Osino Namibia Minerals Exploration (Pty) Ltd

Final Environmental Scoping and Environmental Management Plan (EMP) Report to Support the Application for Renewal of Environmental Clearance Certificate (ECC) for Ongoing / Proposed Exploration / Prospecting Activities in the Exclusive Prospecting License (EPL) No. 5880,
Karibib District, Erongo Region

July 2023

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

PROPONENT, LISTED ACTIVITIES AND RELATED INFORMATION SUMMARY

Proponent
Osino Namibia Minerals Exploration (Pty) Ltd

Type of Authorisation Requiring Environmental Clearance Certificate (ECC)
Minerals exploration /prospecting activities under the Exclusive Prospecting License (EPL) No. 5880

Ministry of Environment, Forestry and Tourism (MEFT) ECC Reference Application No.
APP-001686

Competent Authority
Ministry of Mines and Energy (MME)

Project Title / Subject on the ECC
Proposed / Ongoing Minerals Exploration / Prospecting Activities in the Exclusive Prospecting License (EPL) No. 5880, **Karibib District, Erongo Region**

Location of the Project Area
Karibib District, Erongo Region

PROJECT LOCATION
Karibib District, Erongo Region, West-Central Namibia
(Latitude: -21.918333, Longitude: 15.619722)

Environmental Regulator and National Regulatory Framework
Ministry of Environment, Forestry and Tourism (MEFT), Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007) and Environmental Impact Assessment (EIA) Regulations No. 30 of 2012

Address of the Proponent and Contact Person
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NON-TECHNICAL SUMMARY

Osino Namibia Minerals Exploration (Pty) Ltd (the Proponent) holds mineral rights for base and rare metals, dimension stone, industrial minerals, nuclear fuels, and precious metals under the Exclusive Prospecting Licence (EPL) No. 5880. The EPL 5880 was granted on the 04/10/2016 and will expire on the 21/11/2023. The EPL 5880 with a total area of 39589.1873 Ha, is situated in Karibib District in the Erongo Region and covers the Usakos Townlands and Farms Kranzberg, Kranzberg South, Mansfeld, Klein Aukas, Groos Aukas, Usakos West, Goabeb and Ameib in the Karibib District, Erongo Region. The exploration activities to be undertaken and as assessed in this updated Scoping and Environmental Management Plan (EMP) Reports 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);

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

The proponent intends to continue with the ongoing exploration or prospecting for base and rare metals, dimension stone, industrial minerals, nuclear fuels, and precious metals likely to be associated with the various Damara Rocks found within the EPL area. These Damara Rocks hosts economic minerals resources in different parts of Namibia such as copper, lead, zinc, gold, lithium, uranium as well as marble and granite dimension stones.

The proposed mineral exploration activities are listed in the Environmental Management Act, 2007, (Act No. 7 of 2007) and cannot be undertaken without an Environmental Clearance Certificate (ECC). The Scoping and Environmental Management Plan (EMP) Report was prepared by the Risk-Based Solutions (RBS) CC on behalf of the Proponent and submitted to the Environmental Commissioner in the Ministry of Environment, Forestry and Tourism (MEFT) in 2020. An ECC was granted by the Environmental Commissioner on 8th September 2020 and will expire on the 8th September 2023. This updated Environmental Scoping and EMP report has been prepared by Risk-Based Solutions on behalf of the Proponent in order to support the application for the renewal of the ECC granted on the expiring on the 8th September 2023.

The population of Karibib Constituency is 13, 320 which accounts for 8.8 percent of the total Erongo Region population. The town Usakos situated in central part of the EPL area has 3,000 inhabitants and owns 58 square kilometres of land. The regional terrain around the EPL 5880 is rocky and rugged in nature with steep slopes characterising the mountainous sections whilst the foothills of the mountains are flat and gently undulating. The drainage of the area is dendritic in nature with ephemeral streams, often steeply incised, forming small early-stage tributaries of the Aroab and Khan Ephemeral Rivers channels. The land use around the EPL area is dominated by farming (small stock and cattle). The economic activities of the Towns of Usakos and Karibib as well as the surrounding EPL areas are dominated by formal and informal trading, tourism and hospitality, minerals exploration and mining including several EPLs, Mining Claims (MCs), quarries for dimension stone (marble), small scale mining operations and large-scale mining such as the Navachab Gold.

It is estimated that at least 78 reptile, 9 amphibian, 83 mammal and 209 bird species (breeding residents) are known to or expected to occur in the general/immediate Elbe area of which a large proportion are endemics. Endemics include at least 36% of the reptiles, 33% of the amphibians, 8% of the mammals and 71% (10 of the 14 Namibian endemics) of all the breeding and/or resident birds

known and/or expected to occur in the general area. Faunal disturbance with respect to the proposed exploration activities would be localised.

The likely positive or negative impacts that the proposed exploration and associated infrastructure would have on the fauna and flora would depend on the extent of the development, area of development, management of the area and how the proposed mitigations are eventually implemented by the proponent (Osino Namibia Minerals Exploration). Access and maintenance routes would have the most impact on the surroundings although these would also be negligible if new accesses are constructed properly, avoided sensitive habitats such as Swakop Ephemeral River channel and associated tributaries and track discipline (including no killing/poaching fauna along these routes) is adhered to and/or enforced. The following is the summary of the likely environmental impacts of the proposed exploration / prospecting activities on the receiving environment (physical, biological and socioeconomic environments) without and with mitigations:

(i) Initial desktop exploration activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible as no field-based activities will be undertaken.

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

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

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

Current proposed main mineral exploration field-based activities covering mapping, geochemical sampling and drilling operations will have low localised impacts on the local receiving environment with low significant impacts. Based on the findings of this Environmental Assessment study covering Environmental Scoping and Environmental Management Plan (EMP), it is hereby recommended that the proposed exploration activities be issued with an Environmental Clearance Certificate (ECC) with key conditions of adhering to all the provisions of the EMP, requirement and conditions of the Access Agreement and all applicable national regulations. Mitigation measures must be implemented as detailed in Section 6 (EMP) of this report. The proponent (Osino Namibia Minerals Exploration (Pty) Ltd) must obtain permission of the land owners (surface rights holders) before exercising their subsurface rights in all the farms covered by the EPL 5880.

If additional and more detailed boreholes drilling activities need to be undertaken, extensive environmental monitoring including groundwater monitoring shall be undertaken. The groundwater monitoring should include water levels monitoring and sampling on a bi-annual basis, and that the affected landowners / farmers must have access to the results of the water monitoring analyses as part of the stakeholder disclosure requirements. Once a viable project has been identified (economic resources are discovered) and separate field-based and site-specific Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) must be implemented as part of the prefeasibility and feasibility study with respect to the test mining or possible mining operations. The site-specific EIA and EMP shall cover the area identified to have potential economic minerals resources. The following specialist studies shall be undertaken as prat of the EIA and EMP for possible test mining or mining operations: Groundwater studies, flora, fauna, socioeconomic and others as may be identified / recommended by the stakeholders/ land owners/ Environmental Commissioner or specialists.

1. BACKGROUND

1.1 Introduction

Osino Namibia Minerals Exploration (Pty) Ltd (the Proponent) hold minerals rights under the Exclusive Prospecting License (EPL) No. 5880. The following is the summary of the EPL 5880:

- Type of License: Exclusive Prospecting License (EPL) No. 5880.
- EPL Holder: Osino Namibia Minerals Exploration (Pty) Ltd.
- Granted Date: 04/10/2016.
- Expiry Date: 21/11/2023.
- Commodities: Base and rare metals, dimension stone, industrial minerals, nuclear fuels, and precious metals.
- Size of the EPL: 39589.1873 Ha, and.
- Environmental Clearance Certificate (ECC) granted on the 8th September 2020 and expired on the 8th September 2023.

Osino Namibia Minerals Exploration (Pty) Ltd intend 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 Impact Assessment (EIA) Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007) and cannot be undertaken without an Environmental Clearance Certificate (ECC).

The Proponent is required to have a valid ECC for the ongoing and proposed exploration activities. In fulfilment of the environmental requirements, the Proponent appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant and led by Dr Sindila Mwiya as the Environmental Assessment Practitioner (EAP).

This report has been prepared based on the previous Scoping and EMP Report that was completed in 2020 as well as the Environmental Monitoring activities that have been undertaken from September 2020 to July 2023 in order to support the application for the renewal of the ECC that was issued on the 8th September 2020 and expiring on the 8th September 2023 (Fig. 1.1).

1.3 Location, Land Use and Supporting Infrastructure

1.3.1 Location

The Exclusive Prospecting Licence (EPL) No. 5880 is located in the Karibib District, Erongo Region, west central Namibia (Figs. 1.2 - 1.4). The EPL 5880 with a total area of 39589.1873 Ha, covers the Usakos Townlands and Farms Kranzberg, Kranzberg South, Mansfeld, Klein Aukas, Groos Aukas, Usakos West, Goabeb and Ameib as well as a number of small holdings in area around Usakos (Fig. 1.4).

The regional terrain around the EPL 5880 is rocky and rugged in nature with steep slopes characterising the mountainous sections whilst the foothills of the mountains are flat and gently undulating. The drainage of the area is dendritic in nature with ephemeral streams, often steeply incised, forming small early-stage tributaries of the Aroab and Khan Ephemeral Rivers channels.

1.3.2 Current Land Uses

The EPL 5880 area is not pristine and is dominated by a number of old excavations, waste rock and litter linked to the historical exploration activities and other associated current farming, Usakos urban and Peri-urban areas land uses.

The proposed exploration activities within the EPL 5880 will to some extent address some of the current poor state of the local environment that has not been rehabilitated over many years of historical exploration operations and small-scale exploration and mining operations in some parts of the EPL area.

The land use around the EPL area is dominated by farming (small stock and cattle). The economic activities of the Town of Usakos and the surrounding areas including the nearest town of Karibib is engaged in formal and informal trading, tourism and hospitality, minerals exploration and mining including several EPLs, Mining Claims (MCs), quarries for dimension stone (marble), small scale mining operations and large-scale mining such as the Navachab Gold.

A number of lodges are found in the Towns of Usakos and Karibib and the surrounding areas within the EPL boundary. Bush thickening or encroachment is viewed as an economic problem in the general area but does not seem to be an issue within the EPL area. The area is not part of the communal conservancy system in Namibia with no protected area nearby the EPL area.

1.3.3 Supporting Infrastructure

The EPL is accessible via the B2 road linking the towns of Usakos and Karibib to the Capital City Windhoek via the town of Okahandja and to the Port of Walvis Bay via the towns of Arandis and Swakopmund (Figs. 1.2-1.7). A number of minor gravel roads linked to the D1914, D1935 and D1937 gravel roads provide good access to the internal EPL area boundary (Figs. 1.3-1.7).

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

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

Electricity supply will be provided by NamPower from already existing infrastructure in the region (Fig. 1.7). The assessment of the energy and water resources requirements for mining operations will be evaluated in detail in the environmental assessment that will be undertaken as part of the prefeasibility and feasibility studies if economic resources are discovered within the EPL 5880 Area.

ECC – 00893 Serial: usbzAX893

REPUBLIC OF NAMIBIA

MINISTRY OF ENVIRONMENT, FORESTRY AND TOURISM

OFFICE OF THE ENVIRONMENTAL COMMISSIONER

ENVIRONMENTAL CLEARANCE CERTIFICATE

ISSUED

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

TO

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

TO UNDERTAKE THE FOLLOWING LISTED ACTIVITY

Proposed Exploration in the Exclusive Prospecting License (EPL) No. 5880, Karibib District, Erongo Region

MINISTRY OF ENVIRONMENT, FORESTRY AND TOURISM
Private Bag 13306
WINDHOEK, NAMIBIA
10 SEP 2020
ENVIRONMENTAL COMMISSIONER
REPUBLIC OF NAMIBIA

ENVIRONMENTAL COMMISSIONER

Issued on the date: 2020-09-08

Expires on this date: 2023-09-08

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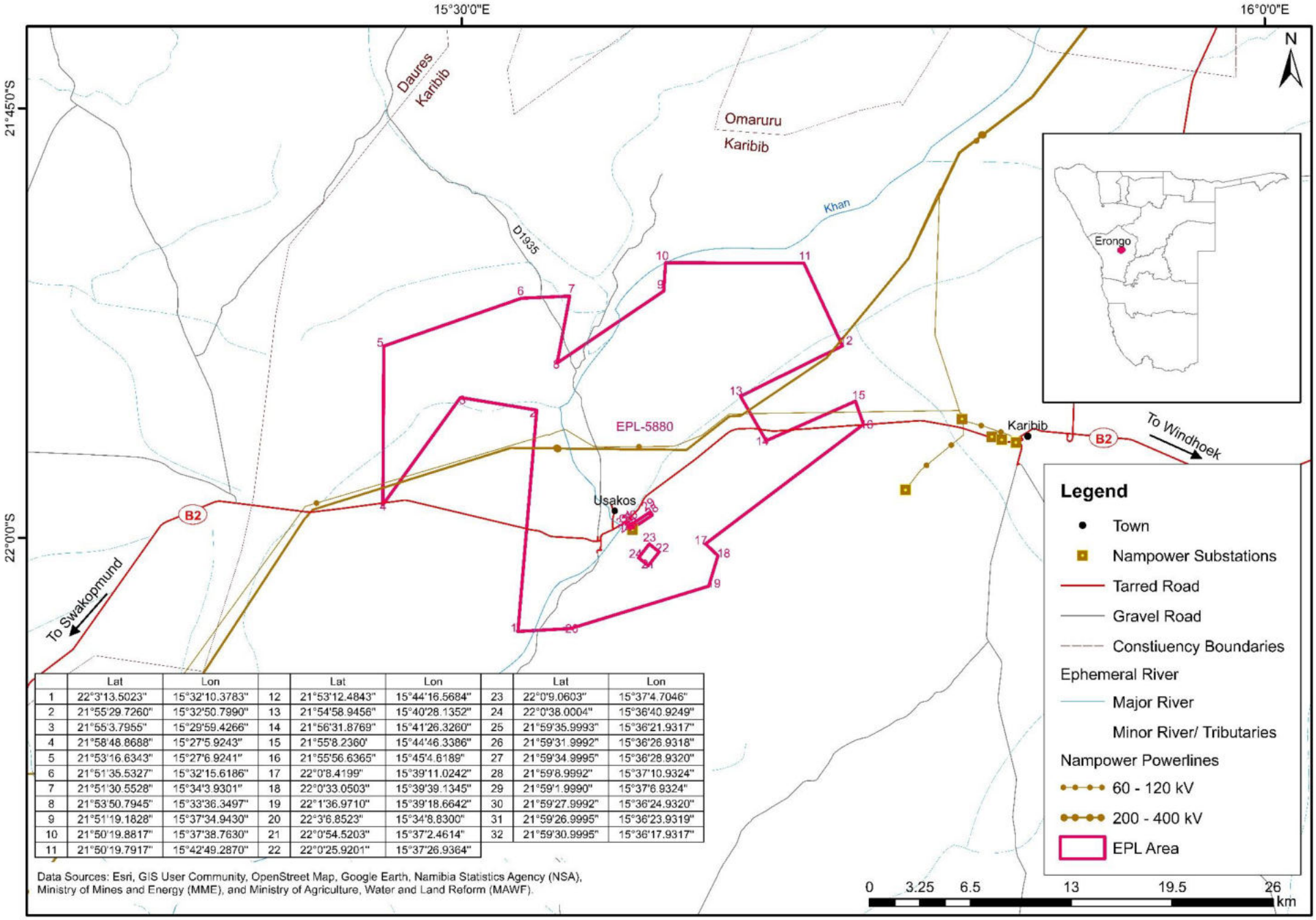
Figure 1.1: Copy of the ECC granted on the 8th September 2020 and expired on the 8th September 2023 and need to be renewed.

Figure 1.2: Regional location of the EPL 5880.



	Lat	Lon		Lat	Lon		Lat	Lon
1	22°3'13.5023"	15°32'10.3783"	12	21°53'12.4843"	15°44'16.5684"	23	22°0'9.0603"	15°37'4.7046"
2	21°55'29.7260"	15°32'50.7990"	13	21°54'58.9456"	15°40'28.1352"	24	22°0'38.0004"	15°36'40.9249"
3	21°55'3.7955"	15°29'59.4266"	14	21°56'31.8769"	15°41'26.3260"	25	21°59'35.9993"	15°36'21.9317"
4	21°58'48.8688"	15°27'5.9243"	15	21°55'8.2360'	15°44'46.3386"	26	21°59'31.9992"	15°36'26.9318"
5	21°53'16.6343"	15°27'6.9241"	16	21°55'56.6365"	15°45'4.6189"	27	21°59'34.9995"	15°36'28.9320"
6	21°51'35.5327"	15°32'15.6186"	17	22°0'8.4199"	15°39'11.0242"	28	21°59'8.9992"	15°37'10.9324"
7	21°51'30.5528"	15°34'3.9301"	18	22°0'33.0503"	15°39'39.1345"	29	21°59'1.9990"	15°37'6.9324"
8	21°53'50.7945"	15°33'36.3497"	19	22°1'36.9710"	15°39'18.6642"	30	21°59'27.9992"	15°36'24.9320"
9	21°51'19.1828"	15°37'34.9430"	20	22°3'6.8523"	15°34'8.8300"	31	21°59'26.9995"	15°36'23.9319"
10	21°50'19.8817"	15°37'38.7630"	21	22°0'54.5203"	15°37'2.4614"	32	21°59'30.9995"	15°36'17.9317"
11	21°50'19.7917"	15°42'49.2870"	22	22°0'25.9201"	15°37'26.9364"			

Data Sources: Esri, GIS User Community, OpenStreet Map, Google Earth, Namibia Statistics Agency (NSA), Ministry of Mines and Energy (MME), and Ministry of Agriculture, Water and Land Reform (MAWF).

Figure 1.3: Detailed regional location of the EPL 5880 showing the license comer coordinates.

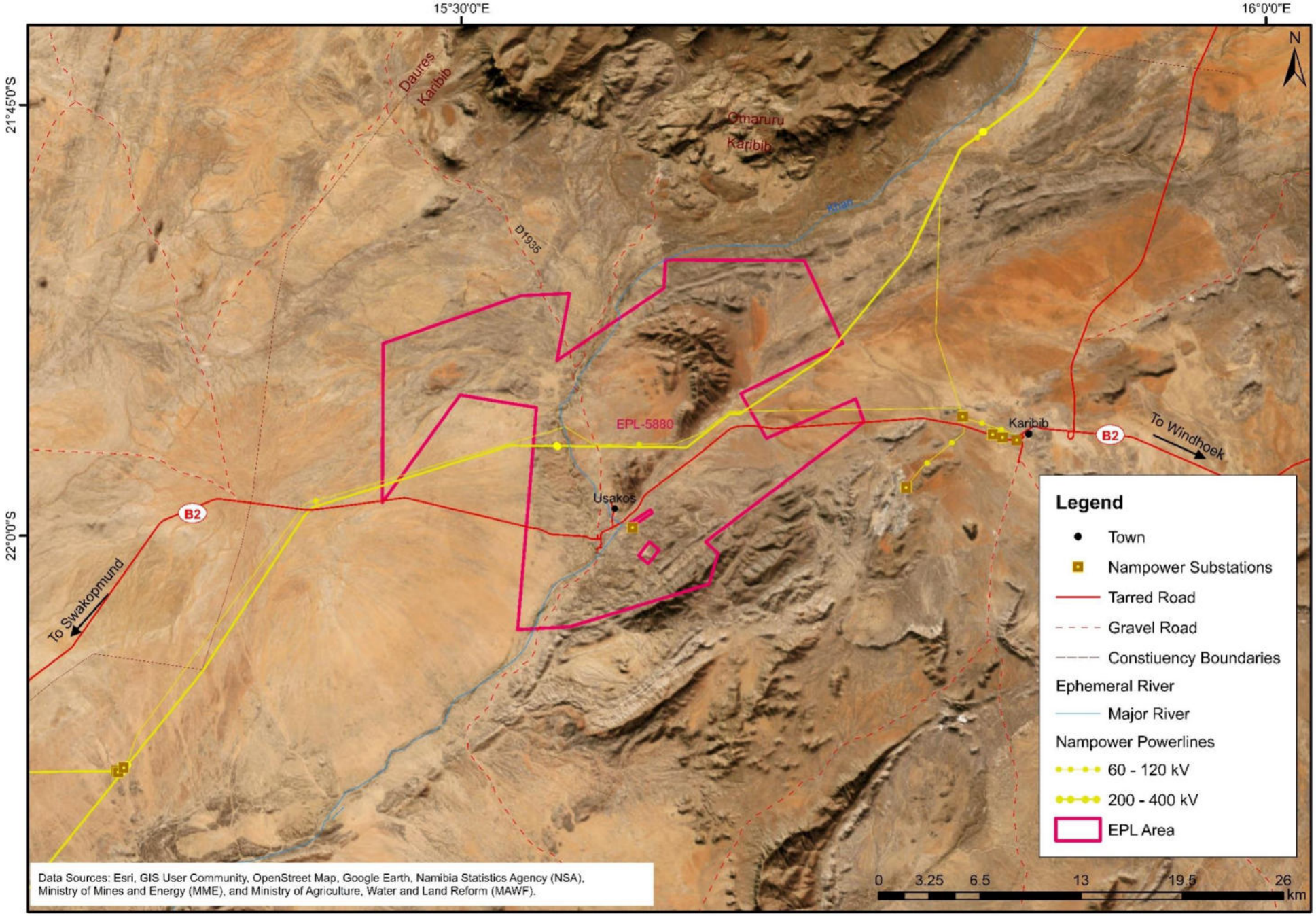


Figure 1.4: Detailed regional satellite image location of the EPL 5880 showing the EPL corner coordinates.

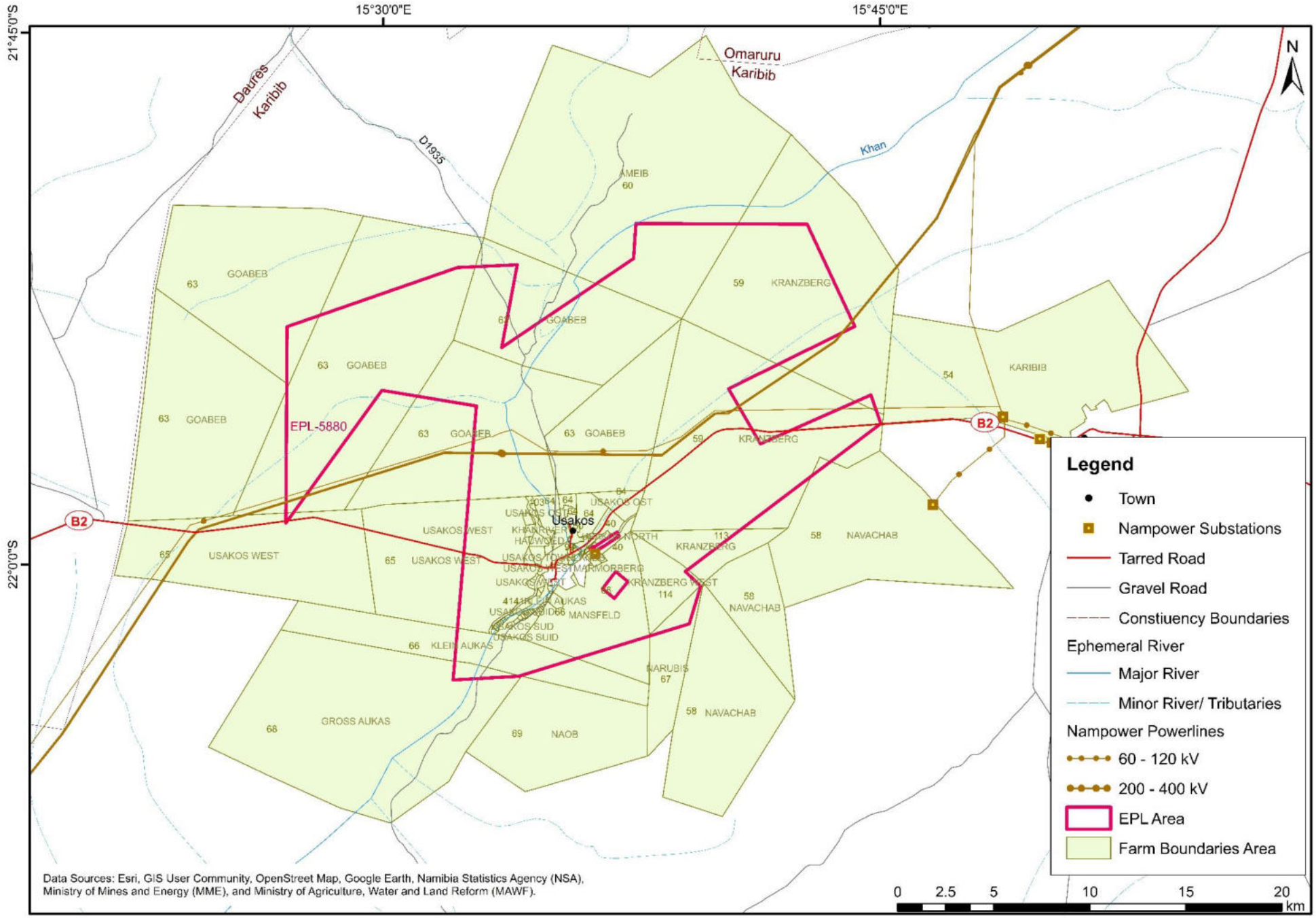


Figure 1.5: Farmlands covered by the EPL 5880 Area.

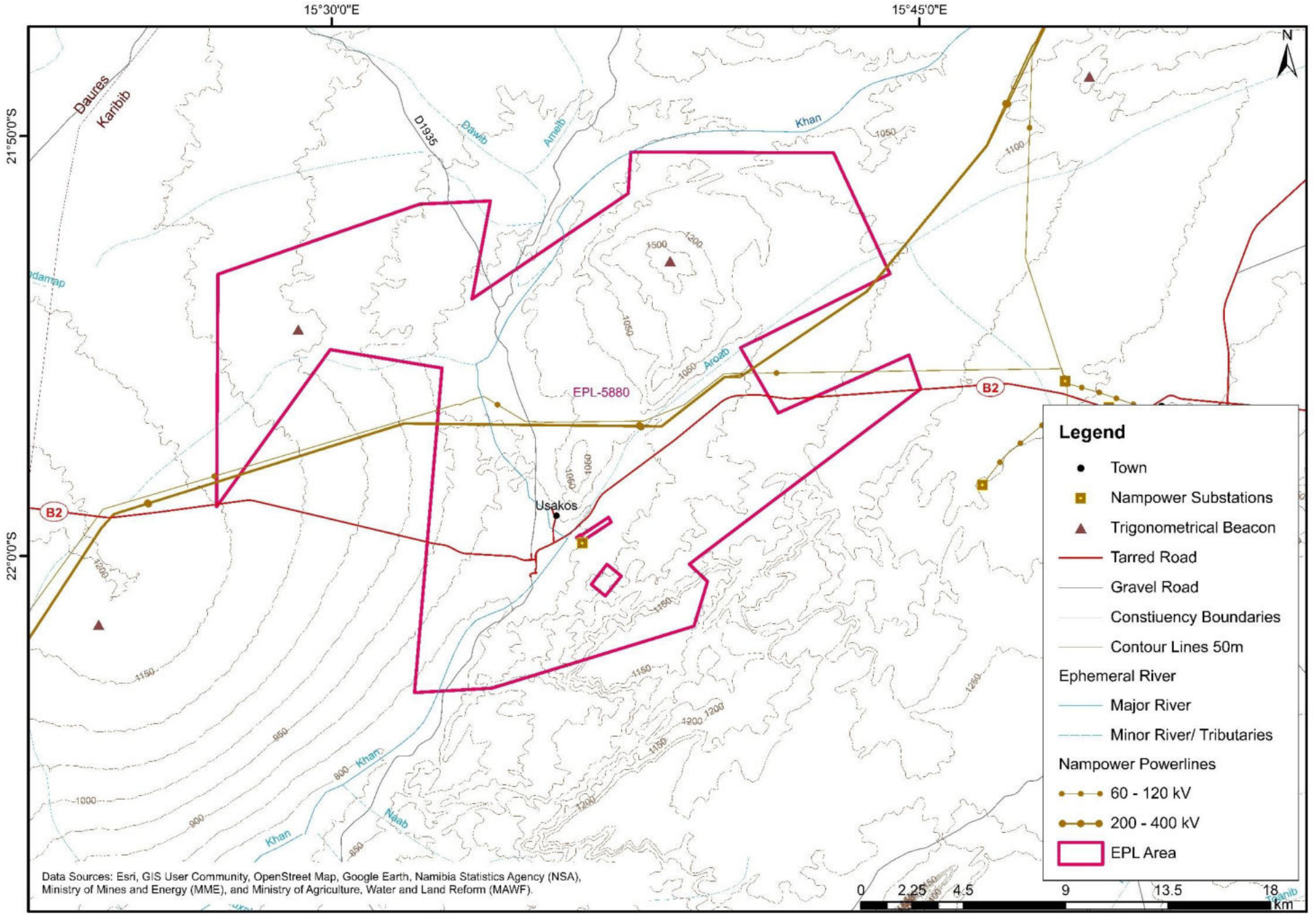


Figure 1.6: Detailed topographic setting of the EPL 5880 and local supporting infrastructure.

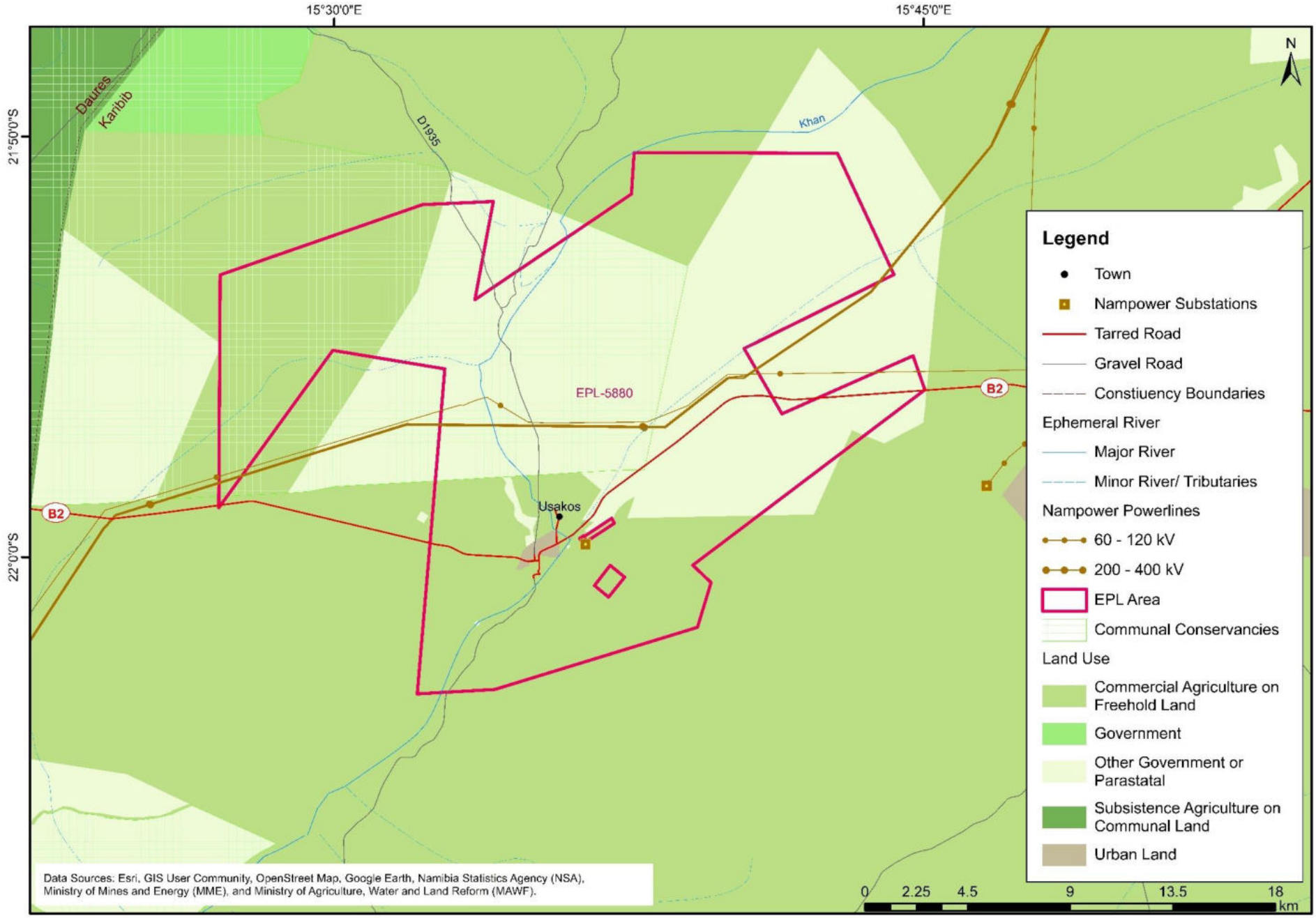


Figure 1.7: Overview of the land use, supporting infrastructure and services around the EPL 5880 and surrounding areas.

1.4 Project Motivation

The EPL 5880 falls within the central Damara Belt which is regarded one of the highly prospective areas for base and rare metals, dimension stone, industrial minerals, nuclear fuels, and precious metals in Namibia. These Damara Rocks hosts economic minerals resources in different parts of Namibia such as copper, lead, zinc, gold, lithium, uranium as well as marble and granite dimension stones. The EPL area covers one of the historical well-known copper deposits called the Elbe Copper Project.

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 mineral resources in the area which otherwise would not have been known if the exploration in the EPL 5880 did not take place.

The potential discovery of additional economic minerals resources and the development of new copper or gold 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 this Scoping and Environmental Management Plan (EMP) based on the approved screening by the Environmental Commissioner in order to support the application for renewal of the Environmental Clearance Certificate (ECC) for the EPL No. 5880 with respect to the ongoing and proposed exploration activities.

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

The key deliverable comprises this Scoping and EMP Report as per the provisions of the confirmation of screening notice send to the Proponent by the Environmental Commissioner through email in terms of the assessment procedures (Section 35 (1)(a)(b) of the Environmental Management Act, No 7 of 2007) (Fig. 1.8).

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

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

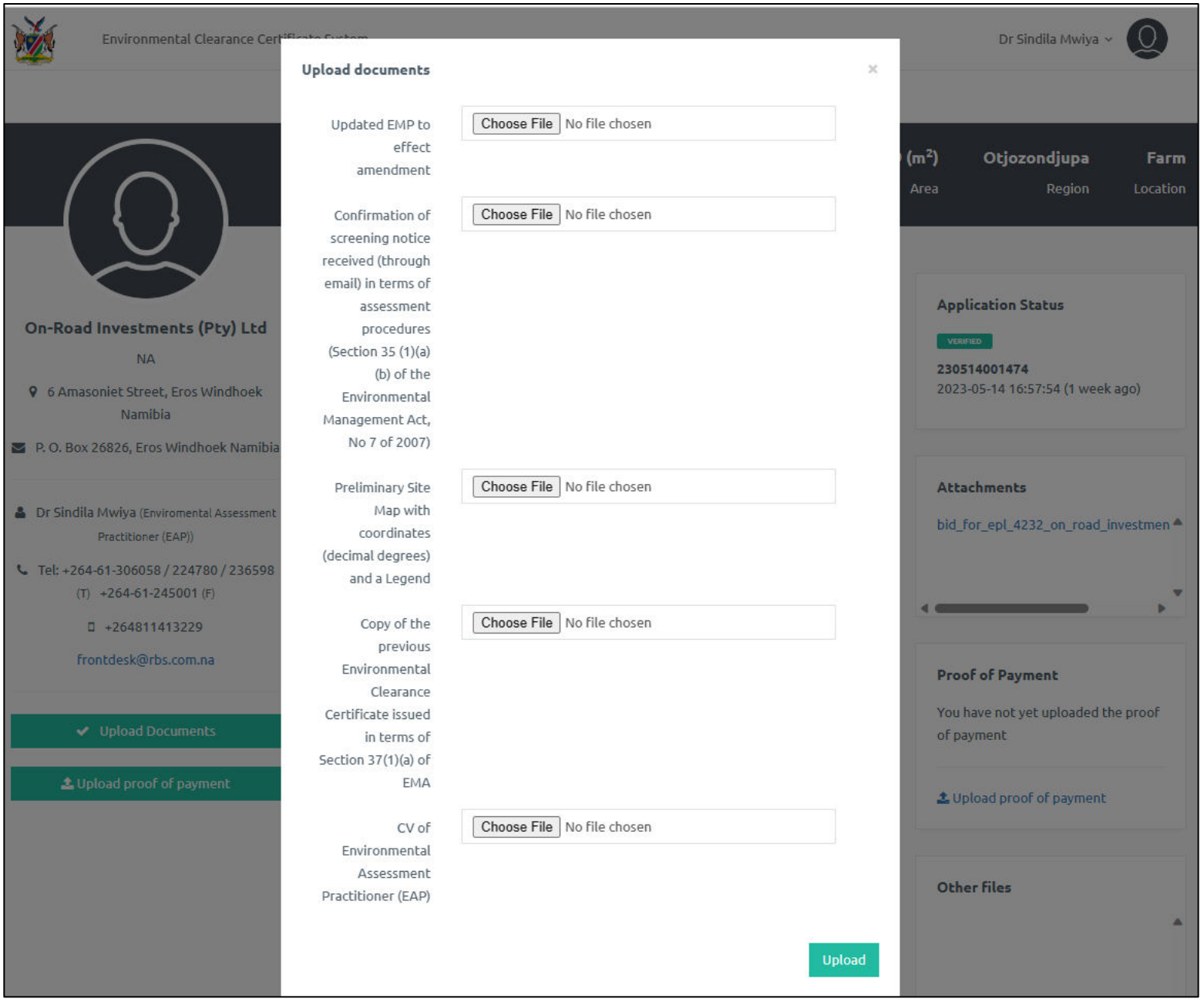


Figure 1.8: Screenshot of the Environmental Commissioner screening results in terms of the provisions of Section 35 (1)(a)(b) of the Environmental Management Act, No. 7 of 2007) with respect to the documents that the Proponent is required to submit as provided for in the confirmation of screening notice send to the Proponent by email but not received due technical issues.

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 EVALUATED AND ASSESSED WITH ENVIRONMENTAL MANAGEMENT PLAN (EMP) / MITIGATION MEASURES DEVELOPED</th></tr>
<tr><td rowspan="6">(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="6">(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="3">Impacts on the Biological Environment</td><td>Flora
Fauna
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. 1.9.

1.5.3 Assumptions and Limitations

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

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

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

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

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

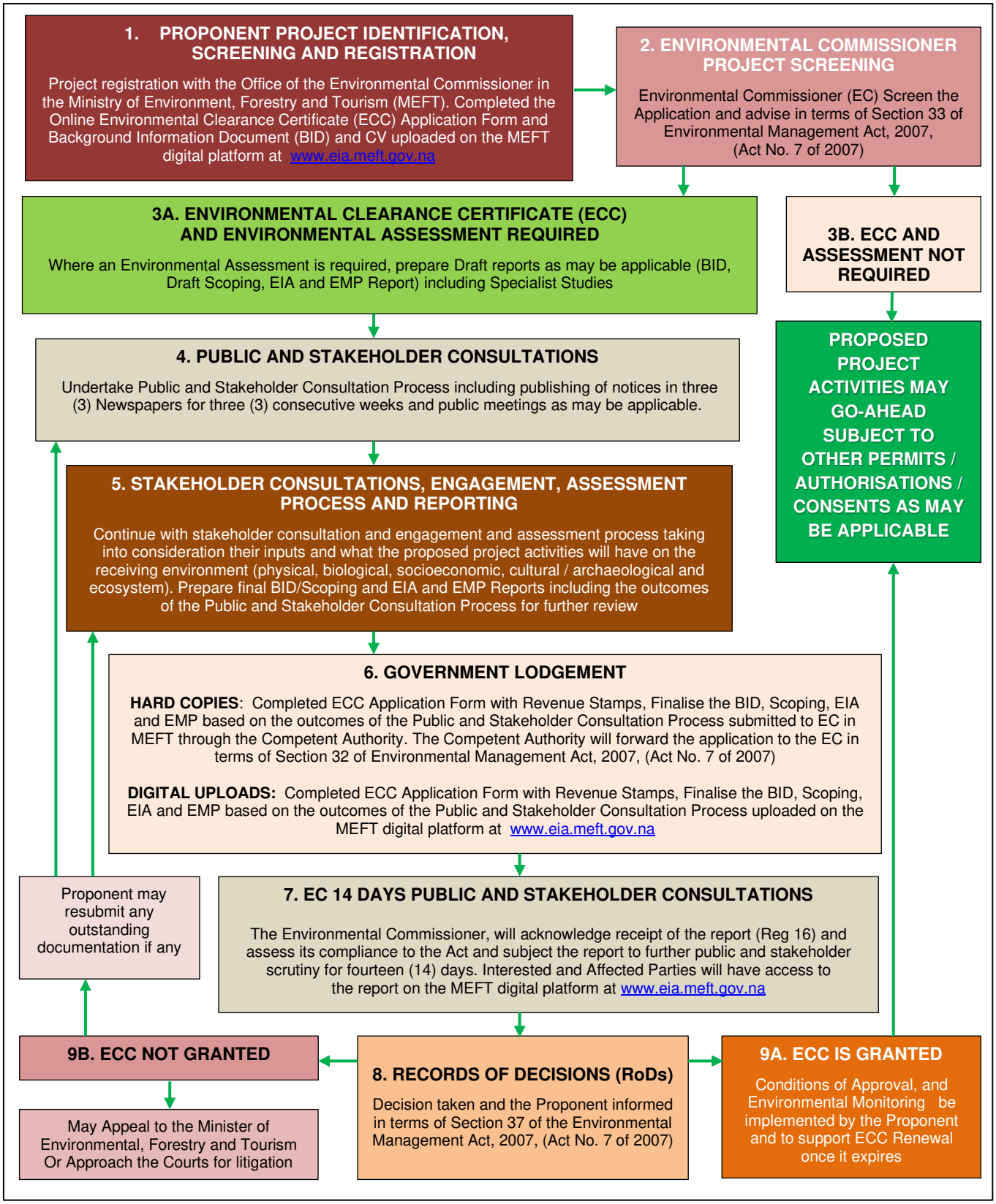


Figure 1.9: RBS Schematic presentation of Namibia's Environmental Assessment Procedure.

1.6 Structure of the Report

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

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

2. DESCRIPTION OF THE EXPLORATION

2.1 General Overview

The overall aim of the proposed / ongoing project activities (exploration / prospecting programme) is to search for potential economic minerals resources 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 Studies

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 proposed exploration activities include: Minerals exploration and mining, environmental management, land rights, water, atmospheric pollution prevention and labour as well as other indirect laws linked to the accessory services of exploration and possible test mining operations.

3.2 Key Applicable Legislation

3.2.1 Minerals Exploration and Mining Legislation

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

3.2.2 Environmental Management Legislation

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

3.2.3 Water Legislation

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

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

3.2.5 Atmospheric Pollution Prevention Legislation

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

3.2.6 Labour, Health and Safety Legislations

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

3.2.7 Other Applicable National Legislations

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

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

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

Table 3.1: Legislation relevant to the proposed exploration operations.

LAW	SUMMARY DESCRIPTION
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, Forestry and Tourism. Should the Proponent operate a nursery to propagate indigenous plant species for rehabilitation purposes, a permit will be required. At this stage, however, it is envisaged that this type of activity will be contracted out to encourage small business development.
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

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

Table 3.2: Government agencies regulating environmental protection in Namibia.

AUTHORITY	TYPE OF AUTHORISATION
Office of the Environmental Commissioner (OEC), Ministry of Environment, Forestry and Tourism	Issue of Environmental Clearance Certificate (ECC) based on the review of the Environmental Assessments (EA) Reports prepared in accordance with the Environmental Management Act (2007) and the Environmental Impact Assessment Regulations, 2012
Directorate of Forestry Ministry of Environment, Forestry and Tourism	Issues the following permits under the Forest Act (Act 12 of 2001) and the Regulations, 2015: ❖ A Harvesting Permit is required for any tree cutting and/or harvesting of wood in an area greater than 15 hectares per annum as stated under Section 22 (1), 23 (1), 24 (2and3) and 33 (1and2) of the Forest Act (Act 12 of 2001). The permit is issued by a Licensing officer, and stipulates conditions of the harvesting on the reverse side of the permit. Inspection of an area to be harvested is done before the permit is issued, and when an application for renewal is made every 3 months. ❖ A Transport Permit is required to convey any wood or wood products (e.g., droppers, planks, charcoal, and firewood). It is obtainable from any Forestry ❖ Office, and is valid for 7 days. ❖ An Export Permit is required to send any wood or wood products outside Namibia. It is obtainable from any Forestry Office, and is valid for 7 days. ❖ A Marketing permit is required to enable the producer to sell his/her products to any other party. The permit is valid for 3 months in commercial areas while in communal areas the permit is valid for 1 month only. The National Botanical Research Institute's (NBRI) mandate is to study the flora and vegetation of Namibia, to promote the understanding, conservation and sustainable use of Namibia's plants for the benefit of all.
Ministry of Mines and Energy (MME)	Competent Authority overseeing all matters related to petroleum exploration and production activities in Namibia. MME is responsible for issuing of all types of Minerals Licenses / Authorisations.
Ministry of Agriculture, Water and Land Reform	The Directorate of Resource Management within the Department of Water Affairs (DWA) at the MAWLR is currently the lead agency responsible for management of surface and groundwater utilisation through the issuing of abstraction permits and waste water disposal permits. DWA is also the Government agency responsible for water quality monitoring and reporting.

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

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

3.4 International and Regional Treaties and Protocols

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

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

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

3.5 Standards and Guidelines

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

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

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

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

Parameter and Expression of the results			WHO Guidelines for Drinking-Water Quality 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 3.6: Liquid effluent emission levels (MIGA /IFC).

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

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

	Maximum Allowable Leq (hourly), in dB(A)	
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 project lifecycle and must obtain the following permits/ authorisations as maybe applicable / required as the proposed project develops:

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

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

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

(iv) All other permits as may be applicable for the proposed exploration operations.

4. RECEIVING ENVIRONMENT

4.1 Climatic Settings

The EPL area fall within the pro-Namib Coastal Zone and receives summer rainfall which is brought by northeast winds, generally from October to April (Fig. 4.1) The average annual rainfall varies considerably and ranges between 300 mm and 400 mm (Fig. 4.1). Regional mean annual gross evaporation around the EPL 5880 area is about 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 is around 24°C with the mean monthly temperatures ranging between 23°C to 14°C throughout the year (Fig. 4.2). 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 (Fig. 4.2).

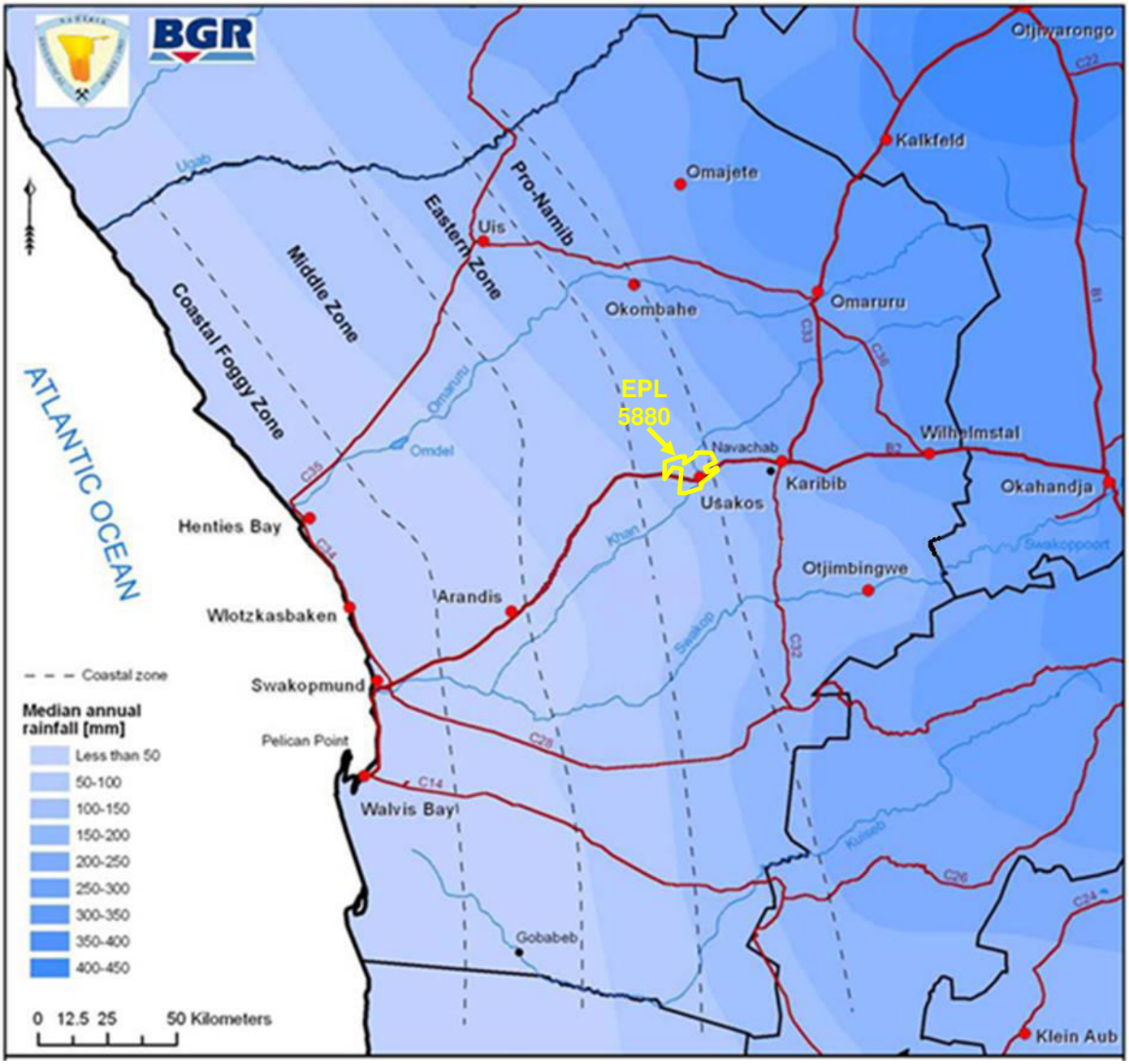


Figure 4.1: Median annual rainfall of central Namib Desert showing the location of the EPL 5880 (Source: Ministry of Mines and Energy (MME), 2010).

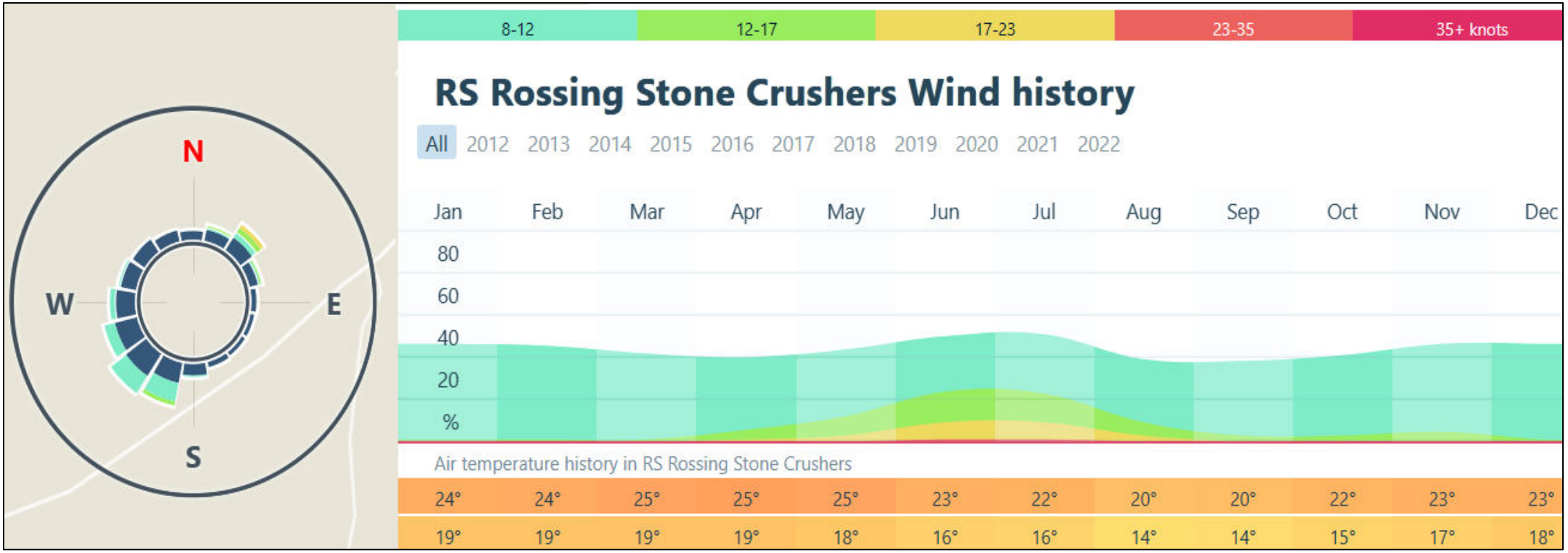


Figure 4.2: Prevailing wind direction, average wind speed and air temperature around Arandis situated to the west of the EPL 5880 (Source: https://windy.app).

4.2 Topography

The regional terrain around the EPL 5880 is rocky and rugged in nature with steep slopes characterising the mountainous sections whilst the foothills of the mountains are flat and gently undulating. The drainage of the area is dendritic in nature with ephemeral streams, often steeply incised, forming small early-stage tributaries of the Aroab and Khan Ephemeral Rivers channels.

4.3 Vertebrate Fauna and Flora Diversity

4.3.1 Reptiles

The high percentage of endemic reptile species (43%) associated with the rocky escarpment region of central western Namibia underscores the importance of this area without formal state protection. The most important species expected to occur in the general area are viewed as the tortoise Stigmochelys pardalis; pythons – P. anchietae and P. natalensis – Varanus albigularis and some of the endemic and little-known gecko species – e.g. Pachydactylus species. Tortoises, snakes and monitor lizards are routinely killed for food or as perceived threats.

Other important species are those viewed as "rare" – i.e. Rhinotyphlops lalandei, Mehelya vernayi & Afroedura africana – although very little is known about these species. An important, albeit little known and understudied species occurring in the Karibib area, is the Namibian Wolf Snake (Lycophidion namibianum) (Haacke and Branch pers. com.). Indiscriminate killing of snakes is a threat to little known species. The most important habitat is the rocky outcrops.

4.3.2 Amphibians

Of the seven species of amphibians that potentially could occur in the general area, 2 species are endemic (Poyntonophrynus hoeschi and Phrynomantis annectens) (Griffin 1998b) and 1 species is classified as "near threatened" (Pyxicephalus adspersus) (Du Preez and Carruthers 2009) – i.e. high level (42.9%) of amphibians of conservation value from the general area.

Pyxicephalus adspersus is also more common in northern Namibia where it faces severe anthropomorphic pressure (Griffin pers. com). With the exception of these important species and due to the fact that there is no open permanent surface water in the general area, amphibians are not viewed as very important in the dry western part of Namibia.

The most important amphibian habitat is probably the ephemeral Khan (north of Karibib) and Swakop Rivers (south of Karibib) and associated tributaries; fountains; farm reservoirs; ground dams and sewage works.

4.3.3 Mammals

Of the at least 88 species of mammals known and/or expected to occur in the general Karibib/Usakos/Omaruru areas, 10 species (11.4%) as endemic while the Namibian legislation further classifies 5 species as vulnerable, 2 species as rare, 3 species as specially protected game, 9 species as protected game and 5 species as insufficiently known.

The most important species from the general area are probably those classified as rare (e.g. Cistugo seabrai & Atelerix frontalis angolae) and vulnerable (e.g. Galago moholi, Proteles cristatus, Hyaena brunnea, Acinonyx jubatus, Felis silvestris, Otocyon megalotis, Vulpes chama & Giraffa camelopardalis) under the Namibian legislation and near threatened (e.g. Eidolon helvum, Hipposideros commersoni, Hipposideros vittatus, Hyaena brunnea & Panthera pardus) and vulnerable (e.g. Acinonyx jubatus, Equus zebra hartmannae) by the IUCN (IUCN 2016).

The most important habitat around the EPL area are the rocky outcrops and Khan River and Swakop Ephemeral Rivers Channels.

4.3.4 Avifauna

At least 216 bird species [mainly terrestrial "breeding residents"] occur and/or could occur in the general Karibib/Usakos/Omaruru areas at any time and include 12 of the 14 Namibian endemics (85.7% of all Namibian endemic species or 5.6% of all the species expected to occur in the area).

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). All the birds listed as endangered, vulnerable and near threatened are also viewed as important. The most important habitat is the rocky outcrops and Khan River riparian vegetation.

4.3.5 Trees and Shrubs

An overview of the vegetation zones associated with the EPL 5880 area is shown in Fig. 4.3. At least 79 to 109 larger species of trees and shrubs are known and/or expected to occur in the general area of which of these 5 species are classified as endemic (4.6%) and 4 species as near endemic (3.7%), 24 species (22%) protected by Forestry laws, 5 species (4.6%) protected by the Nature Conservation Ordinance No. 4 of 1975 and 4 species (3.7%) classified as CITES Appendix II species.

The most important species are viewed as Cyphostemma bainesii (endemic, Forestry#, NC), Cyphostemma currorii (Forestry#, NC), Cyphostemma juttae (endemic, Forestry#, NC), Erythrina decora (endemic, Forestry#), Heteromorpha papillosa (endemic) and Manuleopsis dinteri (endemic). These species are often associated with rocky outcrops indicating the importance of such geological features in the Karibib/Usakos/Omaruru areas.

The endemic grass – Eragrostis omahekensis – is viewed as the most important species potentially occurring in the general area. The most important habitat is the rocky outcrops and Khan River habitat.

4.3.6 Other Flora Species

Aloes are protected throughout Namibia with 5 other aloe species not included in Table 7, but which potentially occur in the general area, and also viewed as important are Aloe asperifolia, A. dinteri, A. hereroensis, A. namibensis and A. zebrina (Rothmann 2004).

Many endemic Commiphora species are found throughout Namibia with Steyn (2003) indicating that Commiphora crenato-serrata (not included in the Table 7) potentially also occurring in the general area.

Other species with commercial potential that could occur in the general area include Harpagophytum procumbens (Devil's claw) – harvested for medicinal purposes and often over-exploited – and Citrullus lanatus (Tsamma melon) which potentially has a huge economic benefit (Mendelsohn et al. 2002).

Lithops species – all protected (See Nature Conservation Ordinance No. 4 of 1975) – are also known to occur in the general area and often difficult to observe, especially during the dry season when their aboveground structures wither. At least two species of Lithops are known to occur in the Usakos area – Lithops gracilidelineata var. gracilidelineata and L. werneri – and are viewed as important (Cole and Cole 2005).

At least 64 species of ferns, of which 13 species being endemic, occur throughout Namibia. Ferns in the general area include at least 15 indigenous species (Actiniopteris radiata, Asplenium cordatum, Cheilanthes dinteri, C. eckloniana, C. marlothii, C. parviloba, Marselia aegyptiaca, M. ephippiocarpa, M. farinosa, M. macrocarpa, M. nubica, M. unicornis, M. vera, Ophioglossum polyphyllum & Pellaea calomelanos) (Crouch et al. 2011). The general area is undercollected with more species probably occurring in the general area than presented above.

The overall diversity of lichens is poorly known from Namibia, especially the coastal areas and statistics on endemicity is even sparser (Craven 1998). More than 100 species are expected to occur in the Namib Desert with the majority being uniquely related to the coastal fog belt. Lichen diversity is related

to air humidity and generally decreases inland form the Namibian coast (Schults and Rambold 2007). Off road driving is the biggest threat to these lichens which are often rare and unique to Namibia. To indicate how poorly known lichens are from Namibia, the recent publication by Schultz et al. (2009) indicating that 37 of the 39 lichen species collected during BIOTA surveys in the early/mid 2000's was new to science (i.e. new species), is a case in point. The most important lichen habitat is viewed as the Erongo Mountains; granite domes and other rocky areas.

4.3.7 Fauna and Flora Conclusions

Species most likely to be adversely affected by the proposed exploration and possible mining operations within the EPL 5880 would be the variety of reptiles and birds specifically associated with the proposed development site(s) as well as the potential effect such development may have on carnivores as well as the protected and unique flora.

As all development have potential negative environmental consequences, identifying the most important fauna and flora species including high risk habitats beforehand, coupled with environmentally acceptable mitigating factors, lessens the overall impact of such development. The following is the summary of the most important fauna and flora (habitat) areas within the EPL area:

(i) Erongo Mountains [botanical richness and endemic vertebrates];

(ii) Granite domes and other rocky outcrops [biotic richness and endemism], and;

(iii) Local Ephemeral Rivers – Tributaries and the main Khan [biotic richness, large desert-dwelling mammals, high value for human subsistence and tourism].

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

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

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

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

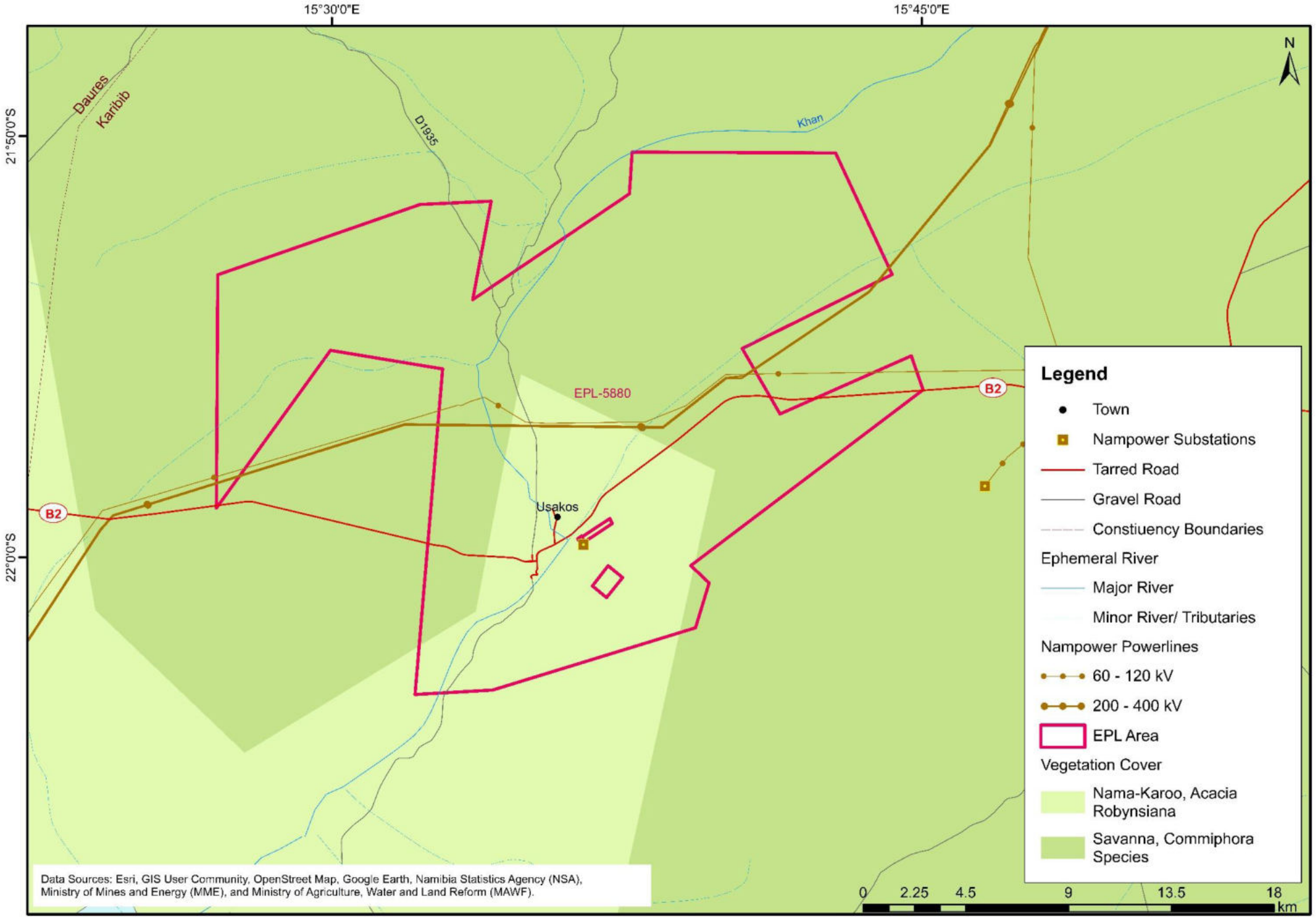


Figure 4.3: Regional vegetation zones around the EPL 5880 Area.

4.4 Socioeconomic

4.4.1 Regional Settings

The Erongo Region extending over 63,720 km^2 and the majority of the population lives in urban settlements, principally Swakopmund and Walvis Bay (Fig. 4.4). The surge in uranium exploration and mining operations has seen significant growth in various downstream industries in the coastal towns. The region has the second highest income per capita in the country after Khomas Region, and its relative prosperity is derived from fishing, mining and tourism. Major mining activities in the region are Rössing Uranium, the Navachab gold mine, Langer Heinrich Uranium, Husab Uranium and the coastal salt operations. Other uranium projects that are also expected to advance further are those of Bannerman, Reptile Uranium and Swakop Uranium, but these do not exhaust the list of potential uranium operations in Erongo Region. The main commodities mined are uranium and gold. Extensive salt mining occurs along the coast at Walvis Bay and smaller companies operate at Cape Cross and Ugab.

Within the Erongo Region, access to economic opportunities and resources in the region is highly variable especially to rural communities. This is usually due to the isolation and underdeveloped infrastructures within these rural communities and is a situation experienced across all regional parts of the country. The uneven pattern to development, benefits and economic opportunity significantly has results in a regional Gini co-efficient of 0.60, with 19.7% of the population being poor and 7.1% being extremely poor (National Planning Commission, 2006, 2007 and 2012). The Erongo Regional Council has adopted developed strategies to address poverty reduction and economic development, with primarily focus on rural areas by initiating measures to insure sound management of the region's natural resources (www.erc.com.na). The Region's main focal areas for development include water resources, the environment, and tourism, fishing and marine resources.

4.4.2 Local Settings

The population of Karibib Constituency is 13, 320 which accounts for 8.8 percent of the total Erongo Region population. The town Usakos situated in central part of the EPL area has 3,000 inhabitants and owns 58 square kilometres of land. The socioeconomic activities in and around the Town of Usakos and the second nearest Town of Karibib are dependent on mining activities such as the QKR Namibia Navachab Gold Mine, various dimensions stones and small-scale mining operations.

Other key economic activities are: Farming with small stock, cattle and game, tourism and formal and informal trading. The development of this project will have some socioeconomic contributions to both the towns of Usakos and Karibib. There will be temporary employment opportunities and workers from the project area will be staying in the Town of Usakos. Potential for the development of a viable mining project will bring added local benefits and contribute to the local and national economies through taxes, royalty and direct investment.

4.4.3 Agriculture

As an important cattle, game and small stock (goats and sheep) farming area (and consequently a source of employment) as well as renewed interest from a tourism point of view, the importance of the western central Namibia to the GDP of Namibia is invaluable. The area surrounding EPL 5880 area falls within the long established private commercial farming communities.

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

The stock density is estimated at <3sheep/km² (1.5% of total sheep in Namibia) and <1cattle/km² (1.3% of total cattle in Namibia) (van der Merwe 1983). There are numerous existing tourism ventures in the area with the tourism potential viewed as relatively high (Mendelsohn et al. 2002).

4.4.4 Conservation and Tourism

The EPL area partly covers the Communal Conservancy of ǂGaingu wirh its key activities centred around Spitskoppe area (Mendelsohn et al. 2002, NACSO 2006, 2010). With the exception of the Town of Usakos, the EPL area is not well known for tourism and it does not have major tourism products such as unique natural landscapes, cultural resources or nature parks.

4.4.5 Safety, Security and Obstructions

Current safety issues include steep slopes / gullies / valleys, excavations and minor scattered scrap metals. Generally, there will be a need to ensure that all employees and the general public and visitors to the EPL area are safe. The entire proposed development will not cause any obstruction to human or fauna.

Figure 4.4: Map of the Erongo Region showing the location of the EPL 5880 (Source: www.erc.com.na).

4.5 Ground Components

4.5.1 Geology

The EPL 5880 falls within the Central Zone of the Damara Sequence which underlies most of Namibia. The oldest rocks within the Central Zone are the pre-Damaran basement that consists of gneiss and granite lithologies found in different parts of the zone (Fig. 4.5 and Table 4.1). According to Miller, (1983a), the sequence was deposited during successive phases of rifting, spreading, subduction and continental collision.

The basal succession (Nosib Group), laid down in or marginal to intracontinental rifts, consists of quartzite, arkose, conglomerate, phyllite, calc-silicate, subordinate, limestone and evaporitic rocks. Local alkaline ignimbrites with associated subvolcanic intrusions ranging from 840 to 720 million years in age also form part of the regional geology (Miller, 1992).

According to Miller, (1992), widespread carbonate deposition followed and overlapped far beyond early rift shoulders (Kudis, Ugab and basal Khomas Subgroups); interbedded mica and graphitic schist, quartzite (some ferruginous), massflow deposits, iron-formation and local within-plate basic lava point to fairly variable depositional conditions south of a stable platform where only carbonates with very minor clastics occur (Otavi Group). Near the southern margin of the orogen, deep-water fans, facies equivalents of the carbonates were deposited on either side of a Southern Zone Ocean separating Kalahari and Congo Cratons (Auas and Tinkas Formations). Thick schistose metagreywacke and metapelite (Kuiseb Formation) overlie the above rocks.

The lithostratigraphy of the Damara Sequence in the Central Zone (CZ) in which the EPL 5880 falls has been reviewed and significantly revised by Badenhorst (1987), who has also correlated the stratigraphy across the Omaruru Lineament. The stratigraphy of the CZ taken from Steven (1993) as slightly modified after Badenhorst, (1987) and (1988) is given in Table 4.1 and Fig. 4.5).

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

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

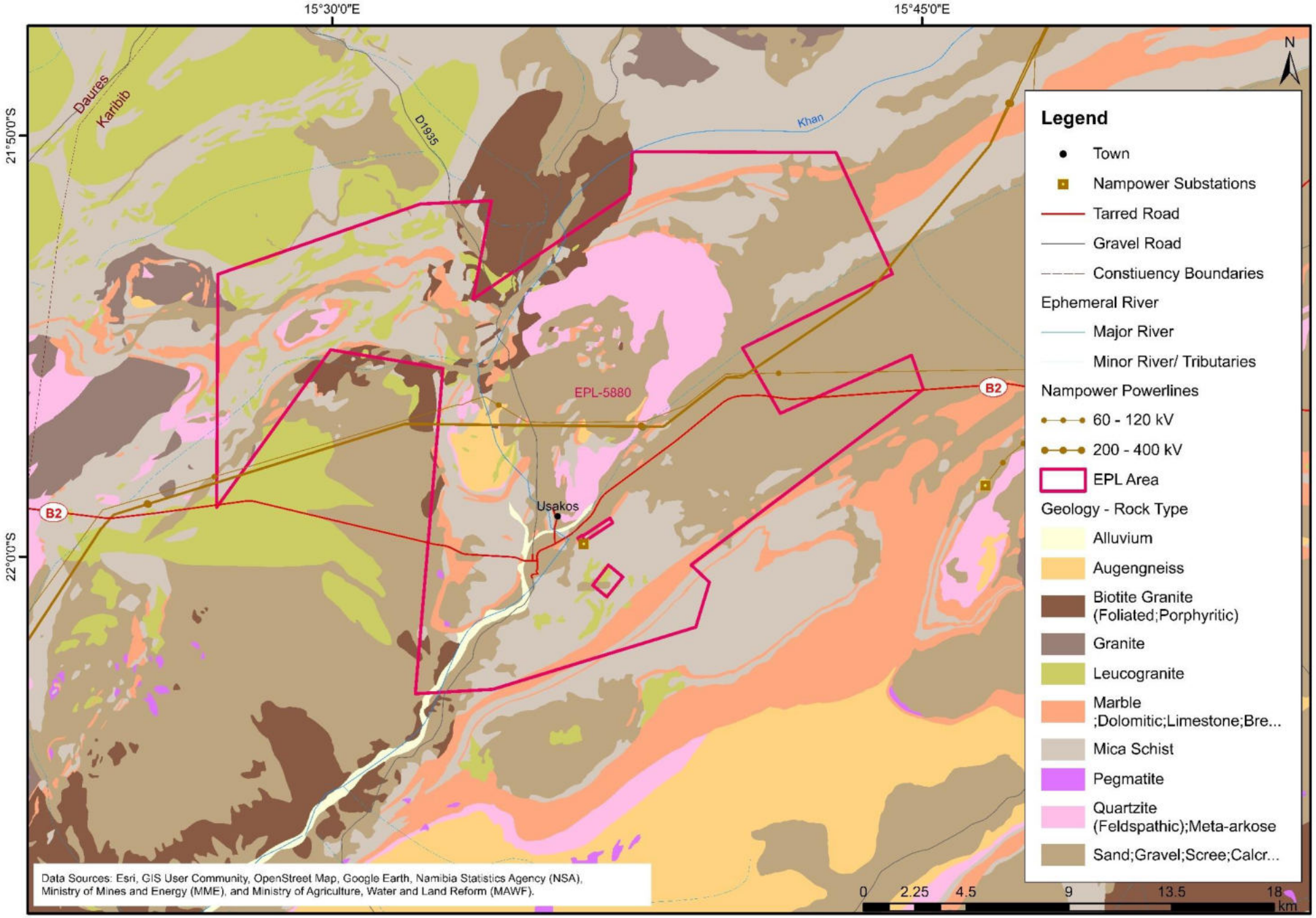


Figure 4.5: Regional geological setting of the EPL 5880.

4.5.2 Geotechnical Engineering Considerations

Rocks of varying geotechnical characteristics are expected within the pegmatite zones and alternating bands within the banded dolomitic marble and biotite-quartz schist country rock and covered by a variety of sediments in some places. No field and laboratory assessment of rock mass and detailed discontinuities survey were undertaken as part of this study.

Table 4.2 outlines an indicative classification of the various discontinuities that are likely to be found in the area. Both low and high order discontinuities are likely to be found around the EPL area.

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

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

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

4.5.3 Water Sources

Groundwater as well as surface water (only during the rainy season) from ephemeral river channels is the sources of water supply in the area as well as much of the Erongo Region. According to the Department of Water Affairs, (2001), the Erongo Region and in particular the Karibib and the EPL area generally has a low groundwater potential (Fig. 4.6). The area with aquifer potential, more or less reflects the rainfall distribution, decreasing westwards. Knowledge of the aquifers in this area is sparse, due to the low number of boreholes and few on groundwater.

Recharge from rainfall is an important parameter determining the groundwater potential, but the degree of metamorphism affects the groundwater potential too. The groundwater potential of rocks decreases, as the degree of metamorphism increases. Crystalline rocks normally exhibit a very low tendency to store water, typical of the pegmatite zones and the alternating bands within the banded dolomitic marble and biotite-quartz schist found within the project area (Fig. 4.6). The groundwater potential of these rock units is generally low, to locally moderate.

Possible targets for water resources in this area are mainly fractured zones and faults that outcrop on the surface without impermeable infillings. But the success rate and yields for these rock types are generally low. The area along major ephemeral rivers may be more promising due to well developed fractures and faults that give rise to good recharge potential during the rainy season.

There is a NamWater Navachab mine water supply pipeline from the Swakoppoort Dam in the area, which dams the ephemeral Swakop River. The water supply pipeline dedicated for Navachab Gold Mine is located within the close proximity of the EPL area.

4.5.4 Evaluation of Water Vulnerability

Vulnerability assessment of surface water covered possible runoff, the presence of source factors and major flow routes such as major high order discontinuities (Table 4.2), ephemeral river channels, valleys and gullies as pathways and the presence of surface water body as a target (Figs. 4.6 and 4.7). The groundwater assessments covered hydraulic properties and thickness of the unsaturated and saturated zones derived from geological and hydrogeological data. The assessment of the unsaturated characteristics was based on the ability for source factors to influence the system through known pathway factors such as discontinuities. The combined effects of unsaturated and saturated flow probabilities were used as indicator for groundwater vulnerability. However, groundwater or surface water will only be vulnerable to contamination if the following three (3) component are all present at the same time and at a site-specific area within the EPL:

(i) Contaminant sources resulting from proposed exploration programme;

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

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

Overall, the limited local groundwater resources found in the area form part of the poorly developed metamorphic rocks based confined and unconfined aquifer system that is moderately vulnerable to any sources of pollution (Figs. 4.6 and 4.7).

During the rainy season, surface water bodies can be found along the local ephemeral river systems around the EPL area. This surface water recharges the local groundwater resources along the faults, solutions holes and other discontinuities along the ephemeral rivers in the general EPL area.

The Aroab Ephemeral River channels and all its tributaries found around the EPL area flows into the Khan Ephemeral River near the Town of Usakos (Fig. 4.4). The Khan Ephemeral River is a major tributary of the Swakop Ephemeral River which eventually flows into the Atlantic Ocean at Swakopmund (Figs. 4.4, 4.7 and 4.7).

Due to the extensive Ephemeral River channels cutting across the EPL area, surface water in the local EPL area is more vulnerable to pollution sources associated with some of the proposed local field-based detailed prospecting / exploration activities such as drilling and trenching as well as supporting activities such as campsite and discharge of liquid and solid waste.

It is important that all polluting activities shall not be placed or undertaken in areas with high order discontinuities, valleys or gullies connected to Aroab Ephemeral River systems in the area. Discharge of liquid or solid waste into a public stream is prohibited.

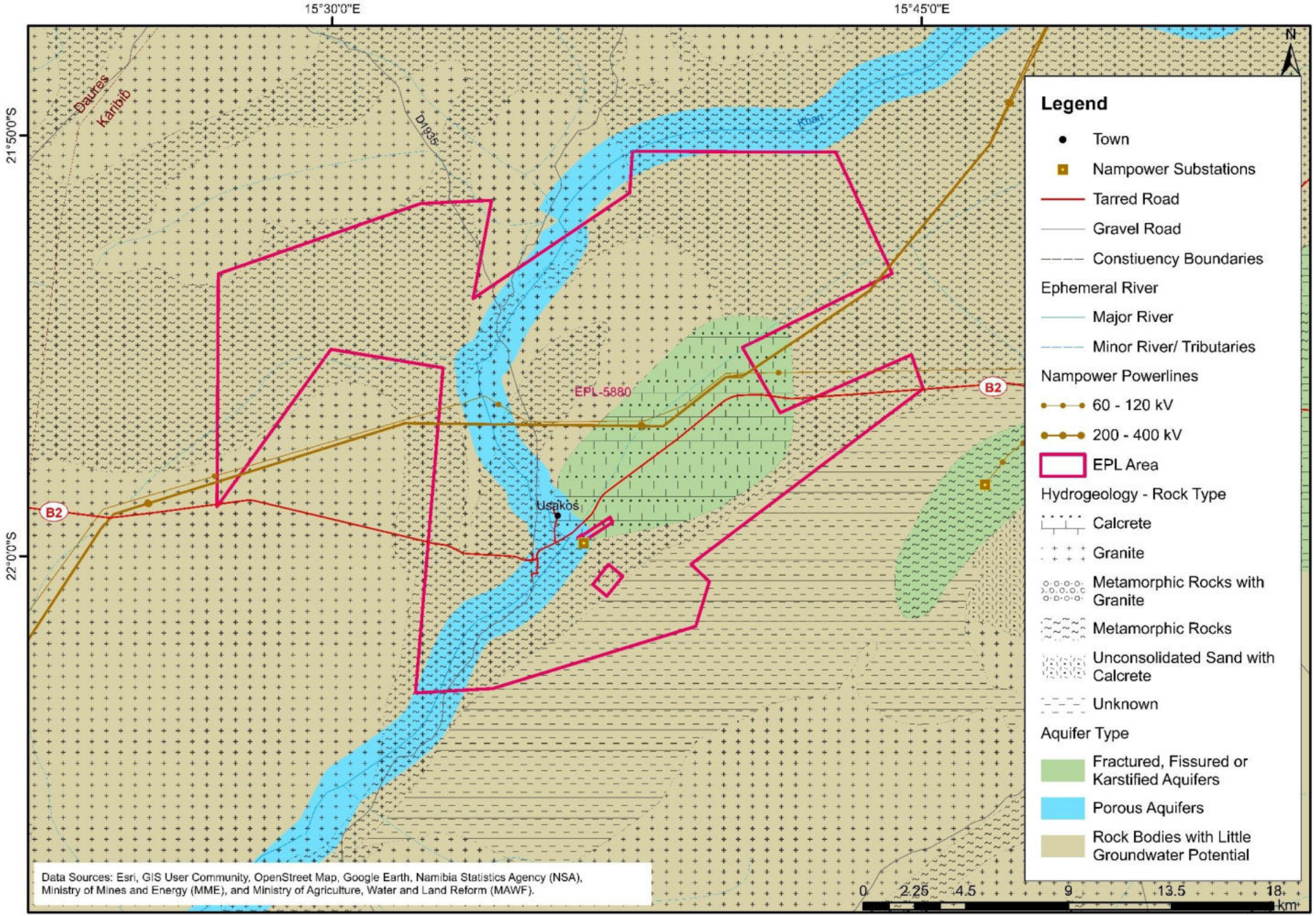


Figure 4.6: Regional Hydrogeology settings of the EPL 5880.

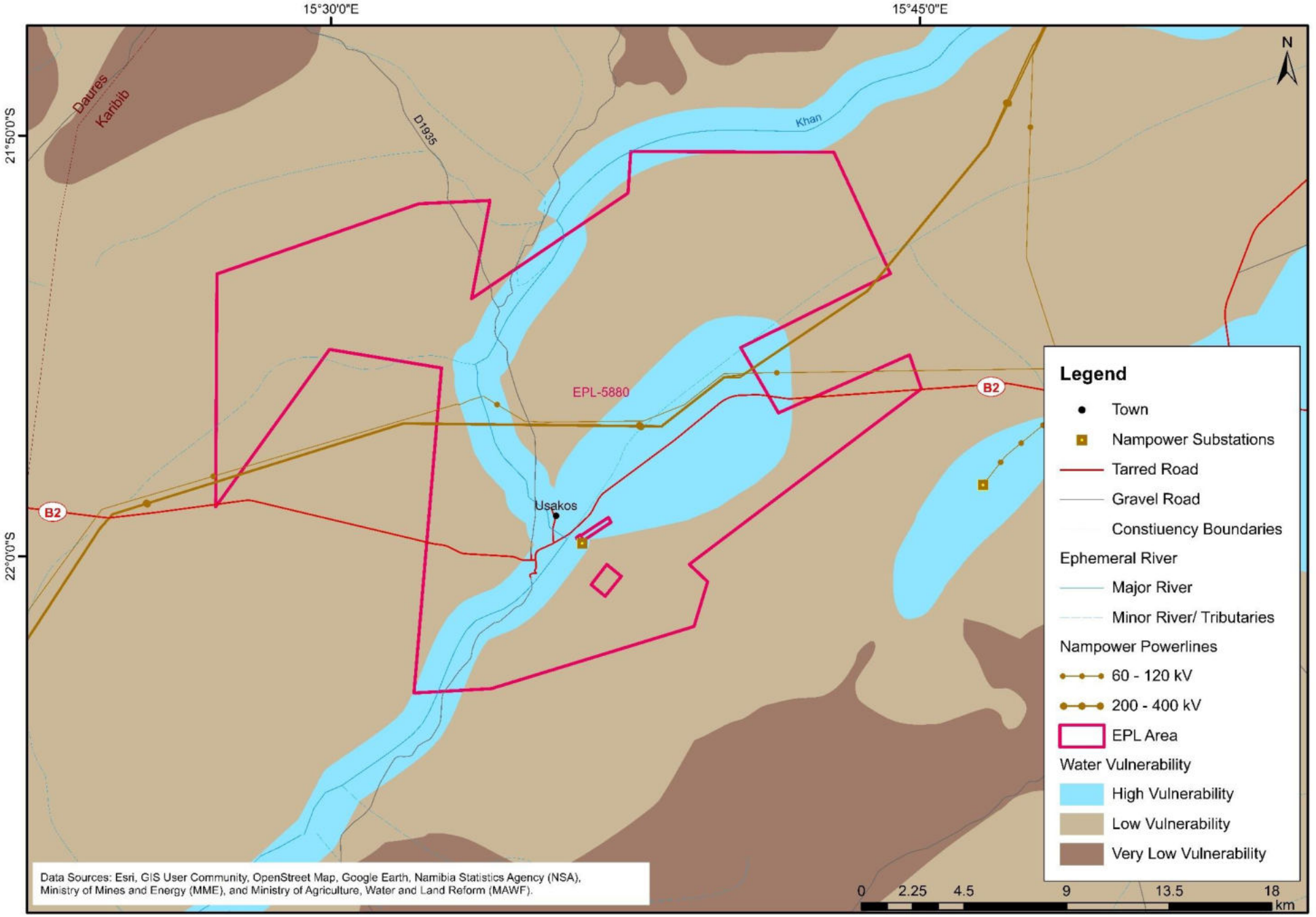


Figure 4.7: Regional groundwater vulnerability around the EPL 5880.

4.6 Archaeology

4.6.1 Regional Archaeological Setting

Modern humans and their ancestors have lived in Namibia for more than one million years, and there are fossil remains of lineal hominin ancestors as early as the Miocene Epoch (Kinahan, 2017). Namibia has a relatively complete sequence covering the mid-Pleistocene to Recent Holocene period, represented by thousands of archaeological sites mainly concentrated in the central highlands, escarpment and Namib Desert.

According to Kinahan, (2017), the Recent Holocene archaeological sequence in Namibia, i.e., the last 5 000 years, is of particular importance because it provides the background evidence for the development and recent history of the indigenous peoples of Namibia before the advent of written historical records during the colonial era.

Many archaeological sites from this period are of great significance to the understanding of Namibian history, and some are considered to be of global importance.

4.6.2 Local Archaeological Setting

The general area around the EPL 5880 is well known for extensive rock-art sites linked to various granite rock outcrop shelters such as those found around the Spitzkoppe situated outside the EPL area. These sites hold significance historical, cultural and spiritual value and all-important heritage area for all Namibians and are protected by the National Heritage Act, 2004 (Act No. 27 of 2004) under the National Heritage Council of Namibia.

It is unlikely that the targeted marble and associated pegmatites will hold significant archaeological rock-art resources because most of these rock arts are associated with the granite which are more resistant to weathering compared to the marbles.

Other potential archaeological resources found in the general area include colonial evidence points to impermanent settlement by groups of probably Khoe pastoralists (Kinahan, 2017). These people formed part of a regional-scale network with links to the Atlantic coast and inland sites where copper was produced.

However, there are a large assemblage of ceramic vessels associated with the general area of and represent an important addition to the regional archaeological picture.

Evidence from the early colonial period relates to mining in the general area and a combination of trade, missionary activity and wagon repair. Local settlements within the EPL area may hold historical archaeological resources of importance. A number of National Monument sites have been recognised in general area under the National Heritage Act, 2004 (Act No. 27 of 2004).

4.6.3 Archaeological Desk Assessment

Early colonial remains are expected to be relatively abundant around the EPL 5880, although it is likely that if these are related to historical mining activity, they will form part of the general area of mining interest in the vicinity. It is expected that the EPL area will be extensively disturbed and that little might remain of either pre-colonial or early colonial sites. The targeted marble and pegmatites are unlikely to have rock shelters containing stratified archaeological deposits.

4.6.4 Archaeological Conclusions and Recommendations

The area of interest for mining operations probably has archaeological potential, although no archaeological sites have been recorded so far from within the area itself. The expectation is therefore:

(i) A high likelihood of Holocene age archaeological sites, including rock art, associated with outcropping granite in the northeast of the MLs Nos. 120 and 123.

(ii) A high likelihood of late precolonial settlement sites throughout the entire tenement, especially in the vicinity of springs and seepages, and.

(iii) A high likelihood of early colonial settlement remains relating to the historical occupation of area that may be unknown or not recorded.

The following are the key recommended actions related to archelogy in the EPL 5880 Area:

(i) Contractors working on the site should be made aware that under the National Heritage Act, 2004 (Act No. 27 of 2004) any items protected under the definition of heritage found in the course of development should be reported to the National Heritage Council.

(ii) The chance finds procedure as outlined in the EMP must be implemented at all times, and.

(iii) Detailed field survey should be carried out if suspected archaeological resources or major natural cavities / shelters have been unearthed during the mining operations.

The Proponent must not disturb major natural cavities that may be unearthed because they could hold some highly significant historical or cultural sites that would require detailed documentation and possibly mitigation measures to be adopted in the event of encroachment by mining activity.

4.7 Public Consultations and Engagement

4.7.1 Overview

Public consultation and engagement process have been part of the environmental assessment process for this project. Public notices were published in the local newspapers during the months of November and December 2016 (Figs. 4.8 - 4.11).

Through the newspaper advertisements as shown in Figs. 4.8 - 4.11 the public were invited to submit written comments / inputs / objections with respect to the proposed / ongoing minerals exploration activities in the EPL 5880.

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

The application for the renewal of the ECC that was granted on the 8th September 2020 and expiring on the 8th September 2023 does not require the implementation of the public and stakeholder consultation process 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). Nonetheless, registered stakeholders may be notified about the proposed ECC renewal application.

As part of the regulatory requirements, the Environmental Commissioner will provide for a fourteen (14) days period for public and stakeholder consultations / inputs on the ECC renewal application when the application is uploaded on the MEFT Portal at www.eia.meft.gov.na.

Furthermore, the Environmental Commissioner may consult the Competent Authority and other Organs of State and other Interested and Affected Parties (I&APs) that may be directly or indirectly be affected by the proposed ECC renewal application.

effectiveness of some of the
d interventions, such as ad-
nent regulations. However,
ated above, policies that di-
rget the availability of alco-
ply and a raised drinking age
ve been proven to be effec-
limited cost to the state.
also generally agreed that
nise interventions (that pe-
ervers) are inadequate unless
with interventions that go
off-site consumers.
tably commerce, tourism and
ure are industries that will be
and responsible drinkers
e certain curtailments that
ver aimed at them in the first

l feedback suggests that
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e the restrictions and the in-
age limit for purchasing al-
s residents of these commu-
now only too well the impact
is having on the youth and
neighbourhoods in general.
al concern, as always with
ive amendments, is that an
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address issues with the cur-
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re roughly 150 000 shebeens
ountry, with one fifth of them
teng. It is estimated that two
three shebeens in that prov-
e illegal. Before introducing
r new legislation, one must be
can be enforced.-**fin24**

PUBLIC NOTICE FOR APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC)

PRIMARY RESOURCES NAMIBIA CC - EXCLUSIVE PROSPECTING LICENCE (EPL) No. 5880, KARIBIB DISTRICT, ERONGO REGION

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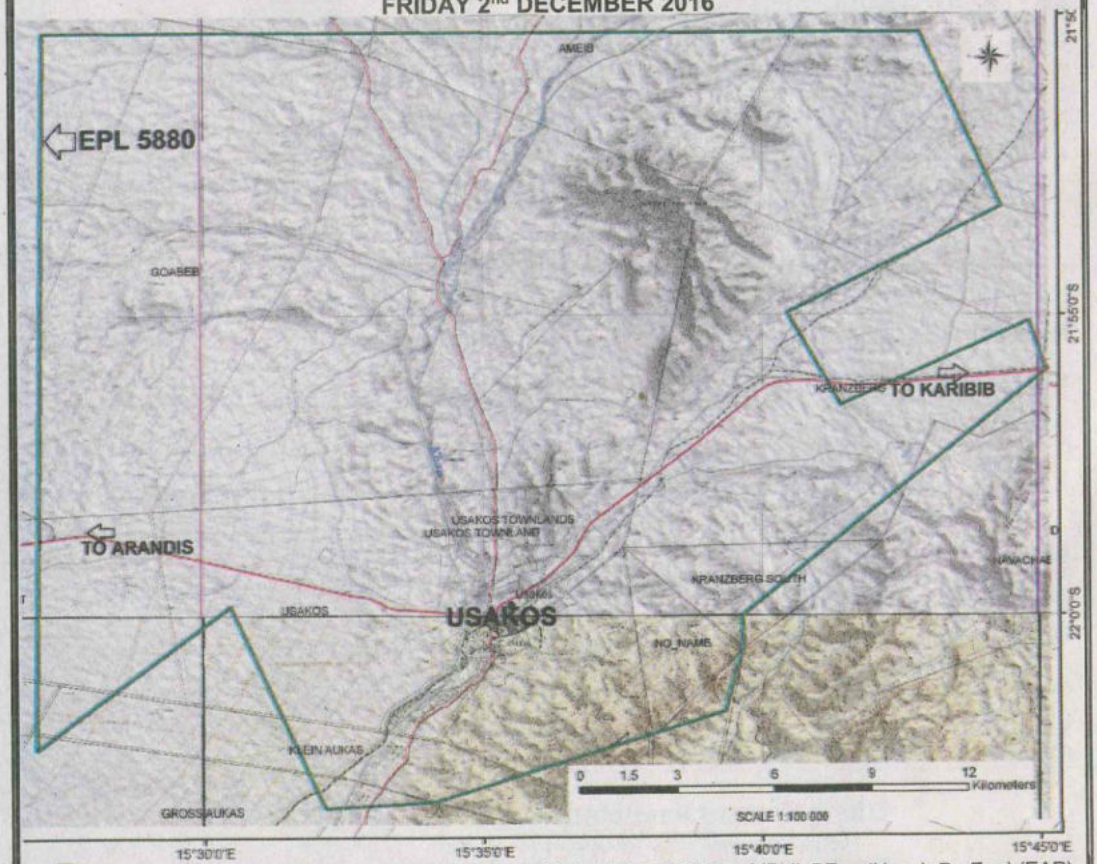
REGISTER BY EMAIL: frontdesk@rbs.com.na or FAX 061-306059.
DEADLINE FOR SUBMISSION OF WRITTEN COMMENTS / OBJECTIONS/ INPUTS TO BE CONSIDERED IN THE ENVIRONMENTAL ASSESSMENT PROCESS IS:
FRIDAY 2nd DECEMBER 2016



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

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

Figure 4.8: Copy of the public notice that was published in the Windhoek Observer newspaper dated Friday 4th November 2016.

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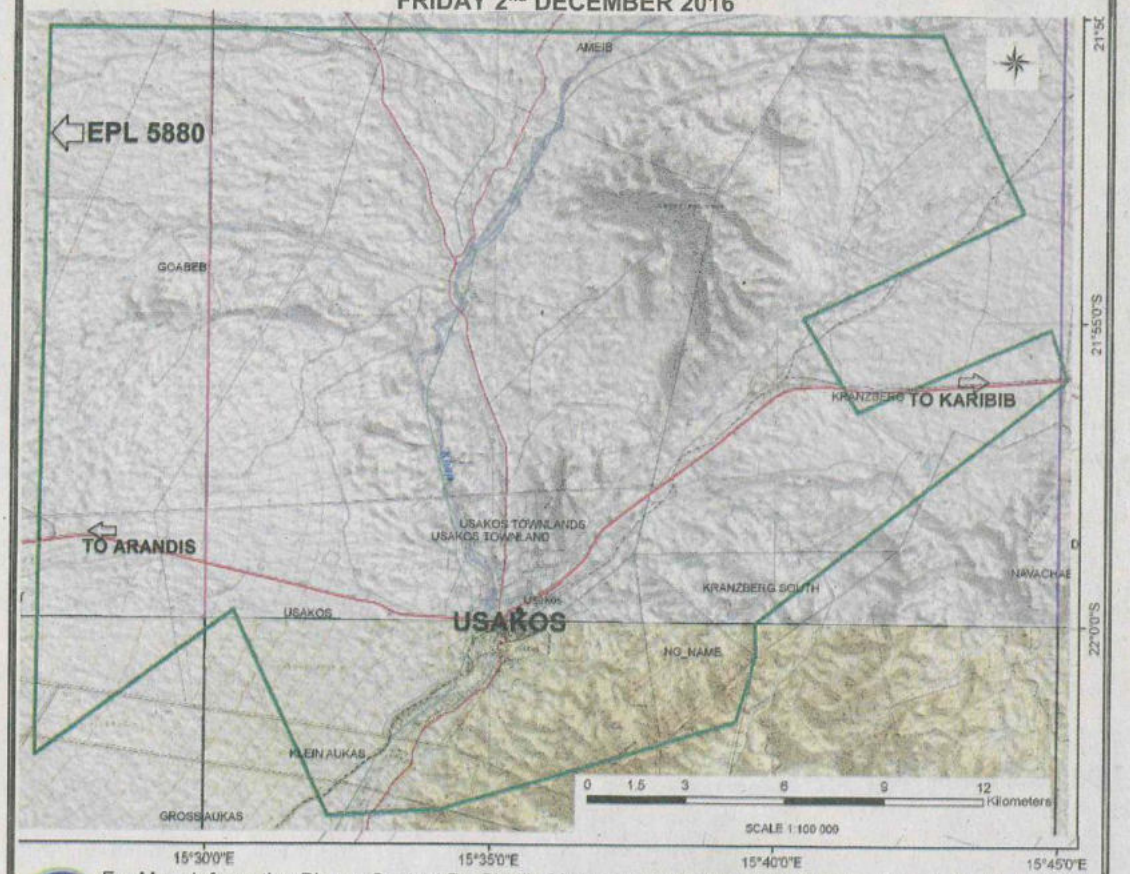

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Risk-Based Solutions (RBS) CC - We are Delivering the Solutions

Figure 4.9: Copy of the public notice that was published in the Windhoek Observer newspaper dated Friday 18th November 2016.

PUBLIC NOTICE FOR APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC)

#Oab Energy Proposed 8MW EBAY Mine Wind Park, Tsau //Khaeb (Sperrgebiet) National Park, //Karas Region

#Oab Energy (PTY) LTD (the Proponent) is in the process of developing an 8 MW Namdeb EBAY Wind Energy Project to supply electricity to Elizabeth Bay (EBAY) mine situated in the Tsau // Khaeb (Sperrgebiet) National Park near the Town of Lüderitz in the //Karas Region in Southern Namibia. The proposed Namdeb EBAY Wind Energy Project site is situated in an ideal windy area of Lüderitz with the nearby substation which is ready to evacuate the generated green energy to the nearby off taker, the Namdeb Elizabeth Bay (EBAY) Diamond mine. The proposed project activities falls under listed activities in the Environmental Management Act, 2007, (Act No. 7 of 2007) that cannot be undertaken without an Environmental Clearance Certificate (ECC). The proponents is required to undertake Environmental Assessment comprising Environmental Scoping, Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) in order to support the application for ECC for the proposed project. The Environmental Assessment process must be undertaken in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). In fulfilment of the environmental requirements, the proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultants led by Dr. Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to undertake the Environmental Assessment in order to support the applications for ECC. All interested and affected parties are hereby invited to register and submit written comments / objections / inputs with respect to the proposed 8 MW Ebay wind project.

FOR MORE INFORMATION THE SCOPING, DRAFT EIA, DRAFT EMP AND OTHER SPECIALIST REPORTS ARE AVAILABLE AT THE FOLLOWING PLACES:

1. WINDHOEK: Risk-Based Solutions (RBS) CC Maerua Mall, Unit 158, 3rd Floor Block A, Cnr Jan Jonker Road & Centaurus Street; Ministry of Mines and Energy Library, 1 Aviation Road; National Library of Namibia, 1-7 Eugene Marais Street; Windhoek Library, 4 Lüderitz Street; Electricity Control Board (ECB), ECB, House 8 Bismarck Street;
2. LÜDERITZ: Lüderitz Town Council, 90 Bay Road, Namdeb Offices in Lüderitz 105 Bay Road and Ministry of Fisheries and Marine Resources, Bay Road, Lüderitz.
3. KEETMANSHOOP: //Karas Regional Council, Wheeler Street.

YOU ARE HEREBY INVITED TO REGISTER AS A STAKEHOLDER AND FOR THE PUBLIC MEETING SCHEDULED TO TAKE PLACE ON FRIDAY, 9TH DECEMBER 2016, 09HRS00 - 13HRS00 AT THE NEST HOTEL IN LÜDERITZ. DATELINE FOR WORKSHOP REGISTRATION IS 8TH NOVEMBER 2016 AND THE DATELINE FOR SUBMISSION OF COMMENTS/INPUTS/ OBJECTIONS IS FRIDAY, 16TH DECEMBER 2016. REGISTER BY EMAIL: FRONTDESK@RBS. COM.NA OR FAX 061-306059.

PUBLIC NOTICE FOR APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC)

EPLs Nos. EPLs Nos. 5117, 5196 and 5649, KARIBIB DISTRICT, ERONGO REGION

1. EPL 5117 Riana Getruida Scholtz, Granted 09/04/2014 and Expiry 08/04/2017, Commodities: Base and Rare Metals, Dimension Stones and Semi-Precious Stones, Size: 1891.1148 Ha, Farms Covered: Spes Bona, Etiro and Okawayo;

2. EPL 5196 Scarab Environmental and Geological Enterprises CC, Granted 09/04/2014 and Expiry 08/04/2017, Commodities: Base and Rare Metals, Precious Metals and Precious Stones, Size: 2664 Ha, Farms Covered: Spes Bona and Okawayo;

3. EPL 4649 Riana Getruida Scholtz, Granted 30/09/2014 and Expiry 29/09/2017, Commodities: Base and Rare Metals, Dimension Stones, Industrial Minerals and Precious Stones, Size: 2127.4656 Ha, Farms Covered: Karibib Townlands.

The above three (3) EPLs are currently pending ministerial approval for transfer to Aloe Investments number 49 Pty Ltd with company name to be changed Osino Holdings Namibia (Pty) Ltd. The proponent is required apply for Environmental Clearance Certificate (ECC) with respect to the proposed minerals prospecting programmes for each of the three (3) EPLs. The applications for ECCs shall be supported by a Scoping and Environmental Management Plan (EMP) Reports undertaken in accordance with the provisions of the Environmental Impact Assessment Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007). In fulfilment of the environmental requirements, the proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultants which is led by Dr. Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to undertake the Scoping and EMP and apply for ECCs for each EPL. All interested and affected parties are hereby invited to register and submit written comments / objections / inputs with respect to the proposed minerals prospecting in the EPLs Nos. 5117, 5196 and 5649.

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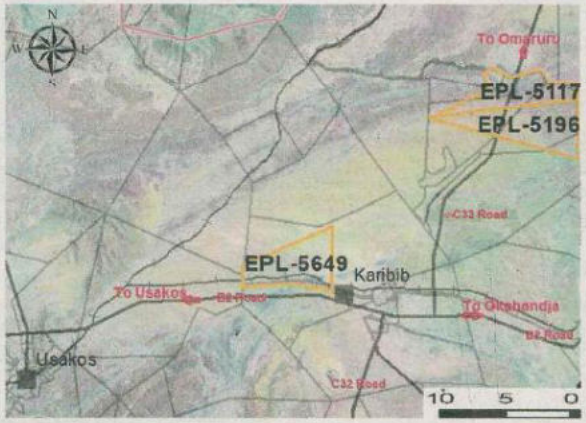

PUBLIC NOTICE FOR APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC)

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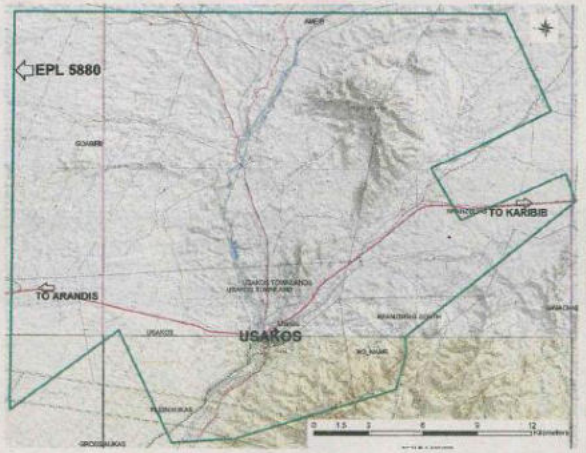

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For More Information Please Contact
Dr. Sindila Mwiya (PhD, PG Cert, MPhil, BEng (Hons), Pr Engi (EAP),
Tel: 061-306058; Fax: 061-306059; Cell: 081277-2546, Global Office at URL: www.rbs.com.na

Figure 4.10: Copy of the public notice that was published in the Republikein Newspaper dated Thursday, 24th November 2016.

PUBLIC NOTICE FOR APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC)

#Oab Energy Proposed 8MW EBAY Mine Wind Park, Tsau //Khaeb (Sperrgebiet) National Park, //Karas Region

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FOR MORE INFORMATION THE SCOPING, DRAFT EIA, DRAFT EMP AND OTHER SPECIALIST REPORTS ARE AVAILABLE AT THE FOLLOWING PLACES:

1. WINDHOEK: Risk-Based Solutions (RBS) CC Maerua Mall, Unit 158, 3rd Floor Block A, Cnr Jan Jonker Road & Centaurus Street; Ministry of Mines and Energy Library, 1 Aviation Road; National Library of Namibia, 1-7 Eugene Marais Street; Windhoek Library, 4 Lüderitz Street; Electricity Control Board (ECB), ECB, House 8 Bismarck Street;
2. LÜDERITZ: Lüderitz Town Council, 90 Bay Road, Namdeb Offices in Lüderitz 105 Bay Road and Ministry of Fisheries and Marine Resources, Bay Road, Lüderitz.
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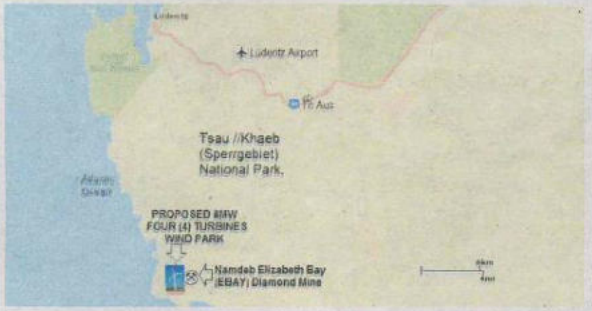

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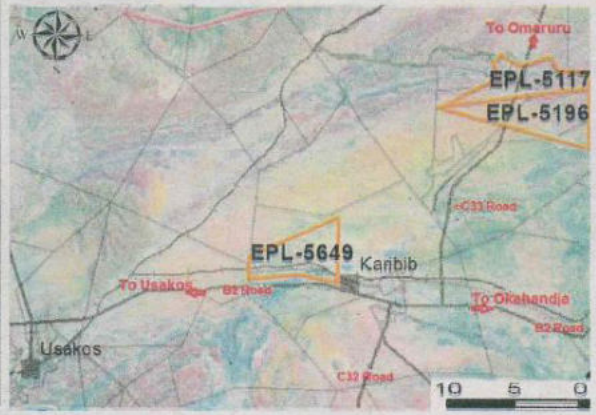

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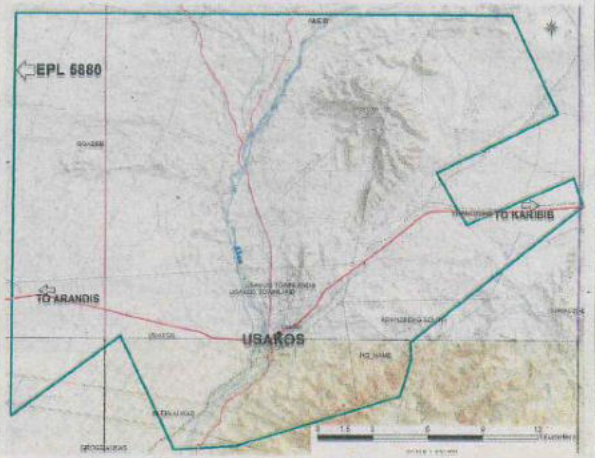

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For More Information Please Contact
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Tel: 061-306058; Fax: 061-306059; Cell: 081277-2546, Global Office at URL: www.rbs.com.na

Figure 4.11: Copy of the public notice that was published in the Republikein Newspaper dated Wednesday, 7th December 2016.

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. 5880 has been conducted in accordance with the provisions of the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007).

5.2 Alternatives and Ecosystem Assessments

The following alternatives have been considered:

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

(ii) **The No-Action Alternative** - A comparative assessment of the environmental impacts of the 'no-action' alternative (a future in which the proposed exploration activities do not take place) has been undertake. An assessment of the environmental impacts of a future, in which the proposed exploration and possible discovery of economic minerals resources does not take place, may be good for the receiving environment because there will be no negative environmental impacts due to the proposed minerals exploration or possible mining operation that may take place in the EPL area.

The environmental benefits will include:

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

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

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

Furthermore, it is important to understand what benefits might be lost if the proposed exploration activities do not take place. Key loses that may never be realised if the proposed project activities do not go-ahead include: Loss of potential added value to the unknown underground minerals resources that maybe found within the EPL No. 5880, socioeconomic

benefits derived from current and future exploration, direct and indirect contracts and employment opportunities, export earnings, foreign direct investments, license rental fees, royalties, and various other taxes payable to the Government.

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

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

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

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

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

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

5.3 Key Issues Considered in the Assessment Process

5.3.1 Sources of Impacts (Proposed Project Activities)

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

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

5.3.2 Summary of Receptors Likely to be Negative Impacted

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

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

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

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

5.4 Impact Assessment Methodology

5.4.1 Impact Definition

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

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

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

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

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

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

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

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

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

5.4.2 Knowledge-Based Impact Assessment Process

5.4.2.1 Characterisation of the Impact Assessment Inputs Variables

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

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

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

5.4.2.2 Climatic Data Sets/Components Inputs

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

- Temperature: Temperature had a direct influence on the fluids that may influence the operation of the site by supporting evapotranspiration. It also has an influence on the planning, operation and implementation of the various project activities.

- Rainfall: Rainfall is one of the data sets used in the water balance assessments with respect to potential fluid production and flash flood occurrences. The data sets had some influence on mobilisation pollutants that may be associated with the proposed project activities.

- Evapotranspiration: This combined effect of evaporation and transpiration is important in water balance assessments with direct influences on the implementation of the various project activities, and.

- Wind Direction and Speed: The direction and speed of the prevailing winds may be critical to the site operations and determination of the optimum operational requirements. The data had a direct influence on the site operations including dust and noise management.

5.4.2.3 Environmental Data Sets/Components Inputs

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

- Economic activities (Proposed minerals exploration) and coordination support available in the area or area.

- Types and amounts of waste likely to be generated.

- Likely contaminants from the activities.

- Ecological, habitats and ecosystems including fauna and flora.

- Community considerations such, land ownership, social, health and safety, and.

- Archaeological, cultural and political issues.

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

- Economic activities and logistic support: The types of economic activities and logistical support services and infrastructure for the proposed activities are a key source of impact component of the environmental data sets in the determination of the likely impacts on the receptors, and.

- The likely Types and amount of waste: Understanding the characteristics of the liquid and solid waste streams be handled is vital in the evaluation of the hazard exposure in terms of the overall risk assessment to the receptors.

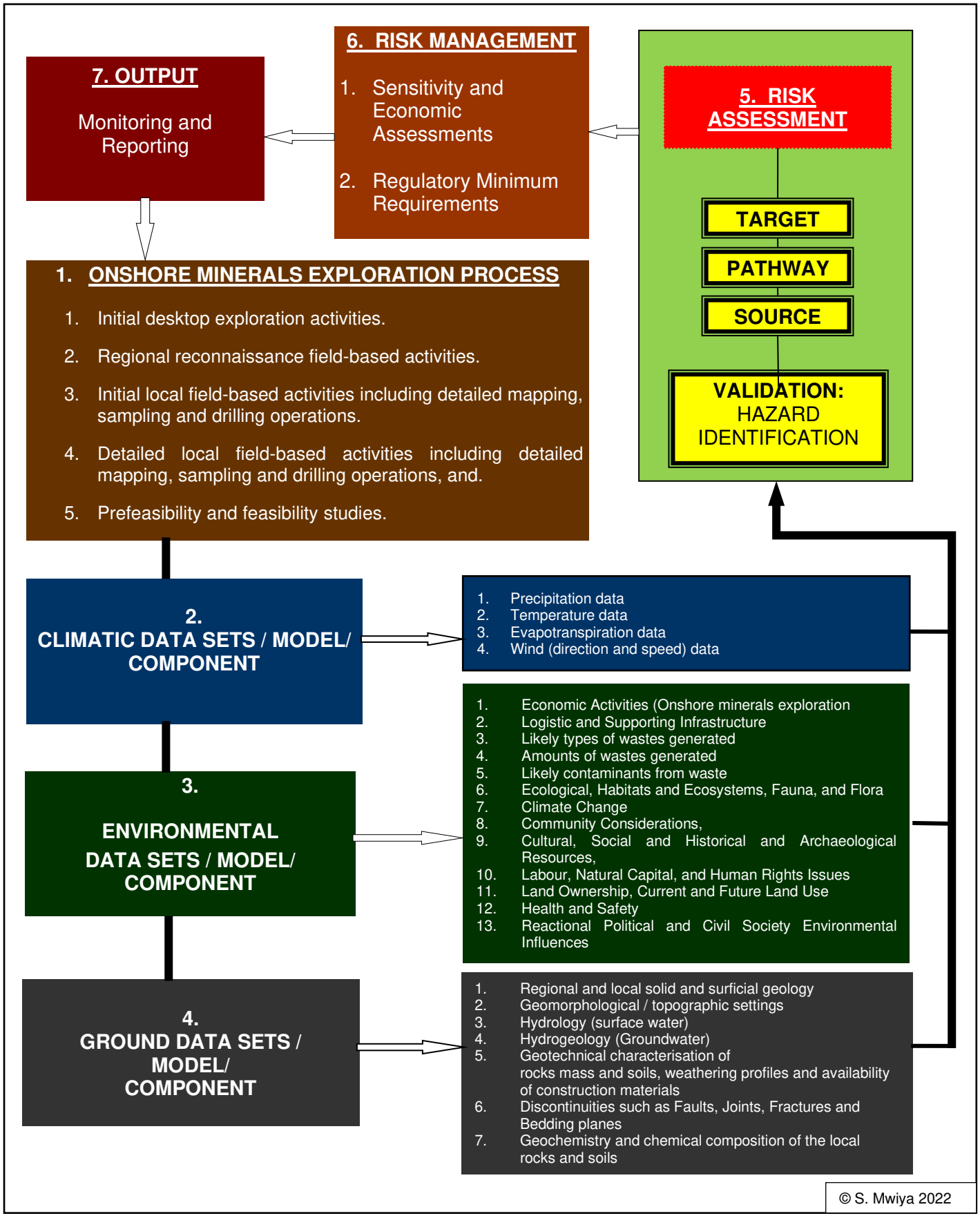

Figure 5.1: Detailed outline of the technical methodology based on a complete looped Knowledge-Based System Model Methodology (KBSMM) used in the impact assessment, risk assessment and determination of the monitoring and reporting strategy. The system model methodology has a built-in looping that allows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

- Likely contaminants: The state (solid, gas, liquid, or vapour) of any likely contaminants that may associated with the proposed phased onshore minerals exploration activities play a major role in the determination of the likely harm, mitigation, monitoring and reporting strategies.

- Ecological, habitats, ecosystems, fauna, flora, and local, regional or global Climate Change influences: At national, regional and local levels, there are a number of unique and protected habitats, ecosystems, fauna and flora and highly vital as they support other sectors of the national economy such as tourism, agriculture, food security and services. Understanding the likely level of sensitivity of the regional or local areas is highly important to the successful determination of the likely impacts and harm, development mitigation measures, monitoring and reporting strategy to be implemented for the proposed phased onshore minerals exploration process, and.

- Community considerations: Local community issues and acceptability of the proposed activities by the local community is of vital importance. Other key components of the community considerations include: Land ownership (State land / Communal or Private), land use, local social settings, labour, natural capital, human rights, public and workers health and safety, archaeological, cultural, political, and civil society influences.

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

5.4.2.4 Ground Data Sets/Components Inputs

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

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

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

The risk source/s refers to knowledge - based identified potential hazards that may be present and can cause harm to the exposed target/s / receptors (Fig. 5.3). The risk pathway refers to the route direct or indirect though which the risk source/s may be transferred and exposed to a target/s of concern.

The risk target/s or receptor/s refers to the destination (area point of exposure) at which the source/s may cause harm. The characterisation of source/s, pathway/s and target/s chain has been undertaken for climatic, environmental and ground model data components with respect to the proposed phased onshore minerals exploration process.

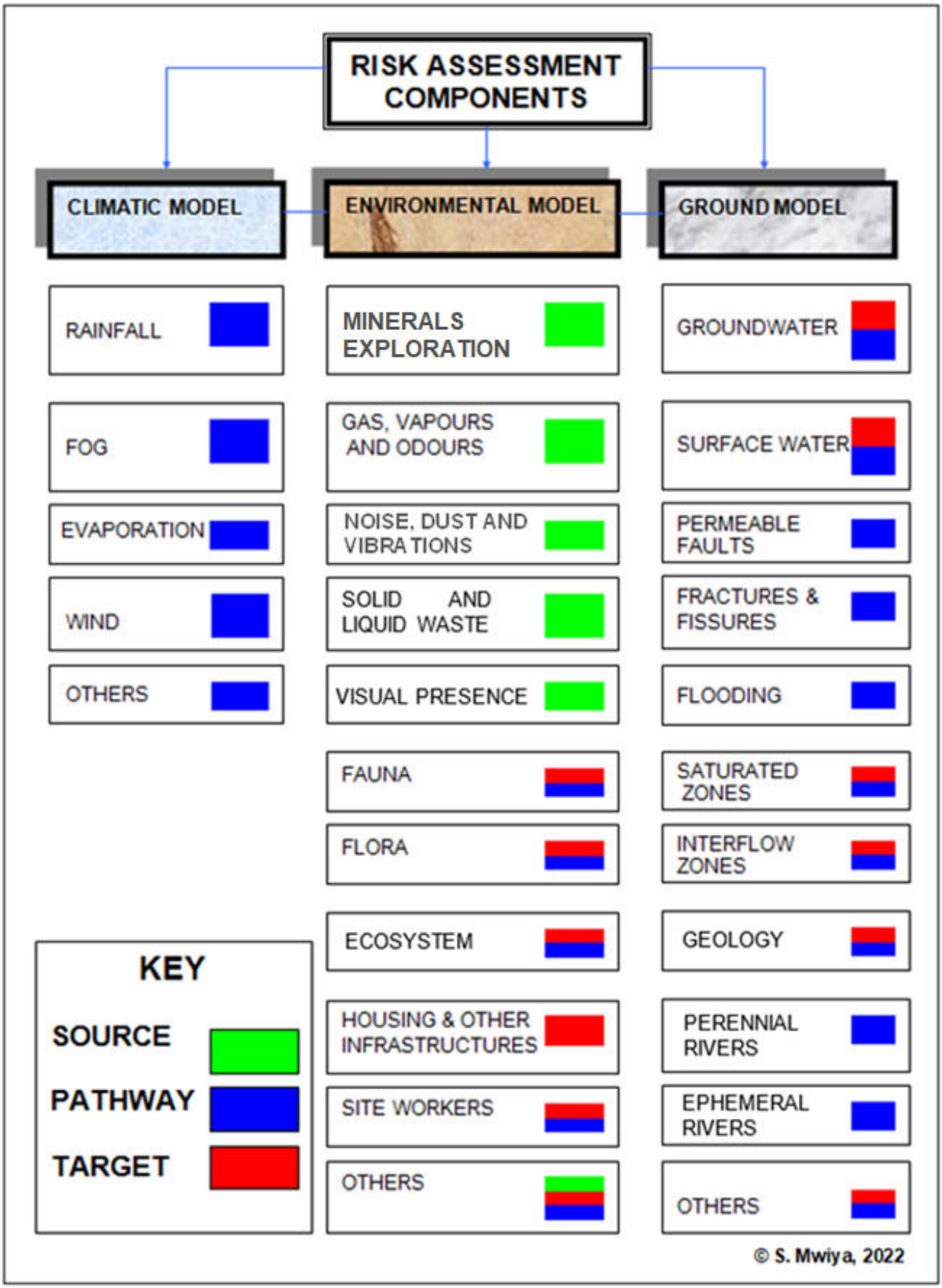

Figure 5.2: A Knowledge-Based System Model Methodology (KBSMM) characterised interactive risk assessment system output field-based and tested / validated Artificial Intelligent (AI) framework windows for onshore phased minerals exploration process implementation project lifecycle.

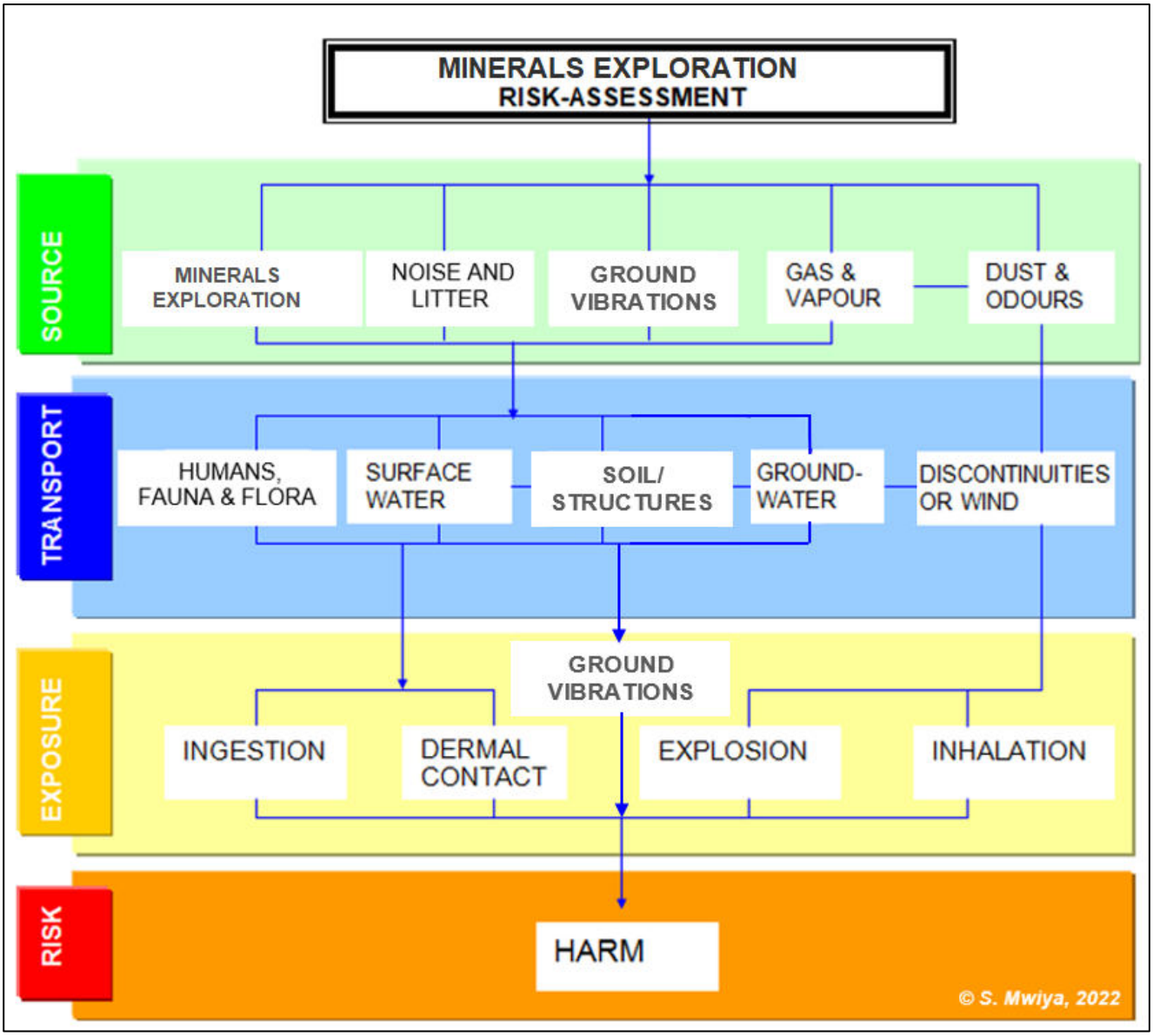

Figure 5.3: A Knowledge-Based System Model Methodology (KBSMM) characterised system output research-based and tested / validated Artificial Intelligent (AI) framework risk consequences (harm) pathways to the receiving target/receptors windows for onshore phased minerals exploration process project implementation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

5.4.2.6 Individual Components Impact Assessment Criteria

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

5.4.3 Overall Component and Significant Impact Assessment

5.4.3.1 Overall Component Impact Assessment

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

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

The characterised components of the receiving environment encompassed the following:

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

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

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

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

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

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

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

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

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

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

Table 5.4: Scored geographical extent of the induced change.

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

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

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

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

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

5.4.3.2 Overall Significant Impact Assessment

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

5.4.4 Proposed Project Activities Summary of Impacts Results

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

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

Table 5.6: Results of the sensitivity assessment of the receptors (Physical, Socioeconomic and Biological environments) with respect to the proposed exploration / prospecting activities.

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.

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	3	3	4
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	4
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	4
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	4
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	4

Table 5.6: Cont.

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
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.																	
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	3	3	4
	(ii)	Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4
	(iii)	Ground geophysical survey (Subject to the positive outcomes of i and ii above)	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4
	(iv)	Possible Trenching (Subject to the outcomes of i - iii above)	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4
	(v)	Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4
	(vi)	Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4
4. Detailed Local Field-Based Activities	(i)	Access preparation and related logistics to support activities	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
	(ii)	Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4
	(iii)	Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4
	(iv)	Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
5. Prefeasibility and Feasibility Studies	(i)	Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
	(ii)	Detailed drilling and bulk sampling and testing for ore reserve calculations	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
	(iii)	Geotechnical studies for mine design	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
	(iv)	Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	4
	(v)	EIA and EMP to support the ECC for mining operations	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	4
	(vi)	Preparation of feasibility report and application for Mining License	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	4

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

RECEPTOR SENSITIVITY		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
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	P
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P

Table 5.7: *Cont.*

DURATION OF IMPACT		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL, AND ARCHAEOLOGICAL ENVIRONMENT				
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	P
	(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(iv) Possible Trenching (Subject to the outcomes of i - iii above)	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
4. Detailed Local Field-Based Activities	(i) Access preparation and related logistics to support activities	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
5. Prefeasibility and Feasibility Studies	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(iii) Geotechnical studies for mine design	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(v) EIA and EMP to support the ECC for mining operations	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P
	(vi) Preparation of feasibility report and application for Mining License	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	P

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

GEOGRAPHICAL EXTENT OF IMPACT		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
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		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	N
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	N
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	N
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	N
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	N

Table 5.8: *Conti.*

GEOGRAPHICAL EXTENT OF IMPACT		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
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	O	R	N
	(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	O	R	N
	(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	O	R	N
	(iv) Possible Trenching (Subject to the outcomes of i - iii above)	L	L	L	L	L	L	L	L	L	L	L	L	L	O	R	N
	(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	O	R	N
	(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	O	R	N
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	O	R	N
	(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	O	R	N
	(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	O	R	N
	(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	O	R	N
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	O	R	N
	(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	O	R	N
	(iii) Geotechnical studies for mine design	L	L	L	L	L	L	L	L	L	L	L	L	L	O	R	N
	(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	O	R	N
	(v) EIA and EMP to support the ECC for mining operations	L	L	L	L	L	L	L	L	L	L	L	L	L	O	R	N
	(vi) Preparation of feasibility report and application for Mining License	L	L	L	L	L	L	L	L	L	L	L	L	L	O	R	N

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: 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
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)																	
1. Initial Desktop Exploration Activities	(i)	General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E
	(ii)	Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E
	(iii)	Purchase and analysis of existing Government aerial hyperspectral	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E
	(iv)	Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E
2. Regional Reconnaissance Field-Based Activities	(i)	Regional geological, geochemical, topographical and remote sensing mapping and data analysis	A	A	A	A	A	A	A	A	A	A	A	A	A	D	D	E
	(ii)	Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	A	A	A	A	A	A	A	A	A	A	A	A	A	D	D	E
	(iii)	Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	A	A	A	A	A	A	A	A	A	A	A	A	A	D	D	E
	(iv)	Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	A	A	A	A	A	A	A	A	A	A	A	A	A	D	D	E
	(v)	Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	A	A	A	A	A	A	A	A	A	A	A	A	A	D	D	E

Table 5.9: *Cont.*

IMPACT PROBABILITY OCCURRENCE			PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
			Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
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	D	D	E
		(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	D	D	E
		(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	D	D	E
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	B	B	B	B	B	B	B	B	B	B	B	B	B	D	D	E
		(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	D	D	E
		(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	D	D	E
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	D	D	E
		(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	D	D	E
		(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	D	D	E
		(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	D	D	E
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	D	D	E
		(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	D	D	E
		(iii) Geotechnical studies for mine design	C	C	C	C	C	C	C	C	C	C	C	C	C	D	D	E
		(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	D	D	E
		(v) EIA and EMP to support the ECC for mining operations	A	A	A	A	A	A	A	A	A	A	A	A	A	D	D	E
		(vi) Preparation of feasibility report and application for Mining License	A	A	A	A	A	A	A	A	A	A	A	A	A	D	D	E

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 5.10.

5.5.2 Significance Criteria

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

Table 5.10: Scored impact significance criteria.

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

5.5.3 Assessment Likely Significant Impacts

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

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

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

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

SIGNIFICANT IMPACT			PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
IMPACT SEVERITY (Magnitude, Duration, Extent, Probability)	RECEPTOR CHARACTERISTICS (SENSITIVITY)		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
Very High (5)	Major [5/5]	Major [4/5[	Moderate [3/5]	Moderate [2 /5]	Minor 1/5													
High (4)	Major [5/4]	Major [4/4]	Moderate [3/4]	Moderate [2/4]	Minor[1/4]													
Medium (3)	Major [5/3]	Moderate[4/3]	Moderate[3/3]	Minor[2/3]	None[1/3]													
Low (2)	Moderate [5/2]	Moderate[4/2]	Minor[3/2]	None[2/2]	None[1/2]													
Negligible (1)	Minor [5/1]	Minor [4/1]	None [3/1]	None [2/1]	None [1/1]													
1. Initial Desktop Exploration Activities	(i)	General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	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	4/4
	(ii)	Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	4/4
	(iii)	Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	4/4
	(iv)	Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	4/4
	(v)	Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	4/4

Table 5.11: *Cont.*

SENSITIVITY			PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
IMPACT SEVERITY (Magnitude, Duration, Extent, Probability)	RECEPTOR CHARACTERISTICS (SENSITIVITY)		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
Very High (5)	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	4/4
	(ii)	Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	4/4
	(iii)	Ground geophysical survey (Subject to the positive outcomes of i and ii above)	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	4/4
	(iv)	Possible Trenching (Subject to the outcomes of i - iii above)	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	4/4
	(v)	Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	4/4
	(vi)	Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	4/4
4. Detailed Local Field-Based Activities	(i)	Access preparation and related logistics to support activities	2\2	2\2	2\2	2\2	2\2	2\2	3/2	3/2	3/2	3/2	3/2	2\2	2\2	3\3	3\3	4/4
	(ii)	Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	2\2	2\2	2\2	2\2	2\2	2\2	3/2	3/2	3/2	3/2	3/2	2\2	2\2	3\3	3\3	4/4
	(iii)	Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	3\3	3\3	4/4
	(iv)	Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	2\2	2\2	2\2	2\2	2\2	2\2	3/2	3/2	3/2	3/2	3/2	2\2	2\2	3\3	3\3	4/4
5. Prefeasibility and Feasibility Studies	(i)	Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	3\3	3\3	4/4
	(ii)	Detailed drilling and bulk sampling and testing for ore reserve calculations	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3\3	3\3	4/4
	(iii)	Geotechnical studies for mine design	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	3\3	3\3	4/4
	(iv)	Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3\3	3\3	4/4
	(v)	EIA and EMP to support the ECC for mining operations	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	3\3	3\3	4/4
	(vi)	Preparation of feasibility report and application for Mining License	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	3\3	3\3	4/4

5.6 Assessment of Overall Impacts

5.6.1 Summary of the Results of the Impact Assessment

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

(i) Initial desktop exploration activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[1/1]** (Table 5.11). Except for the socioeconomic components which carry a **(+)**, the rest of the likely impacts are negative **(-)**.

(ii) Regional reconnaissance field-based activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[1/1]**. Some field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations. Overall significant impacts will be negligible **[1/1]** (Table 5.11). Except for the socioeconomic components which carry a **(+)**, all the other likely impacts are negative **(-)**.

(iii) Initial local field-based activities: Initial field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations**.** Overall significant impacts will be negligible **[2/2]**. All desktop related activities and laboratory assessments will have negligible impacts with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[2/2]** (Table 5.11). Except for the socioeconomic components which carry a **(+)**, all the other likely impacts are negative **(-)**. Cultural, biological, and archaeological resources will have high significant negative impacts **[4/4]**.

(iv) Detailed local field-based activities: Overall likely negative impact on the receiving environment will be high and localised impacts without mitigations and localised low impacts with mitigations. Overall significant impacts will be medium **[2/2]** without mitigations and low with mitigations (Table 5.11). Except for the socioeconomic components which carry a **(+)**, all the other likely impacts are negative **(-)**. Tourism and recreation will have medium significant negative impacts **[3\3]**, and cultural, biological, and archaeological resources will have high significant negative impacts **[4/4]**. and.

(v) Prefeasibility and feasibility studies to be implemented on a site-specific area if the local field-based studies prove positive: Overall likely negative impact on the receiving environment will be high and localised impacts without mitigations and localised medium impacts with mitigations. Overall significant impacts will be medium **[3/3]** without mitigations and low with mitigations for bulk sampling, test mining and field logistics (Table 5.11). Except for the socioeconomic components which carry a **(+)**, all the other likely impacts are negative **(-)**. Tourism and recreation will have medium significant negative impacts **[3\3]**, and cultural, biological, and archaeological resources will have high significant negative impacts **[4/4]**.

6. THE EMP

6.1 Summary of the EMP Objectives

The Environmental Management Plan (EMP) provides a detailed plan of action required in the implementation of the mitigation measures for minimising and maximising the identified negative and positive impacts respectively.

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

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

6.2 Implementation of EMP

6.2.1 Roles and Responsibilities

Management of the environmental elements that may be affected by the different activities of the proposed / ongoing exploration is an important element of the proposed / ongoing exploration activities.

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

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

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

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

- ❖ Attend regular site meetings and inspections as may be required for the proposed / ongoing exploration programme.

6.2.3 Project Health, Safety and Environment (Project HSE)

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

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

6.2.4 Contractors and Subcontractors

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

- ❖ Comply with the relevant legislation and the EMP provision.
- ❖ Preparation and submission to the proponent through the Project HSE of the following Management Plans:
    - o Environmental Awareness Training and Inductions.
    - o Emergency Preparedness and Response.
    - o Waste Management, and.
    - o Health and Safety.
- ❖ Ensure adequate environmental awareness training for senior site personnel.
- ❖ Environmental awareness presentations (inductions) to be given to all site personnel prior to work commencement.

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

6.3 Specific Mitigation Measures

6.3.1 Hierarchy of Mitigation Measures Implementation

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

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

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

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

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

6.3.2 Specific Mitigation Measures Implementation

The Environmental Management Plan (EMP) provides a detailed plan of action required in the implementation of the mitigation measures for minimising and maximising the identified negative and positive impacts respectively.

The EMP also provides the management actions with roles and responsibilities requirements for implementation of environmental management strategies by the proponent through the Contractors and Subcontractors who will be undertaking the exploration activities.

The EMP gives commitments including financial and human resources provisions for effective management of the likely environmental liabilities during and after the implementation of the proposed / ongoing exploration programme.

Based on the findings of the assessment phase, Tables 6.1 – 6.18 provides the detailed specific mitigations measures to be implemented by the proponent with respect to the proposed / ongoing exploration programme activities and in particular for the field-based exploration activities.

The following is the summary of the key areas of the migration measures provided in Tables 6.1-6.18:

1. Project planning and implementation.
2. Implementation of the EMP.
3. Public and stakeholders relations.

4. Measures to enhance positive socioeconomic impacts.
5. Environmental awareness briefing and training.
6. Erection of supporting exploration infrastructure.
7. Use of existing access roads, tracks and general vehicle movements.
8. Mitigation measures for preventing flora destruction.
9. Mitigation measures for preventing faunal destruction.
10. Mitigation measures to be implemented with respect to the exploration camps and exploration sites.
11. Mitigation measures for surface and groundwater protection as well as general water usage.
12. Mitigation measures to minimise negative socioeconomic impacts.
13. Mitigation measures to minimise health and safety impacts.
14. Mitigation measures to minimise visual impacts.
15. Mitigation measures to minimise vibration, noise and air quality.
16. Mitigation measures for waste (solid and liquid) management.
17. Rehabilitation plan, and.
18. Environmental data collection.

Table 6.1: Project planning and implementation.

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

Table 6.2: Implementation of the EMP.

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

Table 6.3: Public and stakeholders relations.

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

Table 6.4: Measures to enhance positive socioeconomic impacts.

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

Table 6.5: Environmental awareness briefing and training.

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

Table 6.6: Erection of supporting exploration infrastructure.

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

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

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

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

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

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

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

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

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

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

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

Table 6.12: Mitigation measures to minimise negative socioeconomic impacts.

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

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

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

Table 6.14: Mitigation measures to minimise visual impacts.

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

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

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

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

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

Table 6.17: Rehabilitation plan.

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

Table 6.18: Environmental data collection.

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

7. REHABILITATION AND MONITORING

7.1 Rehabilitation Process

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

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

- Remove all machinery from the site and transport to a new site where it is to be used or stored or sell at an Auction.

- Remove all fences that have been constructed and either make the material available to the local persons/farmer, dispose at a suitable site or sell at an Auction.

- Remove the generators from the sites from site and either transport to a new site for storage or sell it to the farmer or an Auction.

- Seal all petrol, diesel, oil and grease containers and remove from the site to a storage facility or make it available to the farmer.

- Collect all scrap metal and dispose at a suitable site or sell at an Auction.

- Break up all concrete slabs and structures on site and transport the fragments to a suitable site for disposal.

- The concrete reservoirs can probably remain intact provided that the farmer wishes to utilise them at some stage - this will need to be negotiated.

- The future of the water pipeline can be negotiated with the farmer or a new owner/lender of the site, because if he chooses to use the pipeline it will not be necessary to remove it and rehabilitate the route, and.

- If the pipeline is to be removed, disassemble and transport the component parts to a storage site or sell at an Auction.

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

- Replace the subsoil layer by backfilling the soil on top of the overburden and contour cap the subsoil with a topsoil layer about 10cm deep, and.

- Cap the topsoil containing the seedbank with a layer of gravel by manually spreading the fragments across the surface using a rake.

❖ **Step 5: Rehabilitate the storm-water channel:**

- Remove the Hyson cells or gabions.

- Dispose of the plastic/wire and use the fill material to backfill the storm-water channel.

- Cap with a layer of topsoil to a depth of about 10cm, and.

- Cap the topsoil containing the seedbank with a gravel layer by manually spreading the fragments across the surface using a rake.

❖ **Step 6: Rehabilitate of disturbed grounds:**

- Compaction of the substrate will result from utilization of these areas or the pressure of overlying structures.

- Rip the surfaces to a depth of 40 cm to 50 cm using a multi-toothed ripper and tractor.

- Cover with a layer of topsoil to a depth of about 10 cm, and.

- Cap the topsoil containing the seedbank with a layer of gravel by manually spreading the fragments across the surface using a rake.

- **Step 7: Rehabilitate the roads:**
    - Compaction of the road will result from the continuous passage of heavy vehicles so it will be necessary to break up the road surface.
    - Rip the road surface to a depth of at least 50 cm using a multi-toothed ripper and tractor.
    - Disk the ripped surface to break up the clods.
    - Cover with a layer of topsoil to a depth of about 10 cm, and.
    - Cap the topsoil containing the seedbank with a gravel layer by manually spreading the fragments across the surface using a rake.

7.2 Monitoring of the Environmental Performance

7.2.1 Rehabilitation Evaluation and Performance Monitoring

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

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

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

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

7.2.2 Overall Environmental Performance Monitoring and Reporting

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

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

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

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

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

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

8. CONCLUSION AND RECOMMENDATION

8.1 Conclusions

Current proposed main mineral exploration field-based activities covering mapping, geochemical sampling and drilling of four (4) boreholes will have low localised impacts on the local receiving environment with low significant impacts. Mitigation measures must be implemented as detailed in Section 6 (EMP) of this report. The proponent (Osino Namibia Minerals Exploration (Pty) Ltd) must obtain permission of the land owners (surface rights holders) before exercising their subsurface rights in all the farms covered by the EPL 5880.

8.2 Recommendations

It's hereby recommended that the proposed exploration activities be issued with an Environmental Clearance Certificate with key conditions of adhering to the provisions of the EMP, Access Agreement as well as all other related regulations governing, mineral exploration, water resources management, health and safety and labour. The proponent (Osino Namibia Minerals Exploration (Pty) Ltd) must take all the necessary steps to implement all the recommendations of the EMP for the successful implementation and completion of the proposed exploration programme covering the EPL 5880. Recommended actions to be implemented by Osino Namibia Minerals Exploration (Pty) Ltd as part of the management of the likely impacts through implementations of the EMP are:

(i) The proponent must obtain permission from the land owners to enter the EPL area in order to undertake field-based exploration / prospecting activities.

(ii) The proponent must implement precautionary measures / approach to environmental management. Once a viable and potentially economic resources have been identified, the proponent must develop and implement a separate EIA and EMP inclusive of the specialist studies such as fauna and flora to be undertaken by specialist consultants as part of the feasibility study stage.

(iii) Before detailed site-specific exploration activities such as extensive drilling operations and access routes are selected, the project environmental officer should consider the flora, fauna and archaeological sensitivity of the area and commission a field survey in advance of any site development as may be required based on the assessment undertaken.

(iv) Contract an Environmental Control Officer/ Consultant / suitable in-house resources person to lead and further develop, implement and promote environmental culture through awareness raising of the workforce, contractors and sub-contractors in the field during the whole duration of the proposed exploration period.

(v) Provide with other support, human and financial resources, for the implementation of the proposed mitigations and effective environmental management during the planned exploration activities for the EPL 5880.

(vi) Develop a simplified environmental induction and awareness programme for all the workforce, contractors and sub-contractors.

(vii) Where contracted service providers are likely to cause environmental impacts, these will need to be identified and contract agreements need to be developed with costing provisions for environmental liabilities.

(viii) Implement internal and external monitoring of the actions and management strategies developed during the mineral exploration process. Final Environmental Monitoring report be prepared by the Environmental Coordinator / Consultant / Suitable in-house resource person and to be submitted to the regulators and to end the proposed mineral exploration, and.

(ix) Develop and implement a monitoring programme that will fit into the overall company's Environmental Management Systems (EMS) as well as for any future EIA for possible mining projects.

8.3 Summary Terms of Reference for Full EIA

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

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

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

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