June 2020.

(iv) Prepared the EIA and EMP reports used to support the application for Environmental Clearance Certificate (ECC) for the proposed minerals exploration activities in the EPL 3963 in July 2020, and.

(v) The formal application for ECC is planned to be submitted to the Environmental Commissioner through the Ministry of Mines and Energy (Competent Authority) July 2020.

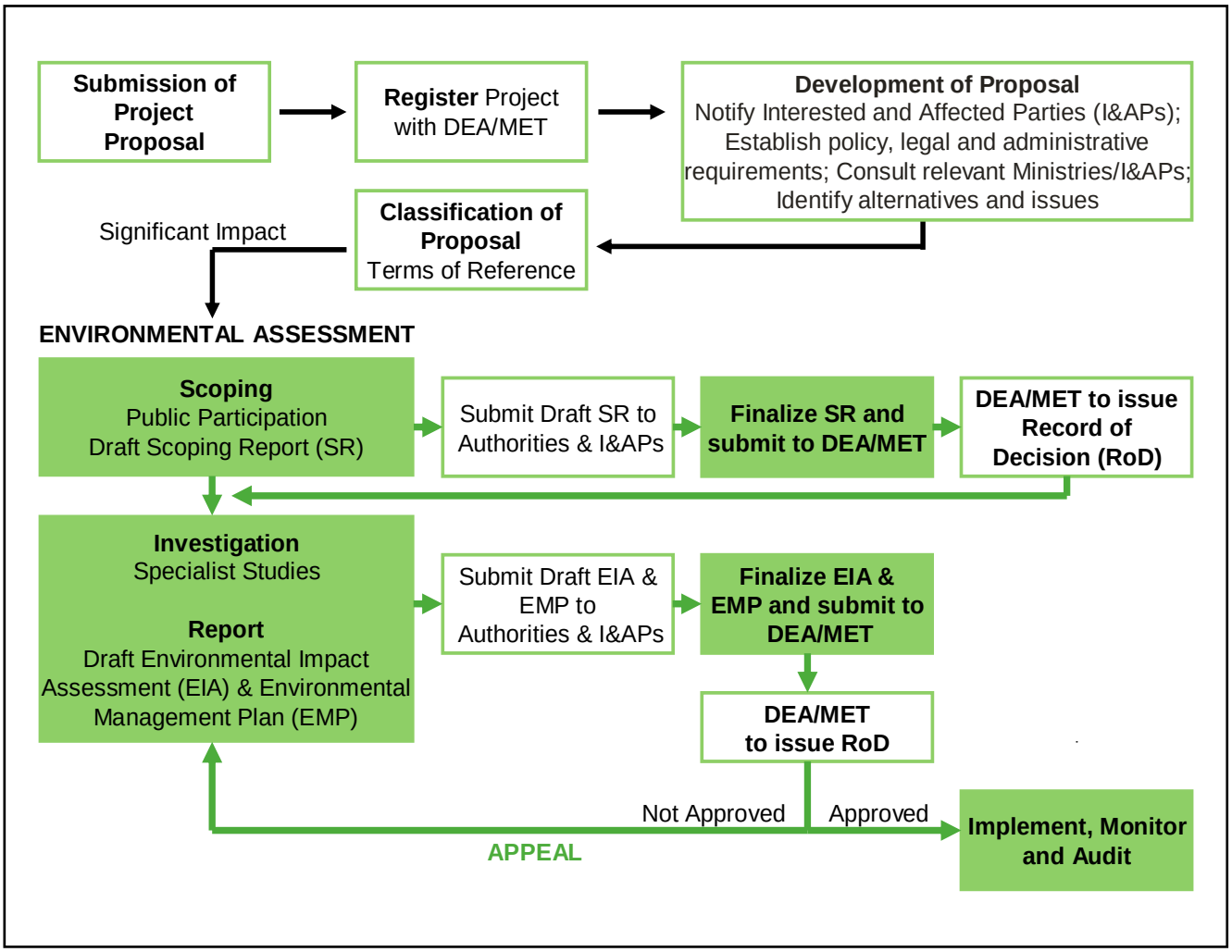


Figure 1.5: Schematic presentation of Namibia's Environmental Assessment procedure.

1.5.3 Assumptions and Limitations

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

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

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

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

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

1.6 Structure of the Report

The following is the summary structure outline of this EIA 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: Conclusions and Recommendations**- Summary of the findings and way forward.

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 (Base and rare metals, industrial minerals, non-nuclear fuels, precious metals and precious stones) within the EPL area.

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 scope of the required field-based support and logistical activities will depend on the scale of proposed exploration activities to be undertaken.

The proposed exploration activities will be supported by existing tracks and campsites / farmstead as well as existing accommodation in 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 within the EPL area in line with the EMP provisions. The size of the exploration camp will be of very limited footprints during the exploration phase but may be expanded for the test mining and mine development phases in an event of a discovery of economic minerals resources.

2.2 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 minerals occurrences 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. LEGISLATIVE FRAMEWORK

3.1 Overview

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

3.2 Key Applicable Legislation

3.2.1 Minerals Exploration and Mining Legislation

The national legislation governing minerals prospecting and mining activities in Namibia fall within the jurisdiction of the Ministry of Mines and Energy (MME) as the Competent Authority (CA) responsible for granting authorisations. The Minerals (Prospecting and Mining) Act (No 33 of 1992) is the most important legal instrument governing minerals prospecting and mining activities in Namibia. A new Bill, to replace the Minerals (Prospecting and Mining) Act (No 33 of 1992) is being prepared and puts more emphasis on good environmental management practices, local participation in the mining industry and promotes value addition as prescribed in the Minerals Policy of 2003.

The Minerals (Prospecting and Mining) Act (No 33 of 1992) regulates reconnaissance, prospecting (exploration) and mining activities. The Mining Commissioner, appointed by the Minister, is responsible for implementing the provisions of this Act including reporting requirements, environmental obligations as well as the associated regulations such as the Health and Safety Regulations.

3.2.2 Environmental Management Legislation

The Environmental Assessment (EA) process in Namibia is governed by the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007) in the Ministry of Environment, Forestry and Tourism (MEFT). The objectives of the Act and the Regulations are, among others, to promote the sustainable management of the environment and the use of natural resources to provide for a process of assessment and control of activities which may have significant effects on the environment. The Minister of Environment, Forestry and Tourism (is authorised to list activities which may only be undertaken if an environmental clearance certificate has been issued by the environmental commissioner, which activities include those relating to exploration and mining operations.

In addition to the requirements for undertaking Environmental Assessment prior to the project implementation, the Environmental Management Act and the EIA Regulations also provide for obligations of a license holder to provide for project rehabilitation and closure plan. In the regulations, the definition of “rehabilitation and closure plan” is a plan which describes the process of rehabilitation of an activity at any stage of that activity up to and including closure stage.

3.2.3 Water Legislation

Water Act 54 of 1956 under the Minister of Agriculture, Water and Land Reform (MAWLR) provides for the control, conservation and use of water for domestic, agricultural, urban and industrial purposes. In terms of Section 6, there is no right of ownership in public water and its control and use is regulated and provided for in the Act. In accordance with the Act, the ongoing exploration must ensure that mechanisms are implemented to prevent water pollution. Certain permits will also be required to abstract groundwater as well as for “water works”. The broad definition of water works will include the reservoir on site (as this is greater than 20,000m^3), water treatment facilities and pipelines. Due to the

water scarcity of the area, all water will be recycled (including domestic wastewater). The Act requires the license holder to have a wastewater discharge permit for discharge of effluent.

The Water Act 54 of 1956 is due to be replaced by the Water Resources Management Act 24 of 2004 which is currently being revised. The Water Resource Management Act 2004 *provides for the management, development, protection, conservation and use of water resources.*

3.2.4 Atmospheric Pollution Prevention Legislation

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

3.2.5 Labour, Health and Safety Legislations

The Labour Act, 1992, Act No. 6 of 1992 as amended in the Labour Act, 2007 (Act No. 11 of 2007), falling under the Ministry of Labour, Industrial Relations and Employment Creation (MLIREC) makes reference to severance allowances for employees on termination of a contract of employment in certain circumstances and health, safety and welfare of employees.

In terms of the Health Safety and Environment (HSE), the Labour Act, 2007 protects employees and every employer shall, among other things: provide a working environment that is safe, without risk to the health of employees, and that has adequate facilities and arrangements for the welfare of employees, provide and maintain plant, machinery and systems of work, and work processes, that are safe and without risk to the health of employees, and ensure that the use, handling, storage or transportation of hazardous materials or substances is safe and without risk to the health of employees. All hazardous substances shall have clear exposure limits and the employer shall provide medical surveillance, first-aid and emergency arrangements as fit for the operation.

3.2.6 Other Applicable National Legislations

Other Important legislative instruments applicable to the ongoing exploration operations in the EPL 3963 include the following (Table 3.1):

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

Table 3.1 summarises the key selected legislations relevant applicable to the ongoing exploration in the EPL 3963.

Table 3.1: Legislation relevant to the ongoing exploration operations in the EPL 3963.

LAW	SUMMARY DESCRIPTION
Constitution of the Republic of Namibia, 1990	The Constitution is the supreme law in Namibia, providing for the establishment of the main organs of state (the Executive, the Legislature, and the Judiciary) as well as guaranteeing various fundamental rights and freedoms. Provisions relating to the environment are contained in Chapter 11, article 95, which is entitled "promotion of the Welfare of the People". This article states that the Republic of Namibia shall – "actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at … maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilisation of living natural resources on a sustainable basis for all Namibians, both present and future. The Government shall provide measures against the dumping or recycling of foreign nuclear waste on Namibian territory."
Minerals (Prospecting and Mining) Act, 1992 ***Ministry of Mines and Energy (MME)***	The Minerals Act governs minerals prospecting and mining. The Act *provides for the reconnaissance, prospecting, and mining for, and disposal of, and the exercise of control over minerals in Namibia. and to provide for matters incidental thereto. A new Minerals Bills is currently under preparation.*
Environmental Management Act (2007) - ***Ministry of Environment, Forestry and Tourism*** **(MEFT)**	The purpose of the Act is *to give effect to Article 95(l) and 91(c) of the Namibian Constitution by establishing general principles for the management of the environment and natural resources. to promote the co-ordinated and integrated management of the environment. to give statutory effect to Namibia's Environmental Assessment Policy. to enable the Minister of Environment and Tourism to give effect to Namibia's obligations under international conventions*. In terms of the legislation it will be possible to exercise control over certain listed development activities and activities within defined sensitive areas. The listed activities in sensitive areas require an Environmental Assessment to be completed before a decision to permit development can be taken. The legislation describes the circumstances requiring Environmental Assessments. Activities listed as per the provisions of the Act will require Environmental Assessment unless the Ministry of Environment, Forestry and Tourism, in consultation with the relevant Competent Authority, determines otherwise and approves the exception.
Water Act 54 of 1956 **Minister of Agriculture, Water and Land reform (MAWLR)**	This Act provides for the control, conservation and use of water for domestic, agricultural, urban, and industrial purposes. In terms of Section 6, there is no right of ownership in public water and its control and use is regulated and provided for in the Act. In accordance with the Act, the proposed project must ensure that mechanisms are implemented to prevent water pollution. Certain permits will also be required to abstract groundwater (already obtained) as well as for "water works". The broad definition of water works will include the reservoir on Site (as this is greater than 20,000m^3), water treatment facilities and pipelines. Due to the water scarcity of the area, all water will be recycled (including domestic wastewater) and the Mine will be operated on a zero-discharge philosophy. It will, therefore, not be necessary to obtain permits for discharge of effluent. Section 23 of the Act requires environment rehabilitation after closure of the Mine, particularly, in this instance to obviate groundwater pollution and potential pollution resulting from run-off. This Act is due to be replaced by the Water Resources Management Act 24 of 2004.
Forest Act 12 of 2001 - **Minister of Environment, Forestry and Tourism (MEFT)**	The Act provide for the establishment of a Forestry Council and the appointment of certain officials. to consolidate the laws relating to the management and use of forests and forest produce. to provide for the protection of the environment and the control and management of forest fires. Under Part IV Protection of the environment, Section 22(1) of the Act, it is unlawful for any person to: cut, destroy, or remove: (a) any vegetation which is on a sand dune or drifting sand or in a gully unless the cutting, destruction or removal is done for the purpose of stabilising the sand or gully or (b) any living tree, bush or shrub growing within 100m of a river, stream, or watercourse. Should either of the above be unavoidable, it will be necessary to obtain a permit from the Ministry. Protected tree species as listed in the Regulations shall not be cut, destroyed, or removed.
Hazardous Substance Ordinance 14 of 1974 ***Ministry of Health and Social Services***	Provisions for hazardous waste are amended in this act as it provides "*for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances. to provide for the prohibition and control of the importation, sale, use, operation, application, modification, disposal or dumping of such substance. and to provide for matters connected therewith"*

Table 3.1: *Cont.*

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

3.3 Key Regulators / Competent 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 3.2.

Table 3.2: 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
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 Land Reform (MAWLR)	The Directorate of Resource Management within the Department of Water Affairs (DWA) at the MAWLR is currently the lead agency responsible for management of surface and groundwater utilisation through the issuing of abstraction permits and waste water disposal permits. DWA is also the Government agency responsible for water quality monitoring and reporting. 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.

3.4 International and Regional Treaties and Protocols

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

- The Paris Agreement, 2016.
- Convention on Biological Diversity, 1992.
- Vienna Convention for the Protection of the Ozone Layer, 1985.
- Montreal Protocol on Substances that Deplete the Ozone Layer, 1987.
- United Nations Framework Convention on Climate Change, 1992.
- Kyoto Protocol on the Framework Convention on Climate Change, 1998.
- Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal, 1989.
- World Heritage Convention, 1972.
- Convention to Combat Desertification, 1994. and
- Stockholm Convention of Persistent Organic Pollutants, 2001.

- ❖ Southern Africa Development Community (SADC) Protocol on Mining, and.
- ❖ Southern Africa Development Community (SADC) Protocol on Energy.

3.5 Standards and Guidelines

Industrial effluent likely to be generated by the proposed activities must comply with provisions of the Government Gazette No 217 dated 5 April 1962 (Table 3.3) while the drinking water quality comparative guideline values are shown in Table 3.4.

The only key missing components to the regulatory frameworks in Namibia are the standards, and guidelines with respect to gaseous, liquid, and solid emissions. However, in the absence of national gaseous, liquid, and solid emission limits for Namibia, the proposed project shall target the Multilateral Investment Guarantee Agency (MIGA) gaseous effluent emission level and liquid effluent emission levels (Table 3.5).

Noise abatement measures must target to achieve either the levels shown in Table 3.6 or a maximum increase in background levels of 3 dB (A) at the nearest receptor location off-site (MIGA guidelines).

Table 3.3: 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 3.4: 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					

Table 3.5: Liquid effluent emission levels (MIGA /IFC).

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

Table 3.6: Noise emission levels (MIGA /IFC).

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

3.6 Recommendations on Permitting Requirements

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

(i) Valid EPL as maybe applicable from Department of Mines in the MME.

(ii) Valid ECC from the Department of Environmental Affairs in the MEFT.

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

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

4. SUMMARY OF NATURAL ENVIRONMENT

4.1 Climate

The EPL area receives summer rainfall which is brought by northeast winds, generally from October to April. The average rainfall varies considerably and ranges between 380 mm and 450 mm. The mean annual gross evaporation is between 3000 mm - 3200 mm. The numbers of rainfall events expressed as an annual average in days as determined from the regional data is 10-30 days. The sun shines for an annual average of 10 hours a day.

The annual mean temperature for Otjiwarongo area is around 24°C with the mean monthly temperatures ranging between 23°C to 14°C throughout the year. Based on regional data sets, temperatures at 08h00, 14h00 and 20h00 are estimated to be around 14°C, 24°C and 18°C respectively. Seasonal variations in the wind fields are presented by the average wind data for January, April, July and October. An increase in the north to north-easterly winds during summer (January) and autumn (April) is likely.

4.2 Topography

The regional terrain around the EPL 3963 is generally flat and gently undulating. Within the EPL area, the drainage is dendritic in nature with ephemeral streams, often steeply incised, forming small early stage tributaries of Onaze, Gunib and Otjozondjou Omuramba Ephemerals Rivers systems (Fig. 4.1).

4.3 Likely Fauna Diversity

4.3.1 Reptiles

According to Alexander and Marais (2007), Branch (1998), Branch (2008), Boycott and Bourquin 2000, Broadley (1983), Buys and Buys (1983), Cunningham (2006), Griffin (2003), Hebbard (n.d.), Marais (1992), Tolley and Burger (2007), at least 77 endemic reptile species known and/or expected to occur in the general license area make up 35.1% of the reptiles from the general area and although not as high as endemism elsewhere for example the western escarpment areas of Namibia but still makes up a large portion of the reptiles.

Reptiles of greatest concern are probably the tortoises – Stigmochelys pardalis and Psammobates oculiferus which are often consumed by humans. Python anchietae and P. natalensis which are indiscriminately killed throughout their range and Varanus albigularis as well as the various Pachydactylus species geckos of which 80% are viewed as endemic. Other important species would be the 3 Blind snakes (Rhinotyphlops species of which 2 species are endemic) and 2 Thread snakes (Leptotyphlops species of which 1 species is endemic) which could be associated with the sandier soils in the area.

4.3.2 Amphibians

According to Carruthers (2001), Channing (2001), Channing and Griffin (1993), Du Preez and Carruthers (2009), Passmore and Carruthers (1995), of the 9 species of amphibians are likely to occur in the general license area, 33.3% (3 species) are of conservation value with 2 species being endemic (Poyntonophrynus hoeschi and Phrynomantis annectens) (Griffin 1998b) and 1 species (Pyxicephalus adspersus) viewed as near threatened (Du Preez and Carruthers 2009).

However, the area does not have unique amphibian habitat with potential habits being associated with the various ephemeral drainage lines associated with the Onaze, Gunib and Otjozondjou Omuramba Ephemerals Rivers systems within the license area (Fig. 4.1).

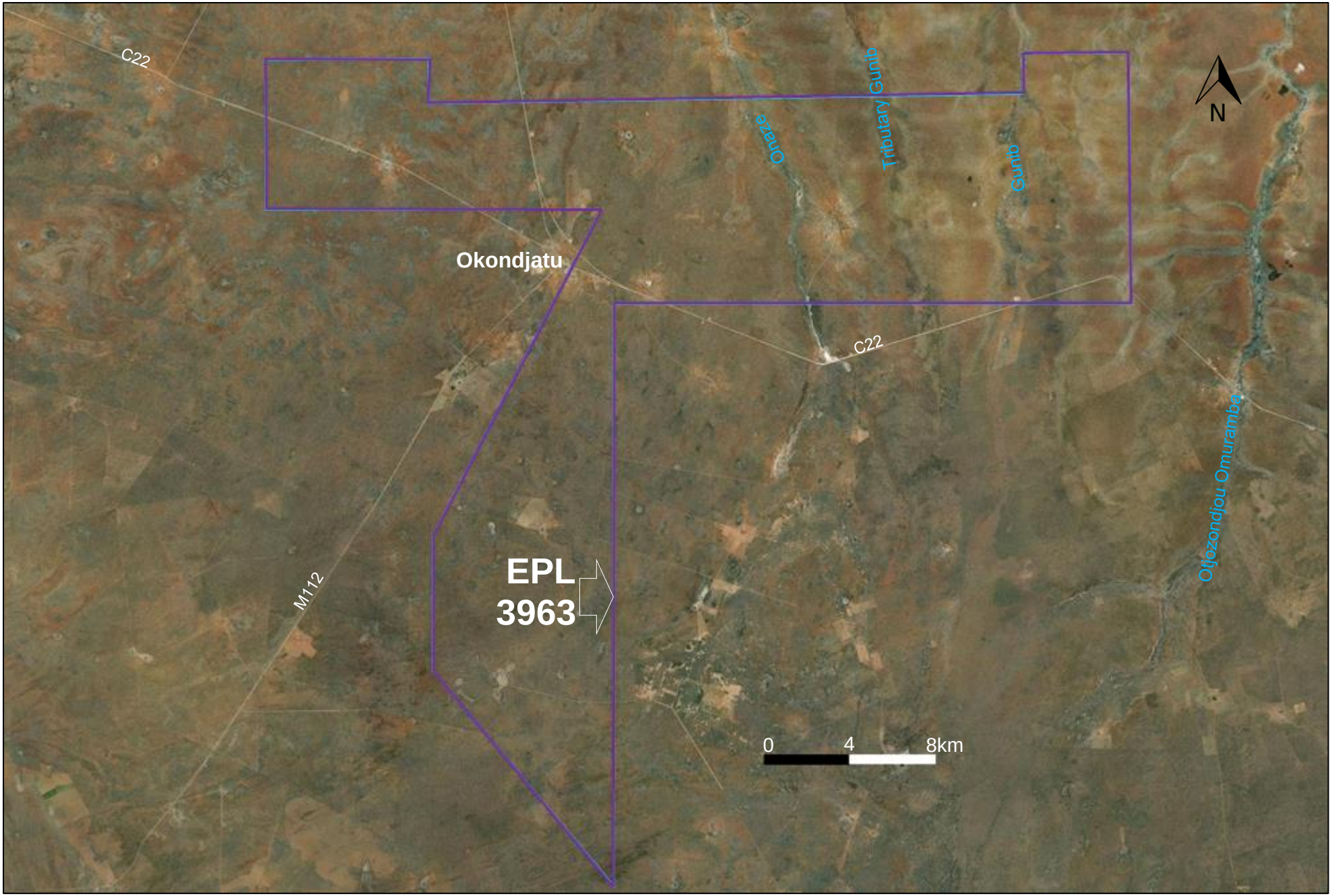


Figure 4.1: Google map image showing the topographic features associated with the EPL 3963 (Source: Google map, 2020).

4.3.3 Mammals

According to De Graaff (1981), Griffin and Coetzee (2005), Estes (1995), Joubert and Mostert (1975), Monadjem et al. (2010), Skinner and Smithers (1990), Skinner and Chimimba (2005), Stander and Hanssen (2003) and Taylor (2000), of the 84 species of mammals expected to occur in the general license area, 4.8% are endemic and 35.7% are classified under international conservation legislation. The most important groups are rodents (29.8% - 12% endemic), bats (26.2% - 4.5% endemic) and carnivores (20.2% - 5.9% endemic). According to De Graaff (1981), Griffin and Coetzee (2005), Estes (1995), Joubert and Mostert (1975), Monadjem et al. (2010), Skinner and Smithers (1990), Skinner and Chimimba (2005), Stander and Hanssen (2003) and Taylor (2000), the most important species from the general area are probably all those classified as near threatened (*Eidolon helvum*, *Hipposideros vittatus*, *Rhinolophus blasii*, *Hyaena brunnea* and *Panthera pardus*) and vulnerable (*Acinonyx jubatus* and *Felis nigripes*) by the IUCN (2014) and rare (*Cistugo seabrai*, *Atelerix frontalis angolae* and *Felis nigripes*) under Namibian legislation.

4.3.4 Birds

The high proportion of endemics – 10 of the 14 endemics to Namibia (i.e. 71% of all endemics) – expected to occur in the general license area underscore the importance of this area. Furthermore 21.3% are classified as southern African endemics (or 6.3% of all the birds expected) and 78.7% are classified as southern African near-endemics (or 23.1% of all the birds expected). According to Brown *et al.* (1998), Brown et al. (2006), Hockey et al. (2006), Komen (n.d.), Maclean (1985), Simmons and Brown (In press) and Tarboton (2001), the most important “endemic” species known/expected to occur in the general area are viewed as Monteiro’s Hornbill (*Tockus monteiri*), Damara Hornbill (*Tockus damarensis*), *Ammomanopsis grayi* (Gray’s Lark), *Namibornis herero* (Herero Chat), *Eupodotis rueppellii* (Rüppell’s Korhaan) and *Poicephalus rueppellii* (Rüppell’s Parrot). The species listed by the IUCN (2014) as endangered are: (Ludwig’s bustard and white-backed vulture), near threatened (kori bustard) and vulnerable (martial eagle and secretary bird) and are viewed as the most important.

4.3.5 Sensitive Areas – Vertebrate Fauna

The following sensitive areas are of most concern at the proposed / ongoing development site:

(i) Drainage lines, albeit ephemeral, are the lifelines in the drier parts of Namibia with a variety of vertebrate fauna attracted and/or associated with such features. Although not as important as perennial rivers, well vegetated ephemeral drainage lines are still viewed as important habitat for a variety of vertebrate fauna in the general area. It is recommended that development attempt to avoid these drainage lines as far as possible linked to the Onaze, Gunib and Otjozondjou Omuramba Ephemeral River channels (Fig. 4.1), and.

(ii) **Mountainous and rocky areas**: Maybe biotic richness and endemism.

4.4 Likely Flora Diversity

4.4.1 Trees/shrubs

It is estimated that at least 79-110 species of larger trees and shrubs (>1m) – Coats Palgrave 1983 [81 sp.], Curtis and Mannheimer 2005 [79 sp.], Mannheimer and Curtis 2009 [110 sp], Van Wyk and Van Wyk 1997 [60 sp.]), are found in the general area. The most important tree/shrub species occurring in the general area are probably *Cyphostemma bainesii* (endemic, NC), *Cyphostemma currorii* (NC), *Cyphostemma juttae* (endemic, NC), *Erythrina decora* (Forestry*, endemic), *Heteromorpha papillosa* (endemic) and *Manuleopsis dinteri* (endemic species) (Craven, 1999. Curtis and Mannheimer, 2005 and Mannheimer and Curtis, 2009). The protected species are viewed as the most important tree/shrubs occurring in the area include: Acacia erioloba and *Boscia albitrunca*. However, these species are widespread throughout large parts of Namibia and are not exclusively associated with the ongoing / proposed development area, which minimises the overall effect on trees/shrubs.

4.4.2 Grass

It is estimated that up to 111 grasses – 73 to 88 species – (Müller 2007 [88 sp.], Müller 1984 [73 sp.], Van Oudshoorn 1999 [73 sp.]) occur in the general area. The most important grass expected in the area is the endemic *Setaria finite* associated with ephemeral drainage lines. Although the season (end of dry and beginning of wet) made the identification of grasses difficult, none off the grasses are exclusively associated with the proposed / ongoing developments area nor protected species, which minimises the overall effect on grasses.

4.4.3 Other

Aloe litoralis – scattered individuals – are viewed as another species of concern although occurs widespread throughout Namibia and not exclusively associated with the proposed / ongoing development area.

4.4.4 Protected Species / Sensitive Areas

The following are the key likely protected species / sensitive areas that maybe found within the EPL area:

(i) Protected species: The protected tree species – *Acacia erioloba, Albizia* along the **Onaze, Gunib and Otjozondjou Omuramba** Ephemerals Rivers Channels and associated drainage lines (Fig. 4.1)**.** Drainage lines, albeit ephemeral, are the lifelines in the drier parts of Namibia with a variety of vertebrate fauna attracted and/or associated with such features. Although not as important as perennial rivers, well vegetated ephemeral drainage lines are still viewed as important habitat for a variety of vertebrate fauna in the general area. It is recommended that development attempt to avoid these drainage lines as far as possible, and.

(ii) **Mountainous and rocky areas**: Maybe biotic richness and endemism.

4.5 Summary of the Socioeconomic Settings

4.5.1 Regional Profiles

The EPL 3963 mainly falls within the Otjozondjupa Region with Okondjatu being the nearest settlement situated to the southwestern edge of the EPL boundary (Fig. 4.2). According to the NSA, (2011), the following is the summary of the regional and local socioeconomic environment of the area linked to the population and housing census, basic analysis with highlights about the Otjozondjupa Region (Fig. 4.2):

- The Project area is situated in Otjozondjupa Region with a population of 143 903 people and an area of 105 295.1 km^2.

- The Otjozondjupa Region had a relatively young population with 36.2% of the population being less than 15 years of age. The medial age of Otjozondjupa Region was 22 years, and was therefore intermediate.

- The urbanization rate in Otjozondjupa Region stands at 54% which is above the national average of 42.8%. Thus, the urbanisations are more progressive in Otjozondjupa Region that the average for Namibia. The urbanization of Otjozondjupa Region has gained momentum between the last two Censuses, 2001 and 2011, from 41% of population living in urban areas in 2001 to 54% in 2011.

- Literacy rate for Otjozondjupa Region was 83% with no major difference between males and females (female 82.9 % and males 83.4%). The literacy rate in urban areas stood at 90.9 %, while in rural areas it stood at 73%. It is the 3rd least literate region in Namibia after Kunene and Omaheke Regions.

- The 2011 Census revealed that 17.6 % of the population aged 6 years and above never attended school in Otjozondjupa Region.

- Otjozondjupa Region has relatively high labour force participation rate (71.5%) in comparison to the national average of 66% with substantially higher rates for males than females (66.5% and 76.2% respectively).

- Otjiwarongo is a large town and the biggest business centre for the Otjozondjupa Region and regional capital.

- The main industries in Otjozondjupa Region are agriculture and forestry followed by social security, then administrative and support service activities. Wages and salaries are the highest main source of income in Otjozondjupa (59.6%).

- The most common source of energy for lighting in Otjozondjupa Region was electricity from the main grid, used by 55.2 percent of the households. Solar energy was not widely used, but played a more important role in rural areas (2.8%) than in urban areas (0.3%).

- Otjozondjupa has 72 schools with a total of 36,284 pupils.

- In terms of communication technology, the constituencies have relatively poor network coverage due to its remoteness and vastness of the constituencies coupled with low population. However, radio and digital television coverage exists in most parts of the constituencies, particularly within the settlements and their nearby places are connected to national grid.

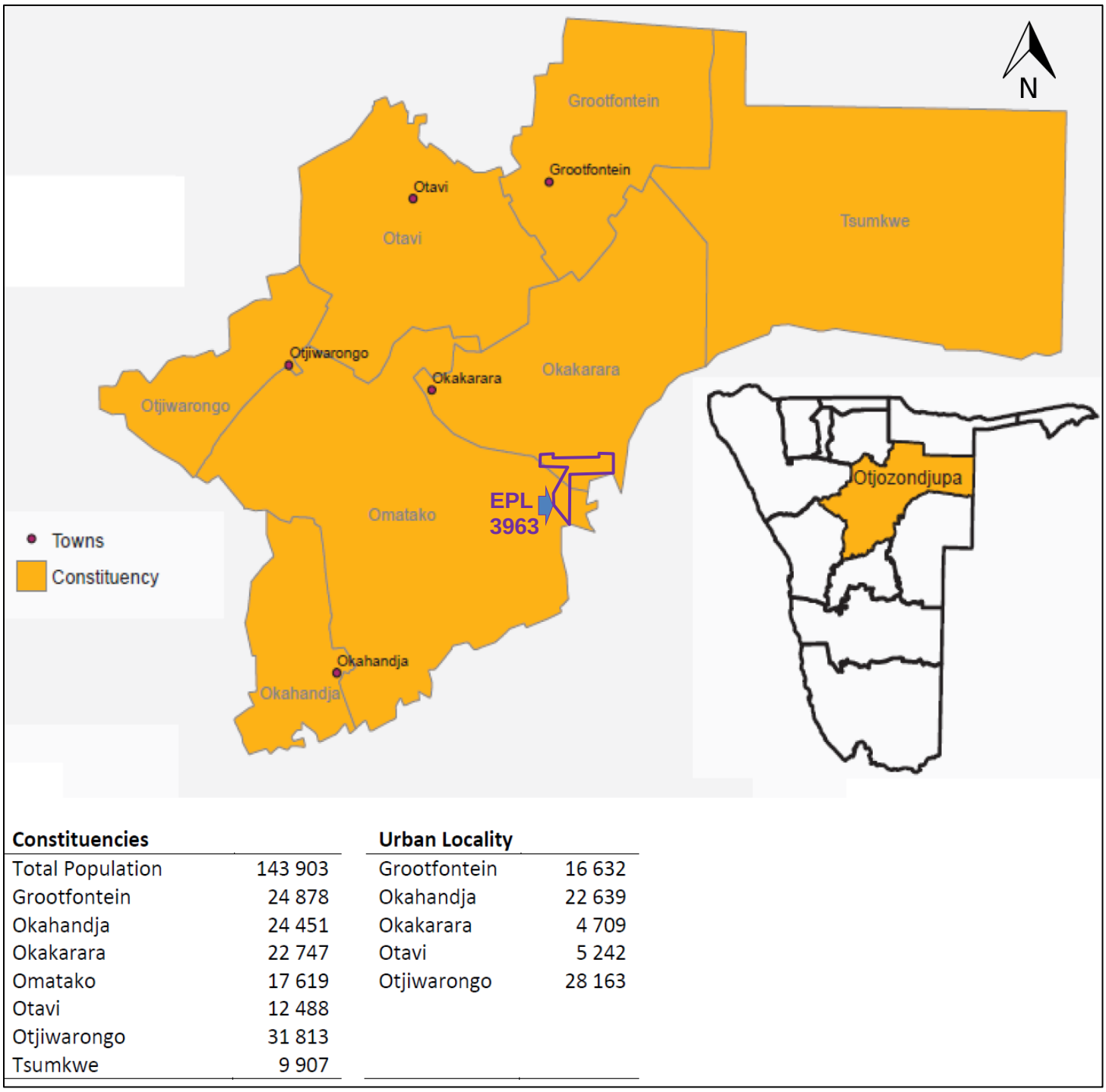
- Limited economic activities are available within the project area. The agriculture, hunting and forestry sectors employ most of the region's economically active population, and.

- The availability of elements such as lime, fluorspar, manganese and copper offer a number of processing opportunities, such as the manufacturing of cement and industrial lime.

4.5.2 Local Profile

Locally, the EPL within Omatako and Okakarara Constituencies with population of 17, 6919 and 22, 747 respectively. The exploration area has a relatively low population density - 0.7 /km^2 and 1.550/km^2 in Omatako and Okakarara Constituencies respectively with Omatako Constituency being the least populated constituency in Otjozondjupa Region. The household main income in both Omatako and Okakarara constituencies are farming, wages and salaries, cash remittance business, non-farming and pension (Tables 4.1 and 4.2).

The overall local socioeconomic profiles of Okakarara and Omatako constituencies are shown in Tables 4.1 and 4.2, respectively.



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: Constituencies and population of Otjozondjupa Region (Source: National Statistics Agency (NSA), 2011).

Table 4.1: Okakarara Constituency – Census selected indicators, 2011 and 2001(Source: National Statistics Agency (NSA), 2011).

	2011	2001		2011	2001
Population Size			Labour force, 15+ years, %		
Total	22 747	21 820	In labour force	60	32
Females	10 953	10 519	Employed	53	48
Males	11 794	11 301	Unemployed	47	52
			Outside labour force	30	60
Sex ratio: Males per 100 females	108	107	Student	39	30
			Homemaker	17	48
Age composition, %			Retired, too old, etc.	44	18
Under 5 years	17	14			
5 – 14 years	24	26	Housing conditions, %		
15 – 59 years	51	49	Households with		
60+ years	8	9	Safe water	89	87
			No toilet facility	74	79
Marital status: 15+ years, %			Electricity for lighting	33	17
Never married	63	70	Wood/charcoal for cooking	81	80
Married with certificate	6	4			
Married traditionally	20	15	Main source of income, %		
Married consensually	4	5	Household main income		
Divorced/Separated	3	2	Farming	33	46
Widowed	4	4	Wages & Salaries	27	20
			Cash remittance	6	4
Private households			Business, non-farming	10	10
Number	4 814	3 681	Pension	19	13
Average size	4.7	5.6			
			Disability, %		
Head of household, %			With disability	6	6
Females	40	41			
Males	60	59			
Literacy rate, 15+ years, %	81	82			
Education, 15+ years, %					
Never attended school	21	28			
Currently at school	30	19			
Left school	44	51			

Table 4.2: Omatako Constituency – Census selected indicators, 2011 and 2001(Source: National Statistics Agency (NSA), 2011).

	2011	2001		2011	2001
Population Size			Labour force, 15+ years, %		
Total	17 619	26 908	In labour force	70	50
Females	7 664	12 537	Employed	78	64
Males	9 955	14 371	Unemployed	22	36
			Outside labour force	15	38
Sex ratio: Males per 100 females	130	115	Student	61	41
			Homemaker	9	44
Age composition, %			Retired, too old, etc.	25	9
Under 5 years	14	17			
5 – 14 years	24	29	Housing conditions, %		
15 – 59 years	57	50	Households with		
60+ years	5	4	Safe water	91	90
			No toilet facility	34	48
Marital status: 15+ years, %			Electricity for lighting	43	44
Never married	59	52	Wood/charcoal for cooking	69	74
Married with certificate	16	13			
Married traditionally	9	16	Main source of income, %		
Married consensually	13	12	Household main income		
Divorced/Separated	2	3	Farming	13	17
Widowed	2	3	Wages & Salaries	57	71
			Cash remittance	4	1
Private households			Business, non-farming	7	3
Number	4 017	2 827	Pension	6	5
Average size	4.0	4.2			
			Disability, %		
Head of household, %			With disability	4	5
Females	27	21			
Males	73	79			
Literacy rate, 15+ years, %	84	60			
Education, 15+ years, %					
Never attended school	17	26			
Currently at school	28	17			
Left school	49	45			

4.5.3 Land Uses

The EPL 3963 and the surrounding areas are an important cattle, game and small stock (goats and sheep) farming areas (and consequently a source of employment). The EPL area falls within the long established commercial / communal farming communities. The northern half of the EPL area overlaps with the African Wild Dog Conservancy (Fig. 4.3). Started in 2001, the African Wild Dog Conservancy (AWD Conservancy) is a registered 501(c)(3) non-profit dedicated to working with local communities, and national and international stakeholders to conserve wild dogs through scientific research and education. The AWD Conservancy's objectives are the following:

- Establish and support long-term conservation programs involving local communities in research and education.

- Develop and implement a collaborative multidisciplinary program integrating applied field and captive conservation research, and.

- Facilitate development programs aimed at improving the lives of local people by building partnerships with community-based organisations and NGOs

4.5.4 Socioeconomic Conclusions

The proposed exploration activities in the EPL 3963 are likely to coexists with the current and future land uses such as the commercial agriculture. Tourism, and conservation efforts similar to the once being undertaken by the AWD.

Social impacts at the exploration stage are likely to be minimal and tend to be positive in an event of a discovery of economic minerals resources. A clear understanding of these impacts may help communities understand and anticipate the effects of exploration.

One of the major possible impacts of the proposed / ongoing exploration activities include employment expectations and unrealistic expectations about the development of a mine and coexistence opportunity / conflicts associated with the current land uses (conservation and tourism operations). It’s important for local communities to bear in mind that 99.9% of the exploration projects will not advance to a mine development.

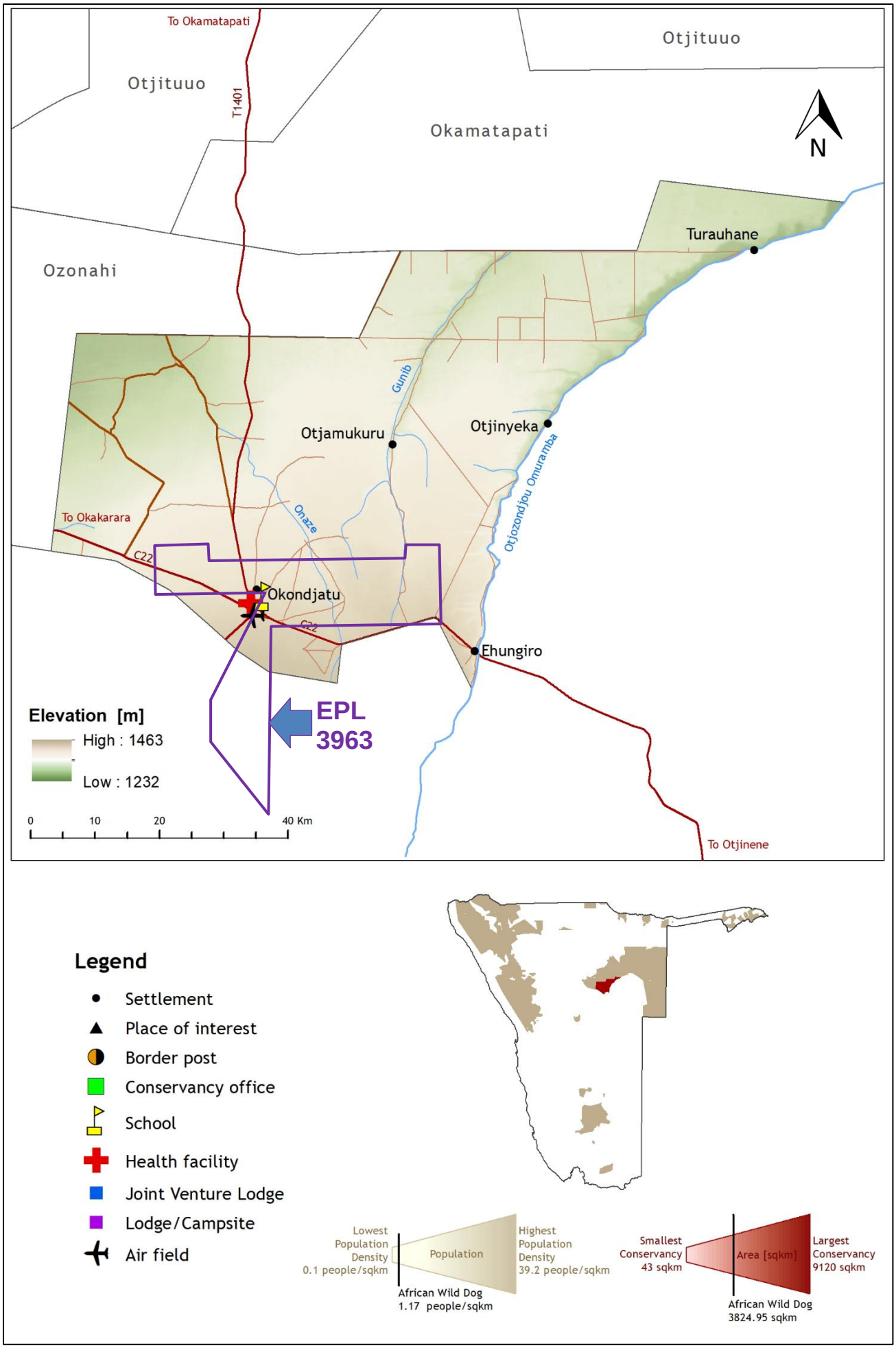


Figure 4.3: African Wild Dog Conservancy overlap with the EPL 3963 (Source: www.nacso.org.na).

4.6 Ground Components

4.6.1 Regional and Local Geology

The EPL 3963 Area falls within the eastern part of the southern Central Zone of the north-easterly trending intracontinental branch of the Pan-African Damara orogenic belt, just north of the Okahandja lineament (Fig. 4.4, Roesener, et *al*, 2004 and Miller 2008). The EPL area covers part of the well-known Otjosondu Manganese field comprising Neoproterozoic ferromanganese rocks that occur in an area of poor exposure in the eastern part of the southern Central Zone of the Damara Orogen and has been studied mined around Otjosondu (De Villiers, 1951, Vermass, 1952, Roper, 1959, Miller, 1983, Miller, 1992, Bühn *et al*., 1992, Bühn and Stanistreet, 1992/93, Steven, 1993, Bühn *et al*., 1995, Bühn and Stanistreet, 1997, Geological Survey of Namibia, 1999, Miller, 2008, Cabral, *et al*., 2011). The stratigraphy of the Otjosondu area defined by Roper (1959) consists of, from the base:

1. Granulitic gneiss and schist.
2. A lower unit of quartzites and feldspathic quartzites.
3. Banded hematite quartzites with marginal manganiferous layers.
4. An upper unit of feldspathic quartzites.
5. Marbles and lesser calc-silicate rocks, and.
6. Biotite schists and gneisses.

According to Cabral, at al., (2011), these units have been correlated respectively with:

1. Pre-Damara basement.
2. Rössing Formation.
3. and 4. Chuos Formation.
4. Karibib Formation, and.
5. Kuiseb Formation by Bühn and Stanistreet (1992/93).

This latter interpretation is problematical in that the type Rössing and Chuos formations are not known to persist further east than the Usakos and Karibib districts, respectively (Miller, 2008), in excess of 200 km to the west (Cabral, *at al.,* 2011). According to Miller, (1983), the Okahandja lineament also marks the southern boundary of the Central Zone, which is the high-temperature/low-pressure metamorphic zone of the orogen. According to Miller, (1992) The Damara rocks were deposited during successive phases of rifting, spreading, subduction and continental collision. Much of the basal succession (Nosib Group), laid down in or marginal to intracontinental rifts, consists of quartzite, arkose, conglomerate, phyllite, calc-silicate and subordinate limestone and evaporitic rocks. Local alkaline ignimbrite with associated subvolcanic intrusions range from 840 to 720 million years in age.

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) (Geological Survey of Namibia, 1999 and Miller, 2008, 1992, 1983a and 1983b).

The Kalahari cover consisting of thin sand/silt/calcrete deposits; hence they are not major source of water supply in the area (Miller, 2008). Some of these deposits, such as the gravels, clays and calcretes, are also potential local materials that can be used in the various construction activities associated with different infrastructure development at various stages of the mine life cycle.

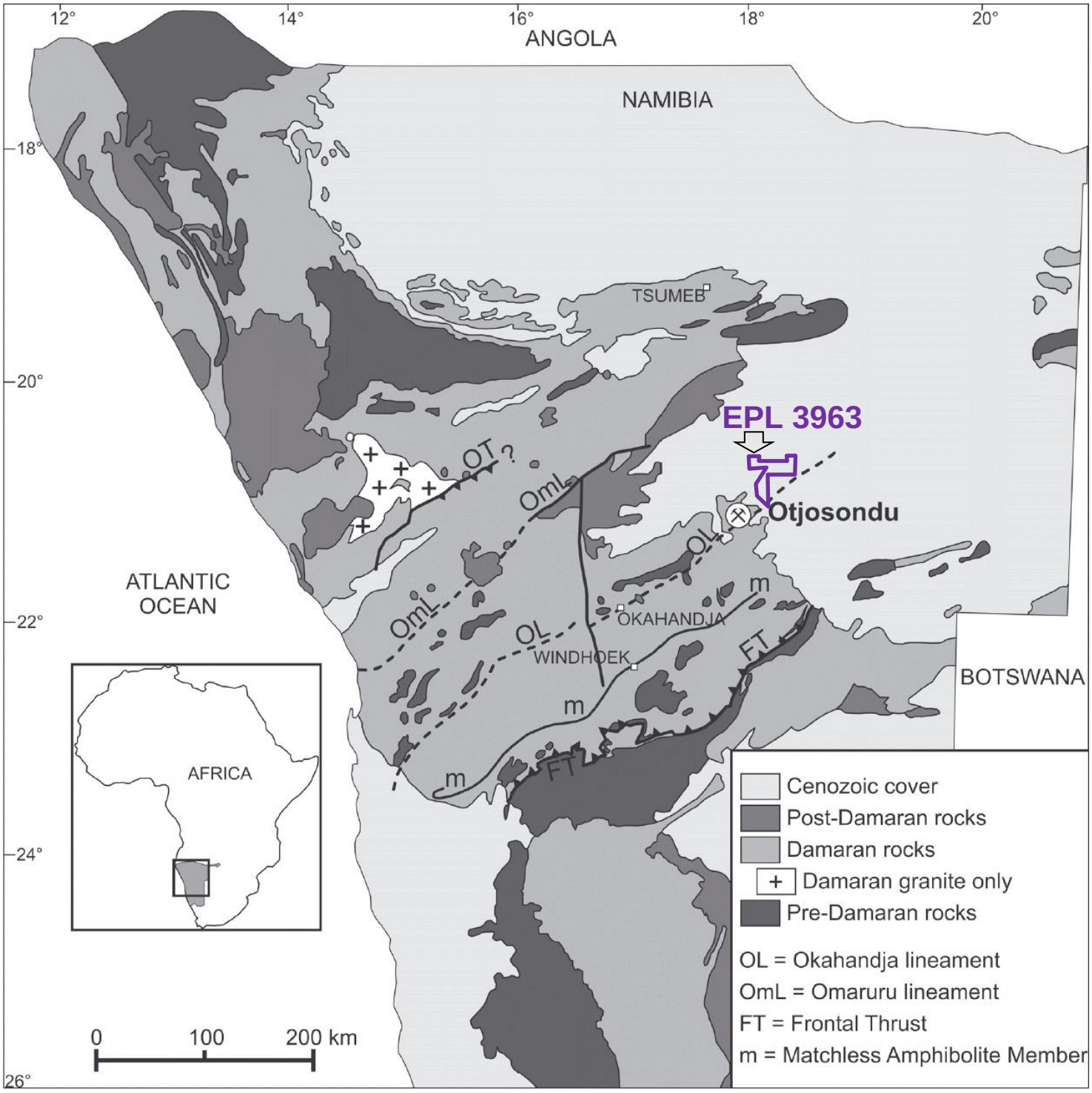


Figure 4.4: Simplified geological map of the Pan-African Damara orogenic belt of Namibia (Miller, 2008), with the Otjosondu ferromanganese deposit located just north of the Okahandja lineament.

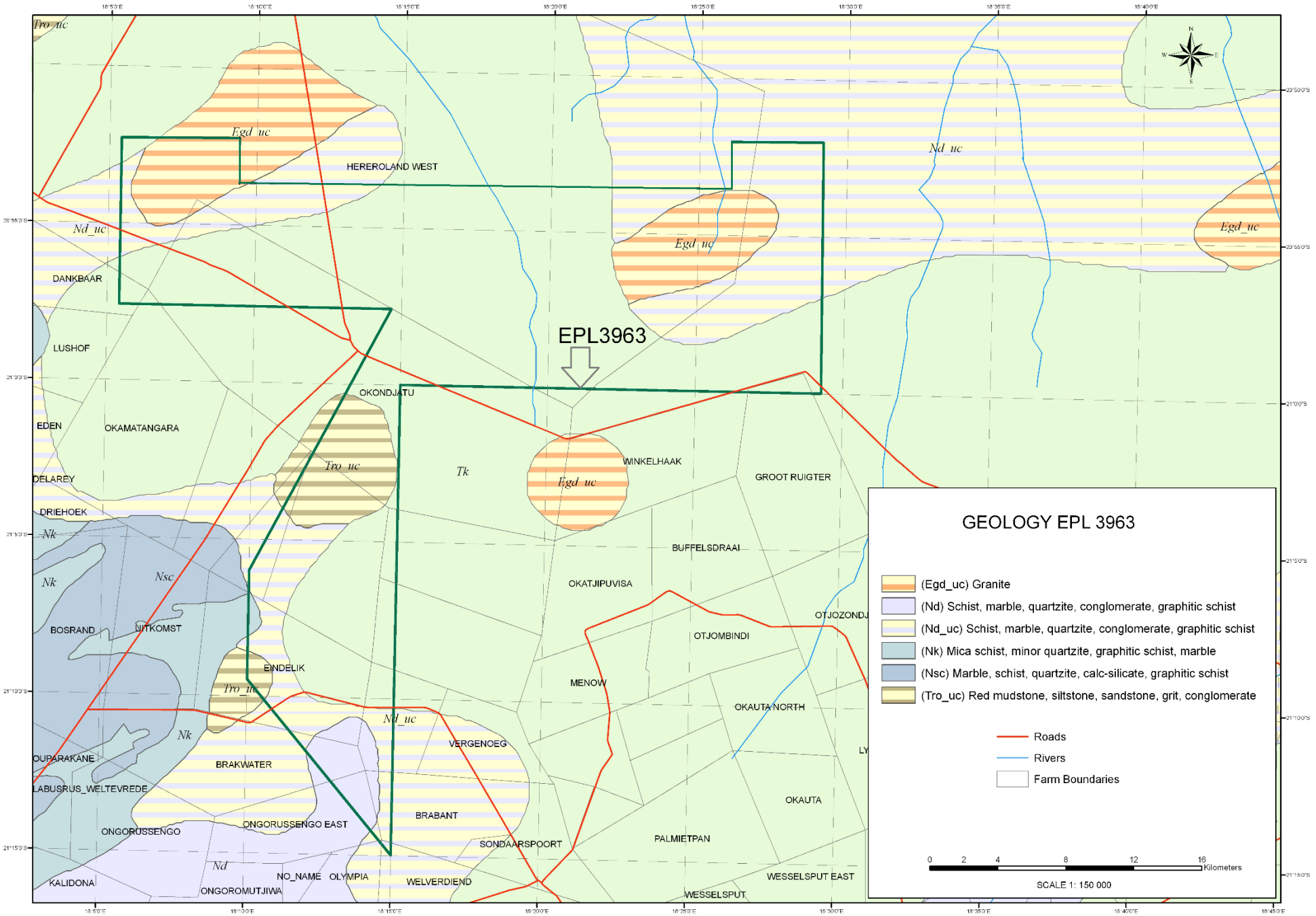


Figure 4.5: Simplified geological map of the EPL 3963 (Data Source: Geological Survey of Namibia).

4.6.2 Water

4.6.2.1 Overview

According to the Department of Water Affairs and Forestry, (2001) and the regional and local geology, the EPL 3963 falls within an area with very limited economic groundwater water resources (aquifers) (Fig. 4.6). Water supply in the general area is from local groundwater resources (Department of Water Affairs, 2001). The proposed / ongoing project activities (exploration programme) will utilise local groundwater resources. No site-specific hydrogeological specialist study, groundwater modelling or water sampling and testing activities have been undertaken for this study.

4.6.2.2 Sources of Water Supply

The source of water supply for the proposed / ongoing exploration and in particular the proposed drilling of exploration boreholes if need arises to drill, will be from existing groundwater resources. The Proponent must obtain permission from the land owner before using water from any existing local boreholes and infrastructures. If there is a need to drilling a water borehole to support the proposed / ongoing exploration programme, the Proponent must obtain permission from the land owner and Department of Water Affairs in the MAWLR.

In an event of discovery of economic minerals resources, the sources of water supply for the mining related operations will be supplied from groundwater resources if proven to be available following a detailed hydrogeological and groundwater modelling study that must be undertaken as part of the EIA supporting the feasibility study. Currently, potential available groundwater resources in the area will not be sufficient to support any new larger-scale mining related operation within the EPL 3963.

However, some parts of the EPL area are covered by local carbonates (calcrete, limestone and dolomites) that seems to have limited and localised groundwater potential.

4.6.2.3 Water Vulnerability Assessments and Recommendations

Possible pathways that will aid groundwater vulnerability in this area are mainly fractured zones and faults that outcrop on the surface without impermeable infillings as well as unconfined shallow aquifers. The general EPL area has shallow (-20m) groundwater resources that are likely to be vulnerable to pollution (Fig. 4.6). The overall water be vulnerability to pollution as a result of the proposed / ongoing exploration as well as other existing activities is moderate (Fig. 4.7).

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

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

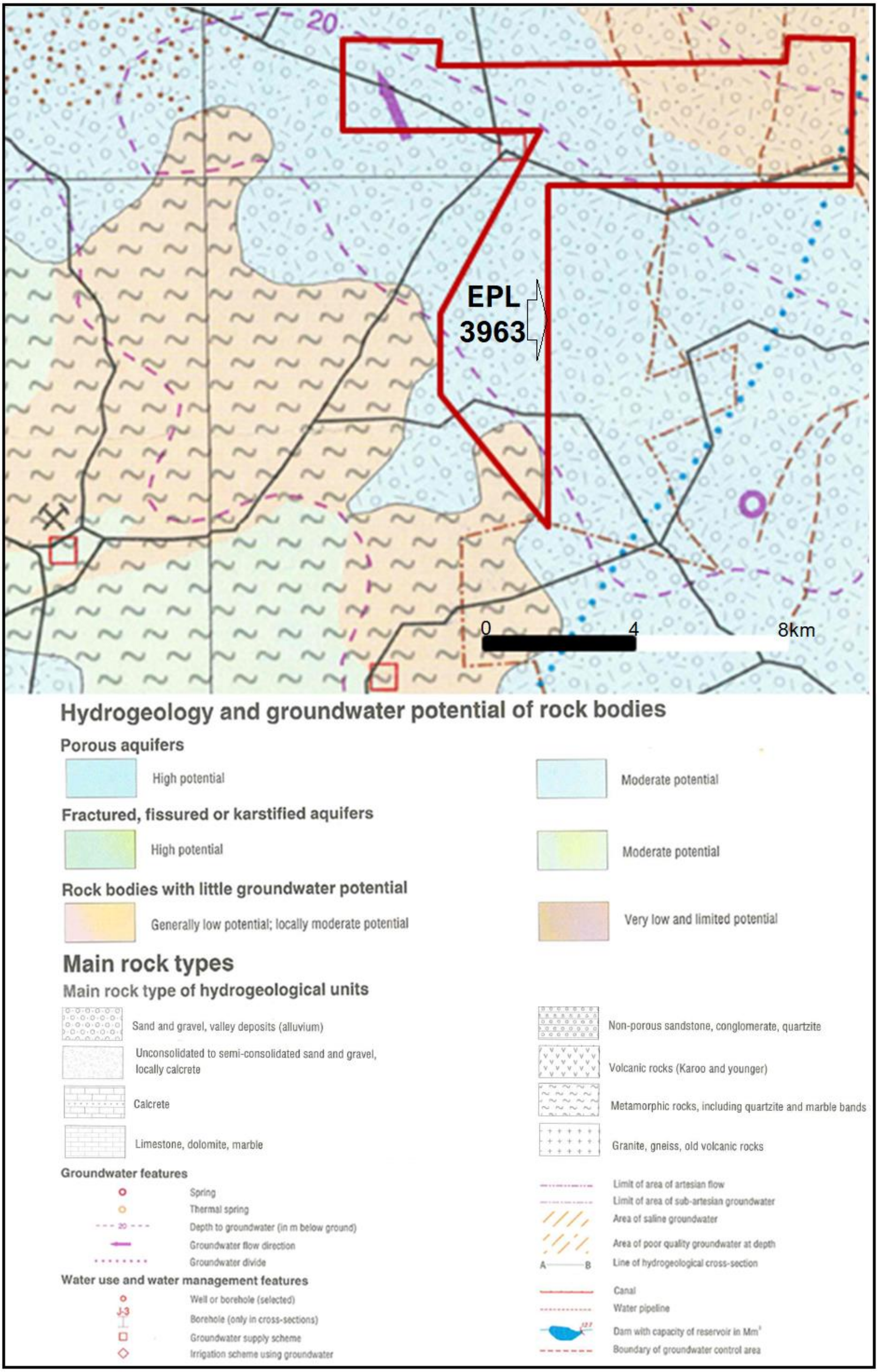


Figure 4.6: Regional Hydrogeology of the EPL 3963 (Source: Department of Water Affairs and Forestry, 2001).

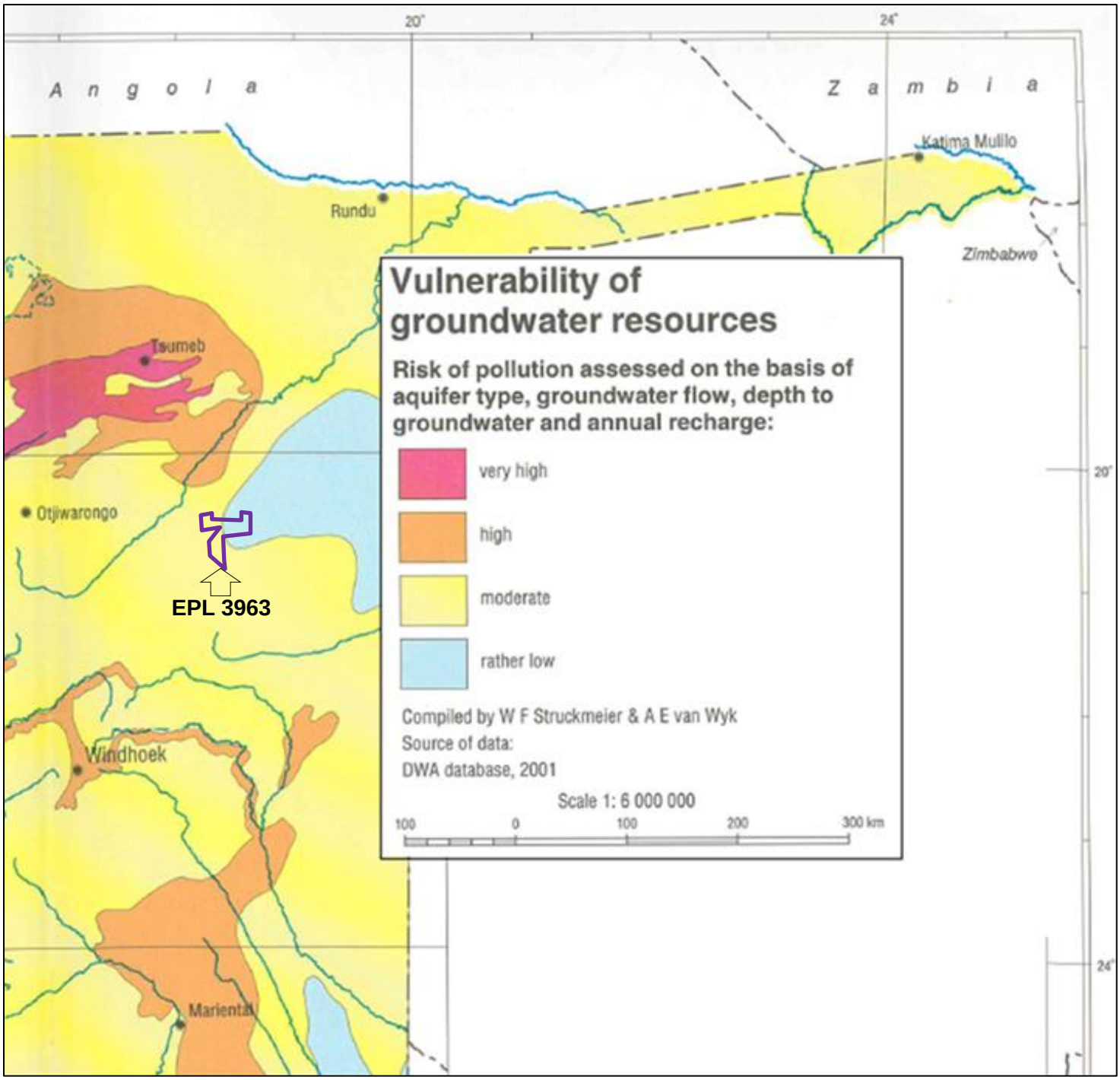


Figure 4.7: Regional groundwater vulnerability around the EPL3963 (Source: Department of Water Affairs and Forestry, 2001).

5. IMPACT ASSESSMENT AND RESULTS

5.1 Impact Assessment Procedure

The Environmental Assessment process that has been undertaken with respect to the proposed exploration programme for the EPL No. 3963 has been conducted in accordance with the provisions of the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007).

5.2 Alternatives and Ecosystem Assessments

The following alternatives have been considered:

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

(ii) **The No-Action Alternative** - A comparative assessment of the environmental impacts of the 'no-action' alternative (a future in which the proposed / 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 will be no negative environmental impacts due to the proposed minerals exploration or possible mining operation that may take place in the EPL area.

The environmental benefits will include:

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

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

- ❖ Land degradation due to drought.
- ❖ Overgrazing / over stocking beyond the land carrying capacity.
- ❖ Poor land management practices, and.
- ❖ 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. 3963, socioeconomic benefits derived from current and future exploration, direct and indirect contracts and employment opportunities, export earnings, foreign direct investments, license rental fees, royalties and various other taxes payable to the Government.

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

(iv) **Potential Land Use Conflicts:** Considering the current land use practices (agriculture and tourism) as well as potential other land uses including minerals exploration, it's likely that potential economic derivatives from any positive exploration outcomes leading to the development of a mine in the general area can still co-exist with the existing and potential future land use options of the general area. However, much more detailed assessments of any likely visual and other socioeconomic impacts will need to be included in the EIA that must be undertaken as part of the prefeasibility and feasibility studies if economic minerals resources are discovered. The use of thematic mapping and delineation of various land use zones for specific uses such as agriculture, conservation, mining or tourism etc, within the EPL area will greatly improve the multiple land use practices and promote coexistence for all the possible land use options.

(v) **Ecosystem Function** (**What the Ecosystem Does**)**:** Ecosystem functions such as wildlife habitats, carbon cycling or the trapping of nutrients and characterised by the physical, chemical, and biological processes or attributes that contribute to the self-maintenance of an ecosystem in this area are vital components of the receiving environment. However, the proposed / 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 values for other land uses such as agriculture, conservation and tourism as well as indirect values which includes: Watching a television show about the general area and its wildlife, food chain linkages that sustains the complex life within this area and bequest value for future generations to enjoy. The proposed / 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 the 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.

5.3 Key Issues Considered in the Assessment Process

5.3.1 Sources of Impacts (Proposed / Ongoing Project Activities)

The ongoing exploration activities being undertaken in the EPL 3963 and as assessed in this EIA Report with mitigation measures provided in the EMP Report 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.

5.3.2 Summary of Receptors Likely to be Negative Impacted

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

- **Physical environment:** Water quality, physical infrastructure and resources, air quality, noise and dust, landscape and topography, soil quality and, Climate change influences.

- **Biological environment:** Habitat, protected areas and resources, flora, fauna, and ecosystem functions, services, use values and non-use or passive use, and.

- **Socioeconomic, cultural and archaeological environment:** Local, regional and national socioeconomic settings, commercial and subsistence agriculture, community protection areas tourism and recreation cultural, biological and archaeological resources.

5.4 Impact Assessment Methodology

5.4.1 Impact Definition

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

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

- Interact with the existing environment (physical, biological and social elements), and.

- Breach relevant national legislation, relevant international legislation, standards and guidelines, and corporate environmental policy and management systems.

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

This EIA Report has assessed the potential impacts resulting from routine Project activities, assuming that the Project activities that may cause an impact that will occur but the impact itself will be dependent on the likelihood (Probability) (Table 5.2).

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

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

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

The overall impact severity has been categorised using a semi-quantitative subjective scale as shown in Table 5.2 for sensitivity of receptors, Table 5.3 for magnitude, Table 5.4 for duration, Table 5.5 for extent and Table 5.6 showing probability.

Table 5.2: Definitions used for determining the sensitivity of receptors.

SENSITIVITY RATING		CRITERIA
1	**Negligible**	The receptor or resource is resistant to change or is of little environmental value.
2	**Low**	The receptor or resource is tolerant of change without detriment to its character, is of low environmental or social value, or is of local importance.
3	**Medium**	The receptor or resource has low capacity to absorb change without fundamentally altering its present character, is of high environmental or social value, or is of national importance
4	**High**	The receptor or resource has moderate capacity to absorb change without significantly altering its present character, has some environmental or social value, or is of district/regional importance.
5	**Very High**	The receptor or resource has little or no capacity to absorb change without fundamentally altering its present character, is of very high environmental or social value, or is of international importance.

Table 5.3: Scored on a scale from 0 to 5 for impact magnitude.

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

Table 5.4: Scored time period (duration) over which the impact is expected to last.

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

Table 5.5: Scored geographical extent of the induced change.

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

5.4.3 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 5.6. Likelihood is estimated on the basis of experience and/ or evidence that such an outcome has previously occurred. Impacts resulting from routine/planned events (i.e., normal operations) are classified under category (E).

Table 5.6: Summary of the qualitative scale of probability categories (in increasing order of likelihood).

SCALE (-) or (+)		DESCRIPTION
A		Extremely unlikely (e.g. never heard of in the industry)
B		Unlikely (e.g. heard of in the industry but considered unlikely)
C		Low likelihood (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)

5.4.4 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 5.7-5.10.

The overall severity of potential environmental impacts of the proposed / ongoing project activities on the receiving environment will be of low magnitude (Table 5.7), temporally duration (Table 5.8), localised extent (Table 5.9) and low probability of occurrence (Table 5.10) 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 5.7-5.10).

It is important to note that the assessment of the likely impacts as shown in Tables 5.7 - 5.10, 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 5.7 - 5.10) and the significant impacts as detailed in Tables 5.11 and 5.12.

Table 5.7: Results of the sensitivity assessment of the receptors (Physical, Socioeconomic and Biological environments) with respect to the proposed exploration / prospecting activities.

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

SENSITIVITY RATING		CRITERIA
1	Negligible	The receptor or resource is resistant to change or is of little environmental value.
2	Low	The receptor or resource is tolerant of change without detriment to its character, is of low environmental or social value, or is of local importance.
3	Medium	The receptor or resource has low capacity to absorb change without fundamentally altering its present character, is of high environmental or social value, or is of national importance
4	High	The receptor or resource has moderate capacity to absorb change without significantly altering its present character, has some environmental or social value, or is of district/regional importance.
5	Very High	The receptor or resource has little or no capacity to absorb change without fundamentally altering its present character, is of very high environmental or social value, or is of international importance.

Table 5.7: Cont.

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

Table 5.8: Results of the scored time period (duration) over which the impact is expected to last.

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

Table 5.8: *Cont.*

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

Table 5.9: Results of the scored geographical extent of the induced change.

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

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

Table 5.9: *Conti.*

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

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

Table 5.10: Results of the qualitative scale of probability occurrence.

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

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)

Table 5.10: *Cont.*

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

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)

5.5 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 5.11.

5.5.2 Significance Criteria

Significance criteria for negative/adverse impacts (i.e., relative ranking of importance) are defined in Table 5.11. 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 5.11: Scored impact significance criteria.

IMPACT SEVERITY (Magnitude, Duration, Extent, Probability)	**RECEPTOR CHARACTERISTICS (SENSITIVITY)**				
	Very High (5)	**High(4)**	**Medium (3)**	**Low (2)**	**Negligible (1)**
Very High (5)	Major [5/5]	Major [4/5[	Moderate [3/5]	Moderate [2 /5]	Minor 1/5
High (4)	Major [5/4]	Major [4/4]	Moderate [3/4]	Moderate [2/4]	Minor[1/4]
Medium (3)	Major [5/3]	Moderate[4/3]	Moderate[3/3]	Minor[2/3]	None[1/3]
Low (2)	Moderate [5/2]	Moderate[4/2]	Minor[3/2]	None[2/2]	None[1/2]
Negligible (1)	Minor [5/1]	Minor [4/1]	None [3/1]	None [2/1]	None [1/1]

5.5.3 Assessment Likely Significant Impacts

The assessment of significant impacts depended upon the degree to which the proposed / ongoing project activities are likely to results in unwanted consequences on the receptor covering physical and biological environments (Table 5.12). 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 5.12.

Table 5.12: Significant impact assessment matrix for the proposed / ongoing exploration activities.

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

IMPACT SEVERITY (Magnitude, Duration, Extent, Probability)	RECEPTOR CHARACTERISTICS (SENSITIVITY)				
	Very High (5)	High(4)	Medium (3)	Low (2)	Negligible (1)
Very High (5)	Major [5/5]	Major [4/5[	Moderate [3/5]	Moderate [2 /5]	Minor 1/5
High (4)	Major [5/4]	Major [4/4]	Moderate [3/4]	Moderate [2/4]	Minor[1/4]
Medium (3)	Major [5/3]	Moderate[4/3]	Moderate[3/3]	Minor[2/3]	None[1/3]
Low (2)	Moderate [5/2]	Moderate[4/2]	Minor[3/2]	None[2/2]	None[1/2]
Negligible (1)	Minor [5/1]	Minor [4/1]	None [3/1]	None [2/1]	None [1/1]

Table 5.12: *Cont.*

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

5.6 Assessment of Overall Impacts

5.6.1 Summary of the Results of the Impact Assessment

In accordance with Tables 5.7 - 5.12, 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 **[1/1]** (Table 5.12). Except for the socioeconomic components which carries a **(+)**, the rest of the likely impacts are negative **(-)**.

(ii) Regional reconnaissance field-based activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[1/1]**. Some field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations. Overall significant impacts will be negligible **[1/1]** (Table 5.12). Except for the socioeconomic components which carries a **(+)**, all the other likely impacts are negative **(-)**.

(iii) Initial local field-based activities: Initial field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations**.** Overall significant impacts will be negligible **[2/2]**. All desktop related activities and laboratory assessments will have negligible impacts with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[2/2]** (Table 5.12). Except for the socioeconomic components which carries a **(+)**, all the other likely impacts are negative **(-)**.

(iv) Detailed local field-based activities: Overall likely negative impact on the receiving environment will be high and localised impacts without mitigations and localised low impacts with mitigations. Overall significant impacts will be medium **[2/2]** without mitigations and low with mitigations (Table 5.12). Except for the socioeconomic components which carries a **(+)**, all the other likely impacts are negative **(-)**, 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 **[3/3]** without mitigations and low with mitigations for bulk sampling, test mining and field logistics (Table 5.12). Except for the socioeconomic components which carries a **(+)**, all the other likely impacts are negative **(-)**.

6. CONCLUSION AND RECOMMENDATION

6.1 Conclusions

Imprint Investments (Pty) Ltd (**the Proponent**) intends to undertake exploration activities in the Exclusive Prospecting Licence (EPL) No. 3963 covering base and rare metals, industrial minerals, non-nuclear fuels, precious metals 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.

6.2 Recommendations

It's hereby recommended that the proposed / ongoing exploration activities be issued with an Environmental Clearance Certificate (ECC). The Proponent shall take into consideration the following key requirements for implementing the proposed exploration programme:

(i) Based on the findings of this EIA Report, the Proponent shall prepare an EMP Report with key mitigations measures.

(ii) Mitigation measures shall be implemented as detailed in the EMP report.

(iii) The Proponent shall negotiate Access Agreements with the land owner/s as may be applicable.

(iv) 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.

(v) Before entering any private or protected property/ area such as a private farm, the Proponent must give advance notices and obtain permission to access the EPL area at all times, and.

(vi) 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.

6.3 Summary ToR for Test Mining and Mining Stages

In an even that economic minerals resources are discovered within the EPL 3963 area and could lead to the development of mining project, a new Environmental Clearance Certificate (ECC) for mining will be required. The ECC being supported by this EIA Report only covers the exploration phase.

A separate field-based and site-specific Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports supported by specialist studies as maybe applicable must be prepared in order to support the application for the new ECC for mining operations. The EIA and EMP studies shall form 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 part 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 EIA and EMP to be implemented as part of the feasibility study if a variable resource are 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 MME, MEFT and MAWLR, 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.

7. BIBLIOGRAPHY / REFERENCES

1. FURTHER GENERAL READING

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2. REFERENCES AND FURTHER READING ON FAUNA AND FLORA

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IUCN, 2015. IUCN red list of threatened animals, IUCN, Gland, 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, Forestry and Tourism (MEFT), Windhoek.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

8. ANNEX

Annex 1: Copy of Expired ECC and BID