

**ENVIRONMENTAL IMPACT ASSESSMENT  
FOR  
THE PROPOSED EXPLORATION FOR  
BASE AND RARE METALS, DIMENSION STONES,  
INDUSTRIAL MINERALS, AND PRECIOUS METALS ON EPL 8634  
IN KUNENE REGION**

JANUARY 2023



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**EXECUTIVE SUMMARY**

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Horn Metals (Pty) Ltd (here in after referred to the developer) is proposing to explore for Base and Rare Metals, Dimension Stones, Industrial Minerals, Nuclear Fuel, Non-Nuclear Fuel and Precious Metals on EPL 8634 in Outjo Area, Kunene Region. The EPL 8634 is located 15km west of Tschudi Copper Mine. The EPL 8634 is situated is located 75km from the Tschudi Copper Mine.. The total area is 65267.45 ha.

Horn Metals (Pty) Ltd was awarded an exploration license for Base and Rare Metals, Dimension Stones, Industrial Minerals, Nuclear Fuel, Non-Nuclear Fuel and Precious Metals by the Ministry of Mines and Energy on the 23<sup>rd</sup> of March 2022. The developer intends to do extensive exploration within EPL 8634 for all commodities on its EPL licence (Ref: 14/2/4/1/8634). The Environmental Management Act No.7 of 2007 stipulates that abstraction of groundwater be subjected to Environmental Impact Assessments (EIA). Matrix Consulting Services, an independent consultant, has been appointed by Horn Metals (Pty) Ltd to undertake an Environmental Impact Assessment on the proposed exploration activities on EPL 8634.

All known environmental and social risks can be minimised and managed through implementing preventative measures and sound management systems. It is recommended that environmental performance of Horn Metals (Pty) Ltd (including drilling contractors) be monitored regularly to ensure compliance and that corrective measures be taken if necessary. It is also recommended that this information be made available to the surrounding communities on a regular basis.

In general, the exploration phase would pose limited environmental risks, provided the EMP for the activity is used properly during planning and drilling phase. The Environmental Management Plan should be used as an on-site tool during all phases of the project. Parties responsible for non-conformances of the EMP will be held responsible for any rehabilitation that may need to be undertaken.

Should the exploration activities be modified or extended to a different area, it is recommended that a different EIA be done for the probable new location. Please note that clearances for EIA/EMP are only valid for 3 years. It is the responsibility of the proponent to initiate the update of the existing EIA.



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## List of Abbreviations

<b>CAN</b>	Central Areas of Namibia
<b>EIA</b>	Environmental Impact Assessment
<b>EMP</b>	Environmental Management Plan
<b>EMA</b>	Environmental Management Act
<b>EMS</b>	Environmental Management System
<b>ESA</b>	Environmental Scoping Assessment
<b>I&amp;Aps</b>	Interested and Affected Parties
<b>MAR</b>	Managed Aquifer Recharge
<b>PPPPs</b>	Projects, Plans, Programmes and Policies



## **PROJECT DETAILS**

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### **TEAM MEMBERS**

<b>NAME</b>	<b>POSITION</b>	<b>COMPANY</b>
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**REPORT STATUS:** **FINAL**

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## **1. BACKGROUND AND INTRODUCTION**

Horn Metals (Pty) Ltd (here in after referred to the developer) is proposing to explore for Base and Rare Metals, Dimension Stones, Industrial Minerals, Nuclear Fuel, Non-Nuclear Fuel and Precious Metals on EPL 8634 in Outjo Area, Kunene Region. The EPL 8634 is located 15km west of Tschudi Copper Mine. The EPL 8634 is situated is located 75km from the Tschudi Copper Mine.. The total area is 65267.45 ha

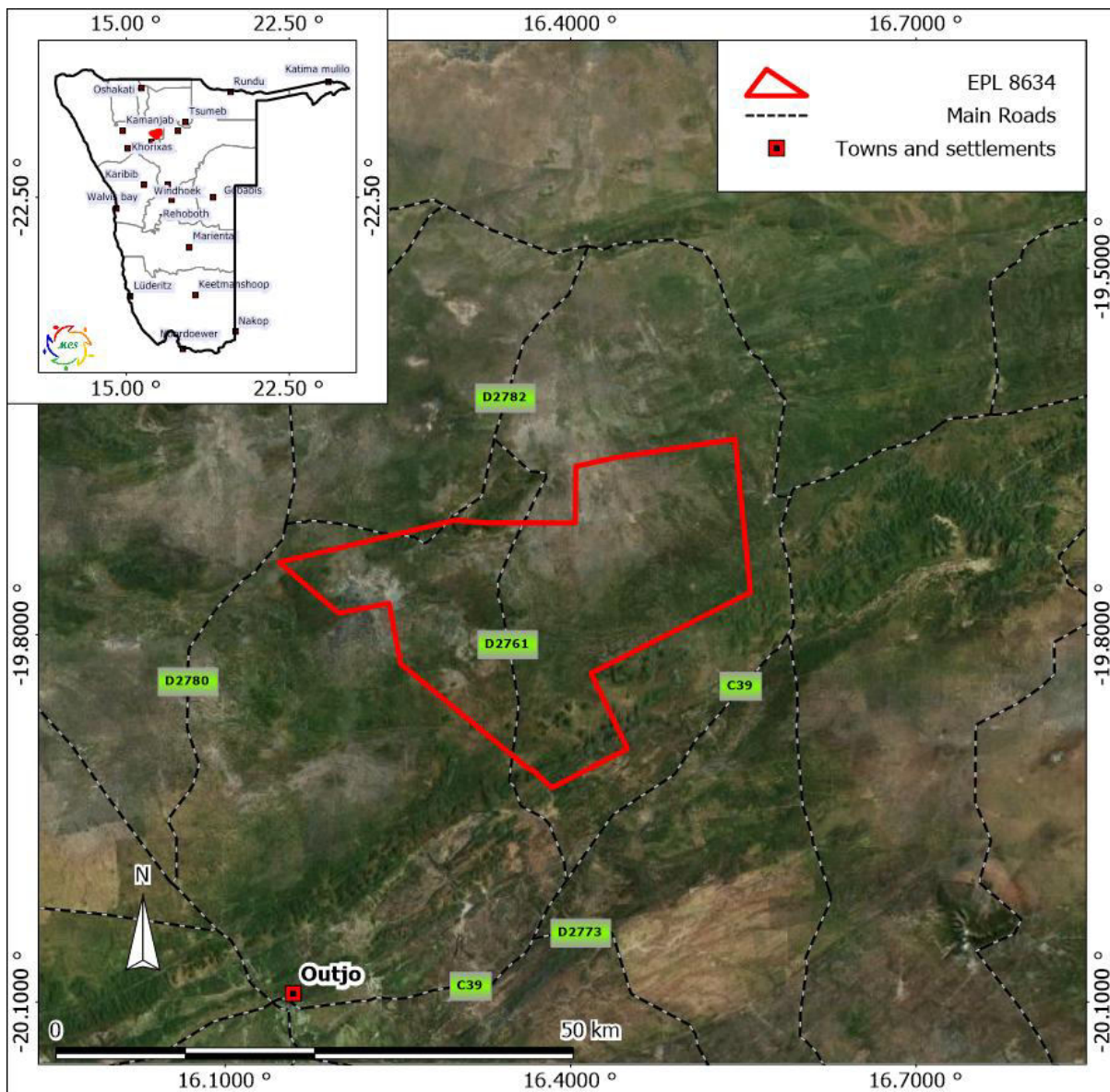
Horn Metals (Pty) Ltd was awarded an exploration license for Base and Rare Metals, Industrial Minerals, Non-nuclear Fuel and Precious Metals by the Ministry of Mines and Energy on the 23<sup>rd</sup> of March 2022. The developer intends to do extensive exploration within EPL 8634 for all commodities on its EPL licence (Ref: 14/2/4/1/8634).

Prospecting, quarrying, mining, mineral extraction or mineral beneficiation activities are a 'listed activities' as per the List of Activities requiring Environmental Clearance (Government Notice 1 of April 2008) and accordingly requires an Environmental Impact Assessment (EIA) to be conducted. Matrix Consulting Services, an independent consultant, has been appointed by Horn Metals (Pty) Ltd to undertake an Environmental Impact Assessment on the proposed exploration activities to be undertaken on EPL 8634.

An assessment was undertaken to determine the potential impact of the development on the environment and to determine all safety, health and social impacts associated with the proposed development activities. The project location is indicated on the map.

The environmental assessment will be conducted as per Namibia's Environmental Assessment Policy and the Environmental Management Act No.7 of 2007 and its regulations of 2012.





**Figure 1. Proposed location map for EPL 8634**

This project was registered with the Ministry of Environment and Tourism (MET), as per Environmental Management Act No 7 of 2007 requirements

## 2. TERMS OF REFERENCE

Horn Metals (Pty) Ltd has commissioned an Environmental Impact Assessment (EIA) for the proposed exploration activities on EPL 8634. The proposed exploration activities will enable the proponent to determine the economical potential of present mineral commodities within EPL 8634. The exploration activities include geological, geochemical and geophysical studies that will include geological mapping, induced polarisation, ground magnetic, soil samples and rock chip samples.

Matrix Consulting Services was appointed to undertake the Environmental Impact Assessment and formulate a construction and operational environmental management plan (EMP) of the proposed exploration drilling phase. This study will enable decision makers to make an informed decision regarding the development and make sure it does not have significant impacts and that they are mitigated. The environmental impact assessment was conducted to comply with the Environmental Assessment Policy (1995) and the Environmental Management Act (2007).

## 3. PROJECT INFORMATION

### *3.1 Project Rationale*

Exploration for minerals is very common in Namibia. Although this activity is likely to have manageable environmental impacts, and should the exploration activity produce good results to quantify a viable mineral deposit, the mining and processing of this resource will have significant positive economic benefits to Namibia as it will provide an income source for both local and regional use.

If the exploration activities yields good results , this could easily be an energy source, base or precious metal source for the domestic and industrial sector.

Due to the ever-increasing demand of precious metals, base metals and precious metals in the world, this development could yield positive outcomes that could address such a demand, and ultimately contributing to Namibia's economy.

### **Other Potential spin-offs from the EPL 8634 exploration:**

- ❖ Contribution to economic development in the region (e.g. supply of goods and services to the exploration team etc.).
- ❖ Expansion of trade and industrial activity in the region.
- ❖ Contributing to concise understanding of geology in Namibia
- ❖ Creation of job opportunities, training and skills development during exploration phase. It is estimated that the new jobs will improve the livelihoods of the workers and their families. Given that the high





unemployment rate of in the 3 regions, this in itself is regarded as a significant benefit to the socio-economic situation in the region .

- ❖ Increase in economic opportunities in the area.
- ❖ General enhancement of the quality of life around the EPL area, should the project be economically viable.

#### **4. EXPLORATION DRILLING ACTIVITIES**

##### **4.1 Current Land-use of EPL 8634 area.**

The proposed sites for the exploration drilling are in the commercial farms. About 40% of the sites could be regarded natural and maybe not be previously disturbed, otherwise a large area of the proposed sites is previously disturbed, with visible invader plants on some parts of the EPL and signs of previous disturbance of the area, for farming activities. The major disturbances on site were the existing foot tracks, logging, exploration trenches and access roads.



**Current state of the EPL (Farmlands)**

## 4.2 Proposed Drilling and Sampling

This phase will be split up in the following steps:

- **Orientation Surveys**

- a) Taking a physical samples in old trenches or by digging sample pits and noting the soil type at sample pit bottom.
- b) Splitting samples into several sieve fractions, package and correctly label sieve fraction samples.
- c) Noting observations pertaining to sample spot on sample sheets (soil type, visible geology, nearby sources of possible contamination, etc, etc).
- d) Orientation Survey team will take note (possibly GPS mapping) of the access roads and camp gates.

- **Geological Sampling**

Drilling for mineral exploration will be done by rotary diamond drilling method and Reverse Circulation (RC) thereafter, and the time required to drill this holes is dependent on depth, tests and samples that are required for this exercise.

The drill rig would either be self contained, truck-mounted unit that will be accompanied by a compressor and a generator. Approximately 10 people will be needed for the drilling activities. Trucks will be needed for transporting of equipment to site for the inspection and logging of the cores. The footprint of disturbance for an exploration rig is approximately 20m<sup>2</sup> at each hole. The site will be temporarily fenced off to prevent entry by people and animals and relevant signs will be erected.

The sampling process will comprise the recovery of core from the rotary diamond drill. The cores will be raised to the surface and sample sections will be immediately inserted into sample trays.

The trays containing the core samples will be sent to the laboratory for testing and analysis. The laboratory may be an on-site caravan or a laboratory in a nearby town or country.

Borehole identification tags will be placed on the boreholes and the borehole will be closed, depending on the likely of it being re-used again. If the hole is not be used again, it will be sealed with cement or bentonite.

Access tracks will be developed as part of the exploration project. The disturbance or work activities will be confined to the working zones of 30m radius from the boreholes or trenches.



- **Housing**

Driller's accommodation will be located at a camp site close to the drilling site. Tented or caravan accommodation will be provided to the drillers. A temporary site office will be set up at the exploration site.

- **Access road**

The drilling site will be accessed using the district road D2761 & C39 road, and existing tracks within the farms. It may however, be necessary to create additional access tracks to the sites.

- **Waste Management**

All waste generated at the drilling site will be collected in plastic or steel drums and removed from site and disposed at a suitable waste disposal site. Hazardous waste will be collected and stored separately, and disposed of at an appropriate facility. Chemical toilets will be provided for the drilling crew and the sewage disposed of at the nearest waste disposal site or sewage pond.

- **Site Rehabilitation**

After the drilling is complete, if the borehole has production potential it will be capped, and it will be sealed and closed if it does not have potential. The site will be cleared of all chemical and hydrocarbon spills. All materials brought to site will be removed, and those that cannot be used again, will be disposed off at suitable waste disposal site. The sludge pond created by the drilling operations will be pumped out and the mud disposed of at the nearest waste disposal facility.

- **Water use**

Water required for exploration drilling, as well as potable water will be obtained locally, with the agreement of relevant authorities and landowners. The water requirements are however dependent on the site specific conditions. The water used in drilling forms a sludge which will be collected in a sludge pond for later disposal at a suitable waste disposal facility.



## 5. ENVIRONMENTAL STUDY REQUIREMENTS

According to the Environmental Management Act no. 7 of 2007 the proponent requires an environmental clearance certificate from the Ministry of Environment and Tourism (Department of Environmental Affairs) to undertake mineral exploration activities, in EPL 8634. Prospecting, quarrying, mining, mineral extraction or mineral beneficiation activities are '*listed activities*' as per the *List of Activities requiring Environmental Clearance* (Government Notice 29 of 6 February 2012) and accordingly requires an Environmental Impact Assessment (EIA) to be conducted.

The environmental clearance certificate means that the Ministry of Environment and Tourism is satisfied that the activity in question will not have an unduly negative impact on the environment. It may set conditions for the activity to prevent or to minimise harmful impacts on the environment.

## 6. DESCRIPTION OF ALTERNATIVES

### *6.1 No-Go Alternative*

The no-development alternative is the option of not going ahead with the exploration activities on EPL 8634. The no-go alternative will keep the sites in their current state. This alternative is undesirable in terms of the current unemployment rate in Namibia. Should the proposed exploration drilling activity not take place, the region could be deprived of developing a income generating source from possible extraction of minerals. The proposed activity could yield positive results that could provide an alternative source of employment in that part of the country. The No-go option will not be a viable alternative at this stage.

### *6.2 Site Alternative*

The site is located in commercial farms. The area holds ecological and conservation values, but the possibility of minerals resources extraction and beneficiation in the EPL is also present. It is thus difficult to choose between keeping the pristine area and exploring for minerals in it, with the possibility of mining. In this case, the best option chosen is to do exploration drilling with strict consideration of environmental aspects. Mitigation measures on impacts likely to be caused by the activity are incorporated in the planning and execution of the activity. The exploration drilling will then have minimal impact on the environment. The environmental footprint is expected to be minimal.



## **7. SCOPE OF THE EIA**

The scope of the EIA aims at identifying and evaluating potential environmental impacts emanating from the proposed exploration activities. Relevant data have been compiled by making use of secondary sources and from project site visits. Potential environmental impacts and associated social impacts are identified and addressed in this report.

The environmental impact assessment report aims to address the following:

- a) Identification of potential positive and negative environmental impacts.
- b) Provide sufficient information to determine if the proposed project will result in significant adverse impacts.
- c) Identification of “hotspots” which should be avoided where possible due to the significance of impacts.
- d) Evaluation of the nature and extent of potential environmental impacts.
- e) Identify a range of management actions which could mitigate the potential adverse impacts to required levels.
- f) Provide sufficient information to the Ministry of Environment to make an informed decision regarding the proposed project.
- g) Present and incorporate comments made by stakeholders.

## **8. METHODOLOGY**

The following methods were used to investigate the potential impacts on the social and natural environment that could arise from mineral exploration activities in EPL 8634:

- a) Information about the site and its surroundings was obtained from existing secondary information and site visits.
- b) Interested and affected Parties (I&APs) were consulted and their views, comments and opinions are presented in this report.



## 9. STATUTORY REQUIREMENTS

### 9.1 National Legislative Requirements

The EIA process is undertaken in terms of Namibia's Environmental Management Act no. 7 of 2007 and the Environmental Assessment Policy of 1995, which stipulates activities that may have significant impacts on the environment. Listed activities require the authorisation from the Ministry of Environment and Tourism (DEA). Section 32 of the Environmental Management Act requires that an application for an environmental clearance certificate be made for the listed activities. The following environmental legislations are relevant to this project:

#### ➤ **The Namibian Constitution**

The Namibian Constitution has a section on principles of state policy. These principles cannot be enforced by the courts in the same way as other sections of the Constitution. But they are intended to guide the Government in making laws which can be enforced.

The Constitution clearly indicates that the state shall actively promote and maintain the welfare of the people by adopting policies aimed at management of ecosystems, essential ecological processes and biological diversity of Namibia for the benefit of all Namibians, both present and future.

#### ➤ **Environmental Management Act No.7 of 2007**

This Act provides a list of projects requiring an Environmental Assessment. It aims to promote the sustainable management of the environment and the use of natural resources and to provide for a process of assessment and control of activities which may have significant effects on the environment; and to provide for incidental matters.

The Act defines the term "*environment*" as an interconnected system of natural and human-made elements such as land, water and air; all living organisms and matter arising from nature, cultural, historical, artistic, economic and social heritage and values.

The Environmental Management Act has three main purposes:

- (a) to make sure that people consider the impact of activities on the environment carefully and in good time.
- (b) to make sure that all interested or affected people have a chance to participate in environmental assessments
- (c) to make sure that the findings of environmental assessments are considered before any decisions are made about activities which might affect the environment



The rezoning of land from open space to any other land use is a *'listed activity'* as per the *List of Activities requiring Environmental Clearance* (Government Notice 29 of 6 February 2012) and accordingly requires an Environmental Impact Assessment (EIA) to be conducted.

*Line Ministry: Ministry of Environment and Tourism*

➤ ***Atmosphere Pollution Prevention Ordinance (1976)***

This Ordinance generally provides for the prevention of the pollution of the atmosphere. Part IV of this ordinance deals with dust control. The Ordinance is clear in requiring that any person carrying out an industrial process which is liable to cause a nuisance to persons residing in the vicinity or to cause dust pollution to the atmosphere, shall take the prescribed steps or, where no steps have been prescribed, to adopt the best practicable means for preventing such dust from becoming dispersed and causing a nuisance.

*Line Ministry: Ministry of Environment and Tourism*

➤ ***Water Resources Management Act of Namibia (2004)***

This act repealed the existing South African Water Act No.54 of 1956 which was used by Namibia. This Act ensures that Namibia's water resources are managed, developed, protected, conserved and used in ways which are consistent with fundamental principles depicted in section 3 of this Act. Part IX regulates the control and protection of groundwater resources. Part XI, titled Water Pollution Control, regulates discharge of effluent by permit. Thus developers are required to efficiently plan for sewage disposal.

*Line Ministry: Ministry of Agriculture, Water Affairs and Forestry*

➤ ***Water Act No.54 of 1956***

This Act provides for Constitutional demands including pollution prevention, ecological and resource conservation and sustainable utilisation. In terms of this Act, all water resources are the property of the State and the EIA process is used as a fundamental management tool.

A water resource includes a watercourse, surface water, estuary or aquifer, and, where relevant, its bed and banks. A watercourse means a river or spring; a natural channel in which water flows regularly or intermittently; a wetland lake or dam, into which or from which water flows; and any collection of water that the Minister may declare to be a watercourse. Permits are required in terms of the Act for the undertaking of the following activities relevant to the proposed project:



- ✓ Discharge of waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit in terms of Section 21 (f); and
- ✓ Disposal of waste in a manner that may detrimentally impact on a water resource in terms of Section 21 (g).

*Line Ministry: Ministry of Agriculture, Water Affairs and Forestry*

➤ ***The Draft Wetland Policy (1993)***

Requires that any wetlands and its associated hydrological functions form a part, to be managed in such a way that their biodiversity, vital ecological functions and life support systems are protected for the benefit of present and future generations.

*Line Ministry: Ministry of Environment and Tourism*

➤ ***Soil Conservation Act (No.76 of 1969).***

The Act advocates for the prevention and combating of soil erosion, conservation, improvement and manner of use of soil and vegetation, and protection of water resources.

➤ ***Draft Pollution Control and Waste Management Bill***

The proposed exploration drilling in EPL 8634, only applies to Parts 2 and 7 of the Bill.

Part 2 stipulates that no person shall discharge or cause to be discharged any pollutant to the air from a process except under and in accordance with the provisions of an air pollution licence issued under section 23. It further provides for procedures to be followed in licence application, fees to be paid and required terms of conditions for air pollution licences.

Part 7 states that any person who sells, stores, transports or uses any hazardous substances or products containing hazardous substances shall notify the competent authority, in accordance with sub-section (2), of the presence and quantity of those substances.

➤ ***National Monuments Act of Namibia (No. 28 of 1969) as Amended until 1979***

“No person shall destroy, damage, excavate, alter, remove from its original site or export from Namibia:

a) any meteorite or fossil; or

b) any drawing or painting on stone or a petroglyph known or commonly believed to have been executed by any people who inhabited or visited Namibia before the year 1900 AD; or





- c) any implement, ornament or structure known or commonly believed to have been used as a mace, used or erected by people referred to in paragraph (b); or
- d) the anthropological or archaeological contents of graves, caves, rock shelters, middens, shell mounds or other sites used by such people; or
- e) any other archaeological or palaeontological finds, material or object; except under the authority of and in accordance with a permit issued under this section.

➤ ***Forestry Act (No.12 of 2001)***

This Act makes provision for the protection various plant species. Harvesting permits are required from the Directorate of Forestry to clear certain protected vegetation species from the site.

*Line Ministry: Ministry of Agriculture, Water Affairs and Forestry*

➤ ***Hazardous Substances Ordinance No. 14 of 1974***

The Ordinance applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export and is administered by the Minister of Health and Social Welfare. Its primary purpose is to prevent hazardous substances from causing injury, ill-health or the death of human beings.

*Line Ministry: Ministry of Health and Social Services*

➤ ***Public Health Act 36 of 1919 and Subsequent Amendments***

The Act, with emphasis to Section 119 prohibits the presence of nuisance on any land occupied. The term nuisance for the purpose of this EIA is specifically relevant specified, where relevant in Section 122 as follows:

- ✓ any dwelling or premises which is or are of such construction as to be injurious or dangerous to health or which is or are liable to favour the spread of any infectious disease;
- ✓ any area of land kept or permitted to remain in such a state as to be offensive, or liable to cause any infectious, communicable or preventable disease or injury or danger to health; or
- ✓ any other condition whatever which is offensive, injurious or dangerous to health.

Potential impacts associated with the development of the MAR project are expected to include dust, air quality impacts, groundwater impacts, noise nuisance and smoke emissions.

*Line Ministry: Ministry of Health and Social Services*



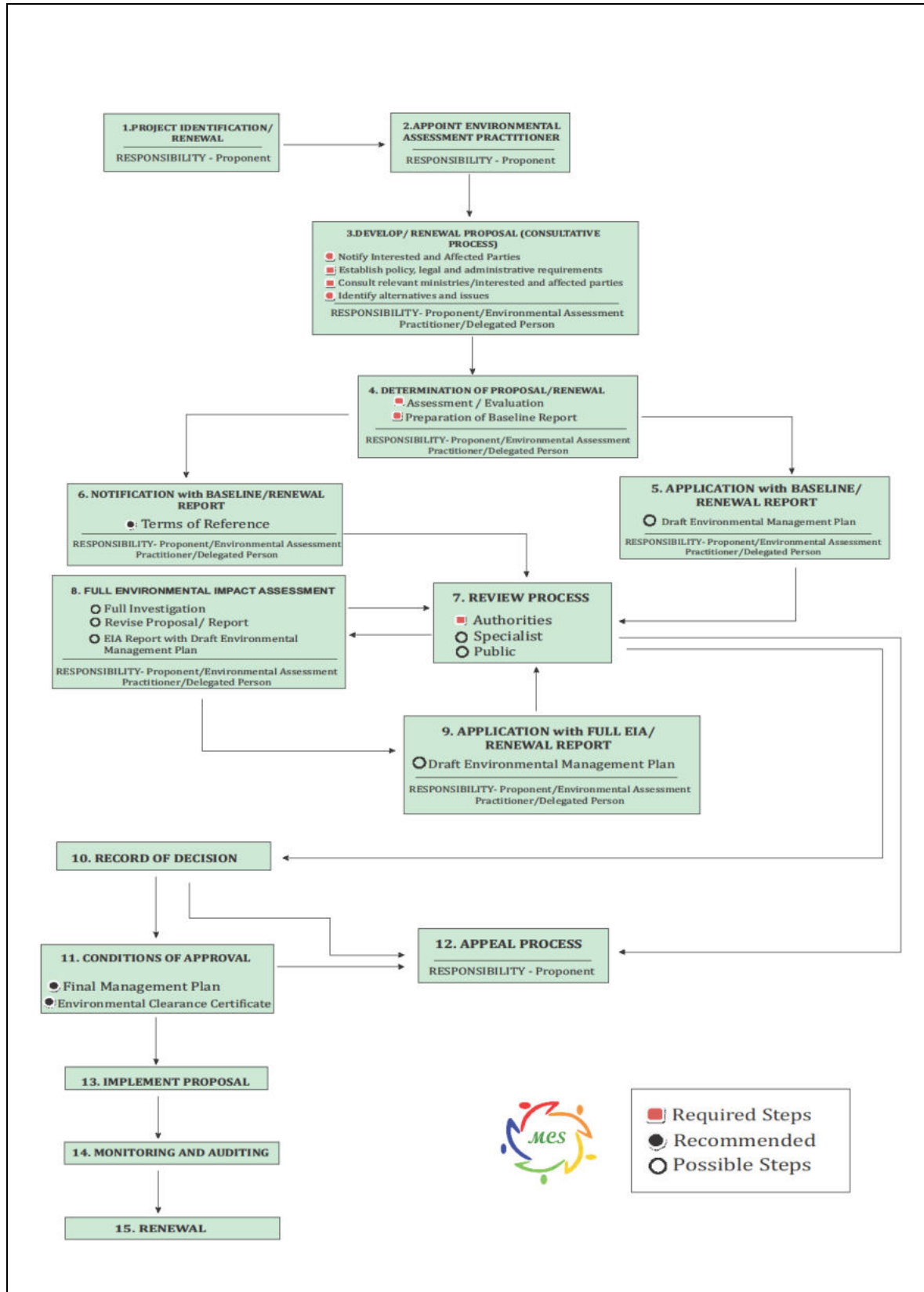
➤ ***Minerals Prospecting and Mining Act 33 of 1992***

The Act provides for EIAs in mining activities, and includes requirements for rehabilitation of prospecting and mining areas and for minimising or preventing pollution.

*Line Ministry: Ministry of Mines and Energy*



➤ **Environmental Assessment Policy (1995)**



**Figure 2. Environmental Assessment Procedure of Namibia** (Adapted from the Environmental Assessment Policy of 1995)



Environmental Assessments (EA's) seek to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process, and that the term ENVIRONMENT (in the context of IEM and EA's) is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.

All listed policies, programmes and projects, whether initiated by the government or the private sector, should be subjected to the established EA procedure as set out in Figure 2.

*Line Ministry: Ministry of Environment and Tourism*

➤ ***National Heritage Act (No.76 of 1969).***

The Act calls for the protection and conservation of heritage resources and artefacts. Should any archaeological material, e.g. old weapons, coins, bones found during the construction, work should stop immediately and the National Heritage Council of Namibia must be informed as soon as possible. The Heritage Council will then decide to clear the area or decide to conserve the site or material.

### ***6.3 International Conventions and Regulations***

Article 144 of the Namibian Constitution states that “the general rules of public international law and international agreements binding upon Namibia form part of the law of Namibia.” This means that all the international agreements that Namibia signed become part of the law of our country. These laws and/or agreements are:

- ✓ Convention on Biological Diversity, 1992;
- ✓ United Nations Framework Convention on Climate Change, 1992;
- ✓ Kyoto Protocol on the Framework Convention on Climate Change, 1998;
- ✓ Stockholm Convention of Persistent Organic Pollutants, 2001.



## 10. GENERAL ENVIRONMENT OF THE STUDY AREA

This section lists the most important environmental characteristics of the study area and provides a statement on the potential environmental impacts on each.

### 10.1 Location and Land Use

The EPL 8634 is located 15km west of Tschudi Copper Mine. The EPL 8634 is situated is located 75km from the Tschudi Copper Mine. The total area is 65267.45 ha

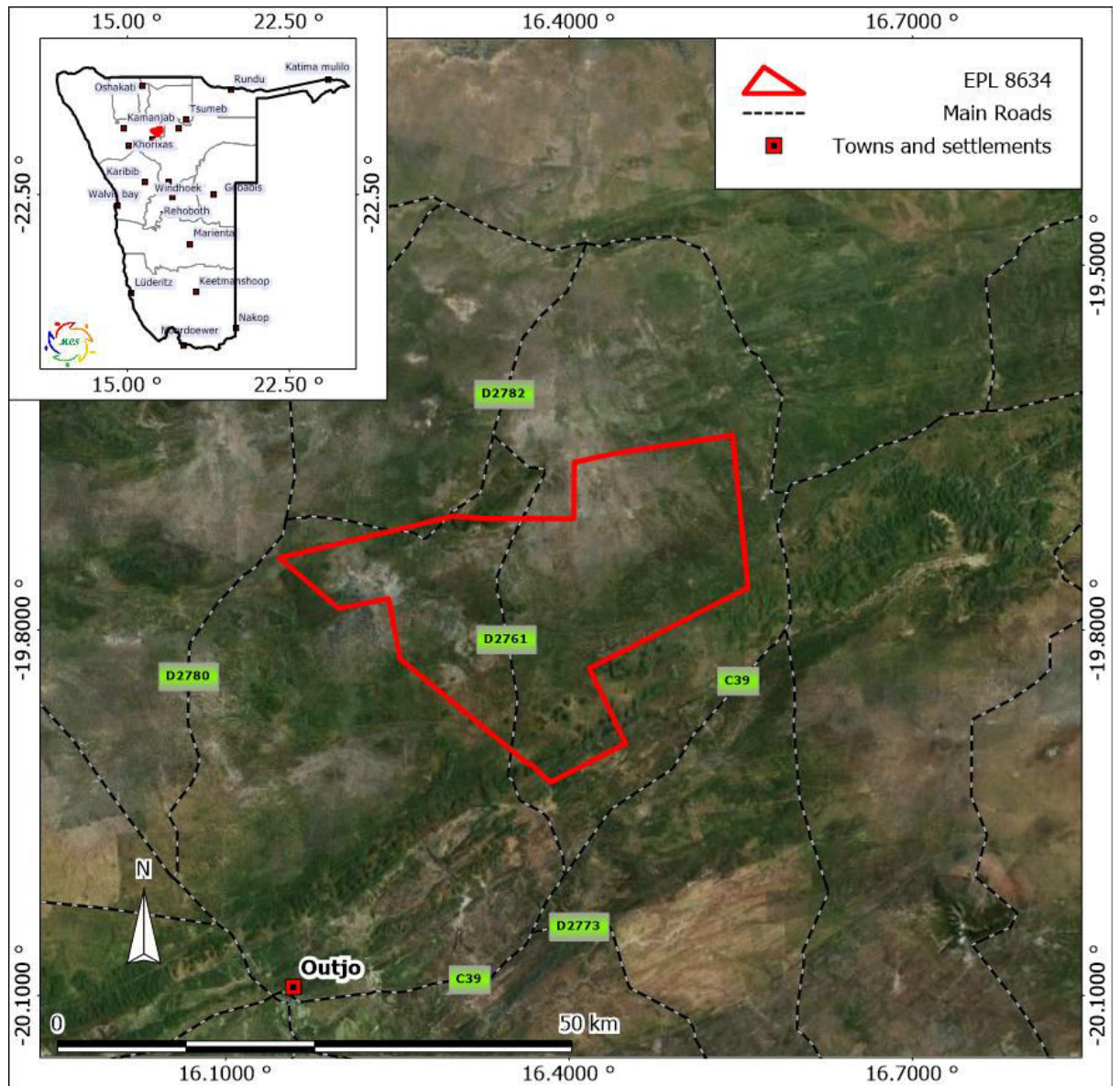


Figure 3: EPL 8634 location map

## 10.2 Topography and Surface Water

Groundwater within the basin flows towards the Etosha Pan, due to the structure of the basin and because as the pan, the deepest point, is the base level of the groundwater flow system. A major part of this northbound groundwater flow is shallow, and discharges south-east of Namutoni through numerous springs along the southern margin of the Etosha Pan and through the bottom of the pan from where it rapidly evaporates (Christelis, et. al., 2011).

## 10.3 Climate *(Mandelsohn et al, 2003)*

**Table 1. Climate Data**

Classification of climate:	Arid area
Average rainfall:	Rainfall in the area is averaged to between 150 mm-200 mm per year.
Variation in rainfall:	Variation in rainfall is averaged to be 40-50 % per year.
Average evaporation:	Evaporation in the area is averaged to be between 2100-2240 mm per year.
Precipitation:	The highest summer rains are experienced from January to March.
Water Deficit:	Water deficit in the area is averaged to be between 1500-1700mm per year.
Temperatures:	Temperatures in the area are averaged to be between 18- 20 °C per year.
Wind direction:	Wind directions in the area are predominantly south and easterly winds.

## 10.4 Geology of the Area

EPL 8634 is located between three Namibian regions (Kunene, Oshikoto and Otjozondjupa), this section will cover brief from each regional area relative to the EPL. The Kunene region lies within the Kaoko Belt belonging to the Neoproterozoic Damara Orogen. Granites, gneisses, marbles and quartzitic bands cover vast areas of the Kaokoveld; carbonate mountain ranges (Otavi Group) are common in the northern areas. In the Khorixas, Fransfontein and Sesfontein areas the most recent rocks are calcretes as well alluvial deposits in ephemeral rivers (Christelis and Struckmeier, 2001). The Sesfontein Thrust is well known tectonic structure which represents contact of Otavi Dolomites and



metamorphic rocks. The contact zones give rise to springs in the town of Sesfontein.

The EPL 8634 falls within the Mulden Group. **The Mulden Group** of the Damara Sequence is a clastic molasse sequence which was deposited syntectonically during the early stages of the Damara orogeny. Miller (1983a) suggests that Mulden sedimentation occurred between the gentle deformation and the more intense deformation episodes. The Mulden Group was extensively deposited throughout the Northern Platform, from as far west as Kaokoveld to the Otavi Mountain Land in the east.

The Mulden Group marks a drastic change from carbonate sedimentation whereby deposition took place on a stable shelf under lagoonal and shallow platform conditions, to a fluvial and deltaic situation in an intermontane setting. Three formations known as the Owambo, Kombat, and Tschudi, reflect a variation in sedimentary facies as well as geographical accumulation. In the Otavi Mountain Land, lithologies of the Mulden Group are located in the central portions of regional synclines where they are separated from the Tsumeb Subgroup by an angular unconformity. They are found in the Tsumeb, Tschudi, and Otavi Valley Synclines, and there is no evidence that Mulden sedimentation occurred further to the east such as over the Grootfontein basement high. Tsumeb Syncline, a 30-40 m thick, ill dermed unit was formerly known as the Lower Mulden (Sohnge, 1957; Hedberg, 1979; P. Harrison, pers. comm.), but presently has no official status (Miller, 1983a). It forms the basal lithology and consists of a dirty sub-greywacke with localized sand supported chert pebble conglomerate. The conglomerates become progressively thicker and coarser towards the Owambo basin in the west. Lenses of argillite, dark shales and siltstones are sporadically intermixed.

Although the Mulden sequences are very poorly exposed, exploration by TCL of the Tschudi sediment-hosted deposit has established that sedimentation took place on an erosional karst surface. Regional seismic surveying conducted by the Etosha Petroleum Company (Hedberg, 1979) indicates a linear reflector extending north- west from Tschudi. P. Harrison interprets this as a palaeo-ridge that influenced a thickening of sediments on opposing sides of the feature. *The Tschudi Formation* overlies the basal sequence and comprises 1600 m of pale, clean feldspathic arenite and occasional greywackes and intraformational breccias. The arenites are massive to thinly bedded with well developed cross bedding. P. Harrison (pers. comm.) suggests that the Tschudi clastic sequence developed as a delta which built outwards as a fan adjacent to the Tschudi basement high. The lower Mulden was deposited as playa mud flat or shallow lacustrine sediments. The arenites were deposited by fluvial processes. It is assumed that the sedimentary source originated by denudation of the basement inliers and footwall lithologies in response to basement uplift and erosion. Hedberg (1979) reports that conglomerate clasts are locally derived, which is probably a function of the palaeo-topography. Investigations of the southern intermontane basins (B.D. Coxon, pers. comm.) indicate an easterly palaeo-current direction, which suggests that the earliest sedimentation was from the west, and was probably derived by denudation of up-domed basement as a consequence of the D event which was more prevalent in the west. However,



sedimentary influx from the east exceeded that from the west and the possibility of a source from as far east as the Katangan Belt, as suggested by Porada (1983) cannot be disregarded. Certainly, the vast quantity of sediment input into the Mulden and Khomas Troughs requires a distant sedimentary supply.

An easterly palaeocurrent trend in the southern intermontane basins is a significant observation because it could mean that a depositional facies change from fluvial to deltaic conditions could explain the apparent gradational lateral change from sandstones in the west, such as north of Outjo, to siltstones and greywackes, such as in the Otavi Valley. It is significant that north-north-easterly trending magnetic lineaments intimating basement geofractures also correspond with the lithological change. It is probable that sedimentation was influenced by these structures. Thus, in summary, the apparent lateral change in sedimentary style was possibly a function of intermixing of sediments from two opposing directions. In the Otavi Valley Syncline, the Mulden Group represented by the *Kombat Formation*, an extensive lutite unit which has been metamorphosed to a phylites or slate. The Kombat Formation is regarded as younger than the Tschudi, and is a possible correlative of the Owambo Formation. Remnant arkosic lenses at the Kombat railway siding (Miller, 1983a) are correlated with the Tschudi Formation. These arkoses attest to the unconformity between the Mulden and Otavi Groups.

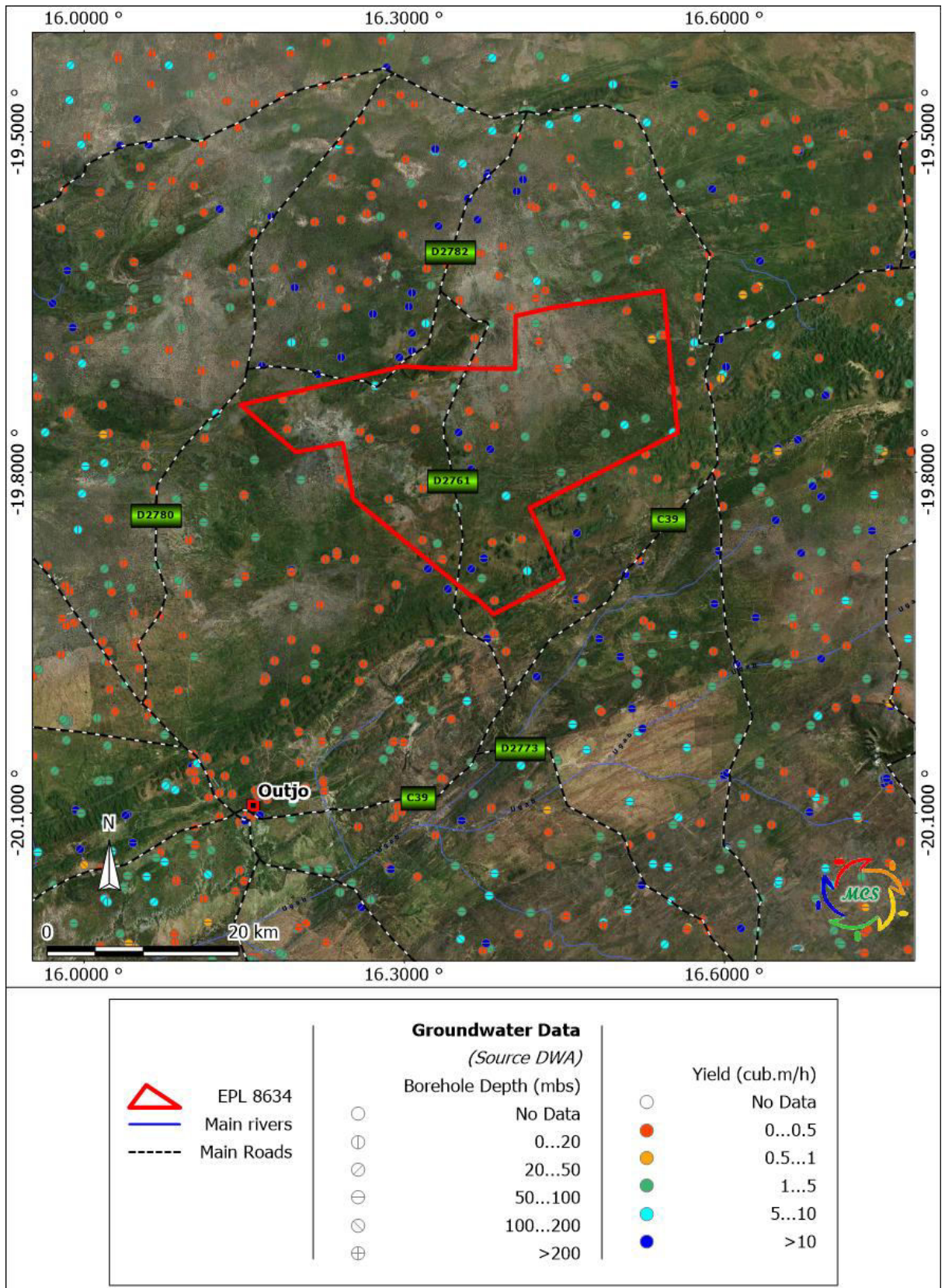
The unconformity is also well displayed at Baltika Mine where the Baltika Breccia Body disrupts the carbonate stratigraphy, and on top of the Otavi Spitze mountain range. This is a 300 m high range marking the southern limb of the Otavi Valley and is characterized by an extensive layer of phylites at the top which was uncomfortably deposited in a parasitic F fold basin. The sediments of the Kombat Formation are regarded as having been deposited in a deep water environment by deltaic processes. (Pirajno, F., Joubert, B.D. 1997)

## **10.5 Hydrogeology**

The biggest portion of the EPL encroaches into the Oshikoto region, the region is known to have a high ground water potential. *The Tschudi Formation* overlies the basal sequence and comprises 1600 m of pale, clean feldspathic arenite and occasional greywackes and intraformational breccias. The arenites are massive to thinly bedded with well developed cross bedding. P. Harrison (pers. comm.) suggests that the Tschudi clastic sequence developed as a delta which built outwards as a fan adjacent to the Tschudi basement high. The lower Mulden was deposited as playa mud flat or shallow lacustrine sediments. The arenites were deposited by fluvial processes. It is assumed that the sedimentary source originated by denudation of the basement inliers and footwall lithologies in response to basement uplift and erosion.







**Figure 4. Geology and Hydrogeology of Area**

The water supply schemes in the surrounding areas of the EPL on a regional scale obtain their water from fountains and springs at the contact Tsumeb dolomites and underlying Mulden Group phyllites. Other favourable rock units are the calcretes underlain by fractured dolomite of the Otavi Group

(Christelis and Struckmeier, 2001). The groundwater potential of fractured aquifers in the Otavi Group commonly underlying the EPL is generally high. The geological properties for the Central North Water Supply Area (CNWSA): Zone 4 is part of the much larger Kalahari Basin covering parts of Angola, Namibia, Zambia, Botswana and South Africa. It contains very thick series of rocks of various ages. The Geology of CNWSA Zone 4 area is found in the northern Cuvelai hydrogeological Basin (Christelis, et. al., 2011).

The Cuvelai hydrogeological Basin is bordered in the south and west by the surface water divide running from Otavi to Outjo. Groundwater within the basin flows towards the Etosha Pan, due to the structure of the basin and because as the pan, the deepest point, is the base level of the groundwater flow system. A major part of this northbound groundwater flow is shallow, and discharges south-east of Namutoni through numerous springs along the southern margin of the Etosha Pan and through the bottom of the pan from where it rapidly evaporates (Christelis, et. al., 2011).

There are 57 boreholes within the EPL boundary. Groundwater belongs to the Government of the Republic of Namibia; this area does not fall within Subterranean Water Control Area, of Government Notice 189 of 6 February 1970. This means that Government does not controls groundwater usage in this area.



## 10.6 General Ecology

11 The site falls within the Acacia Tree-and-shrub Savanna biome, which is characterised by Karstveld vegetation type. The dominant vegetation structure is Mixed woodland that grow mainly on Mollic Leptosols soil present in this area. The Tree-and-Shrub Savanna biome is divided into Broadleaved Tree-and-shrub Savanna and Acacia Tree-and-shrub Savanna sub-biomes. The Acacia Tree-and-shrub Savanna is characterised by large, open expanses of grasslands dotted with Acacia trees. The trees are tallest in areas of deeper sands in the east, with plant growth becoming progressively shrubby further west where the soils are shallower and the landscape is more hilly and rocky. Summer rainfall, frequent and widespread fires, grazing pressures from wildlife and livestock are some of the most important variables affecting both sub-biomes. See vegetation map below.

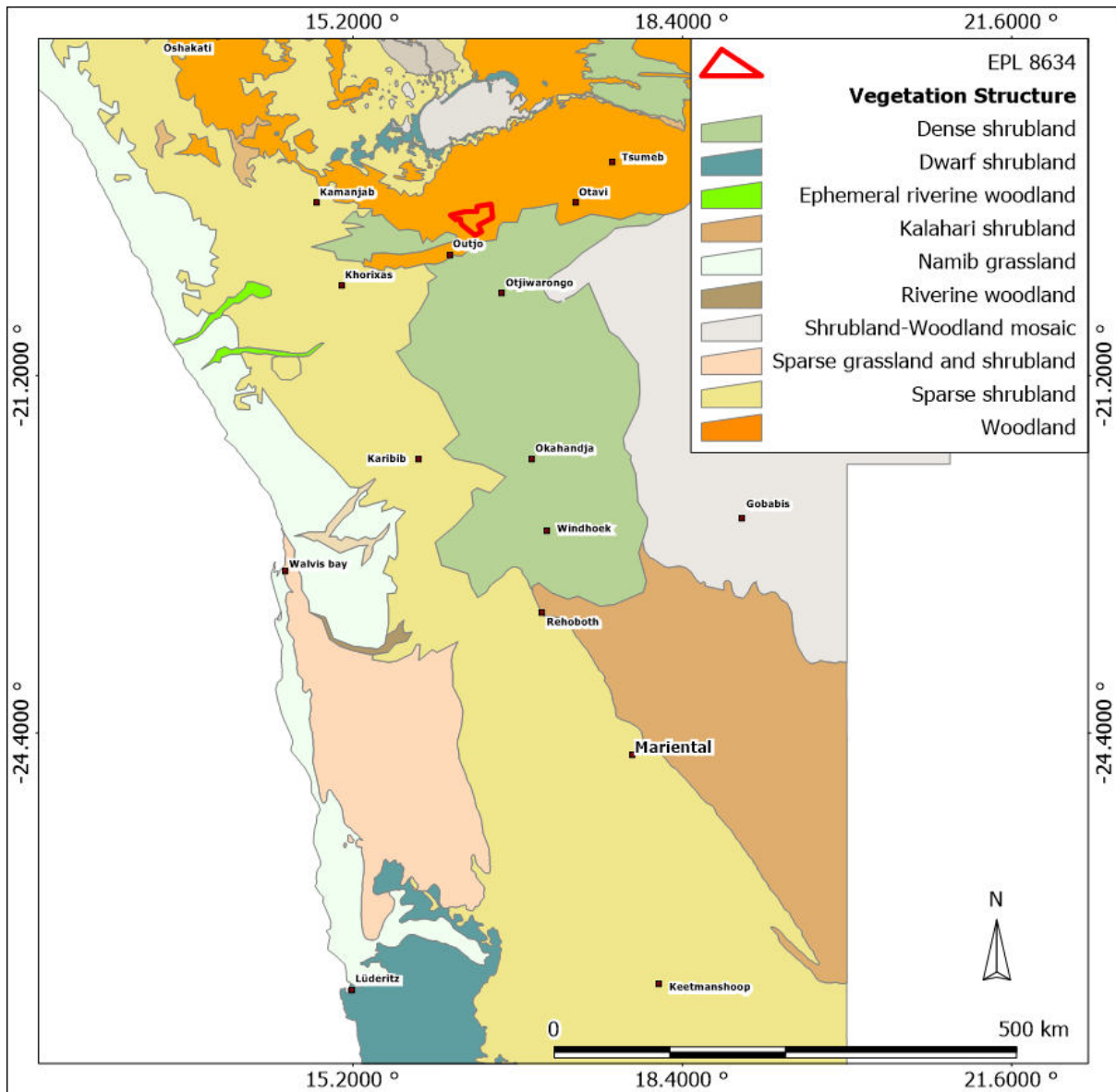


Figure 5: Vegetation Map of Study Area



Deducing from the Atlas of Namibia, the proposed site is within the area that is known to have 400-499 plant species (Mandelsohn et al, 2003). Tree types found in the area include the camelthorn tree (*Acacia erioloba*), baobab tree (*Adansonia digitata*), bird plum (*Berchemia discolor*), marula (*Sclerocarya birrea*) with a combination of mopane woodlands (*Colophospermum mopane*) and shrub lands, saline Kalahari sands support Mopane scrubland and various larger trees. Grass types such as crabgrass (*Digitaria*), Wool grass (*Antheophora*), African lovegrass (*Eragrostis*), creeping panic grass (*Brachiaria*) are found in the area (Mendelsohn et. al., 2000).

With regards to fauna, it is estimated that at least 71 to 80 reptile, 8 to 11 amphibian, 76 to 90 mammal and 171 to 200 bird species (breeding residents) are known to or are expected to occur in the project area of which few proportions are endemics.

The surrounding vegetation on site consists mainly of long and short grasses, shrubs, and various trees unevenly distributed. *Boscia Albintruca*. *Acacia erioloba*, are protected species was also observed on site, and should be conserved by all means. The following photo illustrates the typical vegetation on site.



**Vegetation on site**



**Vegetation on site**



**Vegetation on site**



**Vegetation on site**

## **11. SOCIO-ECONOMIC ASPECTS**

This section provides an overview of socio-economic characteristics of the study area. It provides regional and local information on the, economic activities, population dynamics, vulnerability, and social services currently available in the area.

### **11.1 Regional Information**

The EPL extends over three regions namely the Kunene Region of Namibia.

The Oshikoto Region's total current population is estimated to be 181 973 with 94907 females and 87066 males. Eighty-eight percent of the population living in the Oshikoto region over the age of 15 years of age are literate (NSA, 2011). The estimated unemployment rate in the Oshikoto Region is 40%. The population density is 5 person per km<sup>2</sup>. The life expectancy in Oshikoto Region is 62 years for females and 52 years in males. The Multi-Dimensional Poverty Index in Oshikoto region is 0.214 compared to 0.191 of the National MPI.

### **11.2 EPL 8634 Surrounding Area**

Although the EPL 8634 extends over three regions namely, Oshikoto, Otjozondjupa and Kunene, the larger part of the area falls within the Oshikoto Region.



### **11.2.1 Economic Activities**

The economy of the Oshikoto Region is mainly driven by Mining, Tourism and Farming activities.

### **11.2.2. Employment (Job Opportunities)**

Unemployment still hampers most of the developing world and this area is not an exception. The Unemployment rate in Namibia is currently known to be 40%. The proposed exploration project is likely to increase the job opportunities. The drilling phase of the project will provide job opportunities, of which 80% are expected to be unskilled and semi-skilled people and can be sourced from the unemployed labour force in the area. Unfortunately the intended project will not aid in creating new permanent employment activities for locals living nearby as the drilling contractor is more likely to use his own crew. However temporary jobs may be offered.

Some of the services will be outsourced e.g. security services, supply of consumables to drill personnel, food catering for drilling personnel, maintenance and cleaning services of drill site and camp site, waste removal from site. The outsourcing of these services will strengthen existing businesses operating in the area and these regions and also provide employment.

### **11.2.3 Livelihoods**

Farming constitute the main source of household income for 33% of the total population in the Oshikoto Region. In general Cultivation and Harvesting of Crops, Animal Husbandry, Monthly Pensions, Other Grants and Remittances, Employment, Small and Informal Businesses are the main livelihood activities employed by communities in the Oshikoto Region to sustain their lives. The livelihoods of local communities affected are likely to be positively impacted and thus predicted to be better than before the exploration drilling project commenced in the area.

### **11.2.4 Tourism**

The region have a vast number of tourist attractions areas within their individual region. In Oshikoto the Etosha National Park, Tsumeb Museum and Oshikoto Lake are some of the hot spots.

The area attracts a lot of tourists from all over the world. Excessive waste, dust, noise and vibrations can have negative impacts on the tourism industry in the area, as it can become a nuisance to tourists. Mitigation measures at the site must be put in place to reduce these impacts.



### **11.2.5 In - Migration**

Due to enhanced employment opportunities that could be created by the envisaged project, some in-migration of job seekers to Tsumeb can be expected. Depending on the amount of in-migration, local areas may start experiencing overcrowdings, over use of infrastructure, local conflicts, increase of goods prices due to increased demand etc.

### **11.2.6 HIV & Prostitution**

Namibia is one of the ten worst affected countries in terms of the HIV/AIDS epidemic. The HIV prevalence rate for the age group 15 to 49 is estimated at 10-15%% for Namibia (UNAIDS, 2015). .

The spending powers of locals and expatriates working for the exploration drilling company and its subcontractors are likely to increase, and this might be a perfect opportunity for sex workers to explore. Migrant labourers from other regions and expatriates are normally vulnerable and may use the services rendered by the sex workers.

Should the HIV prevalence increase, the following consequential issues could arise in the Oshikoto, Otjozondjupa and Kunene Region:

- ✓ Overall reduction in workforce.
- ✓ Diversion of income expenditure to medical care.
- ✓ Increase in orphans and households headed by children.
- ✓ Increase in pregnancy related mortality.
- ✓ Increase in number of persons per doctor

### **11.2.7 Infrastructure & Increased Traffic**

The project area is situated on commercial farms and is surrounded by Towns and Settlements. There is also a road and a few power lines in the vicinity. Traffic in the area is expected to increase slightly, the presence of more vehicles, heavy duty cargo trucks and machinery, may also cause car accidents around the area. Infrastructure like roads will be affected due to increased traffic and heavy-duty cargo trucks accessing the several sites.

### **11.2.8 Procurement**

Local businesses are to benefit from the envisaged exploration drilling activities and or its sub-contractors might need to procure services from these businesses e.g. domestic waste removal, transport, security services etc.



## 12. STAKEHOLDER PARTICIPATION

Consultation with the public forms an integral component of an EIA investigation and enables I&APs e.g. neighbouring landowners, local authorities, environmental groups, civic associations and communities, to comment on the potential environmental impacts associated with the proposed development and to identify additional issues which they feel should be addressed in the EIA. The primary aims of public participation were:

- ❖ To initiate participation of Interested and affected parties (I&APs), e.g. local authorities and communities.
- ❖ To inform I&APs and key stakeholders about the proposed development.
- ❖ To identify issues and concerns of key stakeholders and I&APs with regards to the proposed development.
- ❖ To provide information to enable informed decision making
- ❖ To develop a communication structure with stakeholder and I&APs
- ❖ To promote transparency of the project
- ❖ To ensure the public and stakeholders comments are considered for the development.
- ❖ To provide answers to I&APs queries
- ❖ To encourage shared responsibility and sense of ownership.

Decision-making authorities were consulted throughout from the outset of the study, and have been engaged throughout the project process. Consultation with the department of Environmental Affairs (MET) included the environmental assessment procedure and application procedure.

Public participation notices were advertised in two local newspapers on two different occasions, namely; (See Appendix E)

- ✓ NewEra Newspaper, 02 and 09 December 2022
- ✓ Confidente, 02 and 09 December 2022

In the adverts an e-mail address, phone number and fax number was provided to the general public to register as interested and affected parties; and to request a background information document for the project. Posters were placed at strategic locations to invite interested and affected parties to the meeting, e.g. councillors office, constituency office. The public participation process attracted a few interested and affected parties, and focused presentations were done with individual interested and affected parties. There were no objections to project that were recorded.





The general comments that came out from the process were mainly about potential impacts on environment, stock theft, poaching, jobs and general safety. A background information document was available to all interested and affected parties 14 days before and after the meeting (see appendix B).

**Table 2. Registered I&APS**

<b>NAME</b>	<b>ORGANISATION/ERF</b>	<b>OWNER/POSITION</b>
Mr. Rudi Iita	Private	I & APs
Mr. A. Kristof	Private	I & APs
Mr. Firin	Horn Metals	Project Leader
Mr. A. Iitula	Private	I & APs
Mr. M. Ngalangobe	Private	I & APs
Mr. J. Tjilondelo	Private	I& APs
Mr. M. Nakwafila	Private	I & APS



## 13. ENVIRONMENTAL IMPACT EVALUATION

The Environmental Impact Assessment sets out potential positive and negative environmental impacts associated with the proposed Project. The following assessment methodology will be used to examine each impact identified, see Table 3:

**Table 3. Impact Evaluation Criterion (DEAT 2006)**

Criteria	Rating (Severity)	
Impact Type	+VE	Positive
	0	No Impact
	-VE	Negative
Significance of impact being either	L	Low (Little or no impact)
	M	Medium (Manageable impacts).
	H	High (Adverse impact).

Probability:	Duration:
5 - Definite/don't know	5 - Permanent
4 - Highly probable	4 - Long-term (impact ceases)
3 - Medium probability	3 - Medium-term (5-15 years)
2 - Low probability	2 - Short-term (0-5 years)
1 - Improbable	1 - Immediate
0 - None	
Scale:	Magnitude:
5 - International	10 - Very high/don't know
4 - National	8 - High
3 - Regional	6 - Moderate
2 - Local	4 - Low
1 - Site only	2 - Minor
	0 - None

### 13.1 Exploration Activities of the Project.

#### 13.1.1 Dust Pollution and Air Quality

Dust will be generated during drilling and problems thereof are expected to be site specific. Dust is expected to be worse during the winter months when strong winds occur. Release of methane gas from exploration boreholes and exhaust fumes from vehicles and machinery related to exploration drilling are also expected to take place.

It is recommended that regular dust suppression be included in the drilling activities, when dust becomes an issue. No unnecessary revving of engines or operation of vehicles is allowed. Exploration boreholes should be capped and sealed when no drilling is taking place, to prevent emissions immediately after drilling has stopped. In general, the exploration drilling is envisaged to have minimal impacts on the surrounding air quality.

Impact  
Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Dust & Air Quality	-VE	2	1	2	1	M	L



### 13.1.2 Noise Impact

An increase of ambient noise levels at the drilling site is expected due to the drilling activities. It is not expected that the noise generated during drilling will impact any third parties. Ensure all mufflers on vehicles are in full operational order; and any audio equipment should not be played at levels considered intrusive by others. The drilling staff should be equipped with ear protection equipment. Drilling activities will be limited to a period between 06h00 and 19h00.

Impact  
Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Noise	-VE	1	1	4	4	M	L

### 13.1.3 Safety and Security

Safety issues could arise from the earthmoving equipment and tools that will be used on site during the drilling phase. This increases the possibility of injuries and the drilling contractor must ensure that all staff members are made aware of the potential risks of injuries on site. The contractor is advised to ensure that the team is equipped with first aid kits and that they are available on site. Workers should be equipped with adequate personal protective gear and properly trained, thus mitigating these impacts.

Proper fencing around the drill sites should be erected to avoid entrance of animals and unauthorized persons. Safety regulatory signs should be placed at strategic locations to ensure awareness.

The exploration camp should be located in such a way that it does not pose an aesthetic nuisance to the public; and equipment and tools used during the project must be stored properly. Adequate lighting within and around the drilling location should be erected.

No open flames, smoking or any potential sources of ignition should be allowed at the project location. Signs such as 'NO SMOKING' must be prominently displayed in parts where inflammable materials are stored on the premises. Proper barricading and/or fencing around the work sites should be erected to avoid entrance of animals and/or unauthorized persons. Safety regulatory signs should be placed at strategic locations to ensure awareness. Adequate lighting within and around the construction locations should be erected, when visibility becomes an issue.

Impact  
Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Safety & Security	-VE	1	1	4	2	M	L



### 13.1.4 Contamination of Groundwater

Groundwater quality could be impacted through oil leakages, lubricants and grease from the drilling equipment and machinery utilised during the exploration phase, especially during drilling. Possibility of contamination from surface sources exists in the proximity of fault zones.

Care must be taken to avoid contamination of soil and groundwater. Use drip trays when doing maintenance on machinery. Maintenance should be done on dedicated areas with linings or concrete floor. The risk can be lowered further through proper training of staff.

All spills must be cleaned up immediately. Excavations/boreholes should be backfilled and sealed with appropriate material (cement/bentonite), if it is not to be used further.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Groundwater	-VE	2	2	2	2	M	L

### 13.1.5 Contamination of Surface Water

Contamination of surface water might occur through oil leakages, lubricants and grease from the drilling equipment and machinery during the drilling phase. Improper management of general and human waste may also occur. The drilling contractor must ensure that proper and adequate toilet and waste disposal facilities are present at both the drilling and campsite.

Waste material may not be disposed off in any of the nearby rivers and/or tributaries. Hydrocarbon contaminated equipment and clothing should not be washed within 25m from any surface water body. Surface runoff from the site is expected in an easterly direction towards the Etosha Pan .

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Surface water	-VE	2	2	2	3	M	L

### 13.1.6 Generation of Waste

This can be in a form of rubble, cement bags, pipe and electrical wire cuttings. Contaminated soil due to oil leakages, lubricants and grease from the construction equipment and machinery may also be generated during the construction phase. General domestic waste, contaminated soil, oil leaks, drill cuttings etc are common on most exploration camp and drill sites, and thus must be addressed.

The oil leakages, lubricants and grease must be addressed. Contaminated soil must be removed and disposed off at the hazardous waste cell at an appropriate landfill.



The drilling contractor must provide sufficient bins and/or containers on-site, to store any solid waste produced. Drill cuttings must be collected and placed back into the drill holes, or removed from site. Consultation with the relevant authorities should be conducted for the proper disposal of waste. Regular inspection and housekeeping procedure monitoring should be maintained by the contractor.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Waste	-VE	1	1	4	4	M	L

### 13.1.7 Traffic

The exploration project activities are expected to have a minor impact on the movement of traffic along district roads in the area (e.g. D2761 & C39 etc). No diversion of traffic or closure of roads is expected.

Speed limit warning signs must be erected to minimise accidents. Heavy-duty vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Traffic	-VE	2	1	4	3	M	L

### 13.1.8 Fires and Explosions

There should be sufficient water available for fire fighting purposes. Ensure that all fire-fighting devices are in good working order and they are serviced. All personnel have to be trained about responsible fire protection measures and good housekeeping such as the removal of flammable materials on site. Regular inspections should be carried out to inspect and test fire fighting equipment by the contractor.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Fires and Explosions	-VE	1	1	4	2	M	L

### 13.1.9 Nuisance Pollution

Aesthetics and inconvenience caused to persons using access roads in the vicinity of the planned borehole sites and pipeline servitude. Some of the exploration activities would be visible from district roads or farm roads, thus



the supervisor should maintain tidiness on site at all times. Take cognition when parking vehicles and placing equipment.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Nuisance Pollution	-VE	1	1	2	2	L	L

### 13.1.10 Erosion and Sedimentation

Vegetation clearance and creation of impermeable surfaces could result in erosion in areas across drill sites. The clearance of vegetation will further reduce the capacity of the land surface to slow down the flow of surface water, thus decreasing infiltration, and increasing both the quantity and velocity of surface water runoff.

The proposed development will increase the amount of impermeable surfaces and therefore decrease the amount of groundwater infiltration. As a result, the amount of storm water during rainfall events could increase. Compacted areas should be rehabilitated as much as possible to reduce potential erosion impacts.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Erosion and Sedimentation	-VE	1	1	4	2	M	L

### 13.1.11 Ecological Impacts

Removal and/or damage of natural vegetation by preparing and clearing of the drilling and camp sites; and access routes. Land disturbance, which is envisaged to remove habitat (homes, territories and movement corridors) should be avoided and/or minimised. Painting, damage or marking of any natural features should not take place in and around the drill and camp sites.

Accidental fires might occur during the drilling programme, thus a proper code of conduct for the drilling staff should be established for both the camp and drill site. Minimise the area of disturbance by restricting movement to the designated areas. Poaching is illegal and is to be prohibited.

No smoking at the drilling site. Fires and smoking should only be allowed at designated areas at the camp site. Emergency equipment and procedure for fire fighting to be in place.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Ecology	-VE	1	1	4	2	M	L



### 13.1.12 Heritage Impacts

A Heritage Impact Assessment specialist study was conducted and a grave site and an old farm building were identified as sensitive heritage resources. A 100m buffer zone should be created and maintained around the burial sites and old farm house building found within the EPL. Should any archaeological remains or objects with cultural values (e.g. military shells, arterially, weapons, ancient clothing, ancient cutlery, graves etc) are uncovered along the access routes or surrounding, it should be barricaded off and the relevant authorities should be contacted immediately.

Impact  
Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Cultural Impacts	-VE	2	2	3	2	H	L

#### *Summary of all potential impacts expected during the construction of the Project:*

In general, impacts are expected to be low to medium, mostly short lived and site specific. Mitigation options recommended in the Environmental Management Plan (EMP) will guide and ensure that the impacts during the construction activities are minimised.

The drilling contractor and or exploration crew should be made aware of the content and environmental requirements of this report through proper induction training.



## 13.2 Mobilization and Inter-Movement to and from site

### 13.2.1 Dust Pollution and Air Quality

Dust will be generated during the movement of drilling machineries and vehicles to and from the site. Dust is expected to be worse during the winter months when strong winds occur. Release of exhaust fumes from vehicles and machinery related to exploration drilling are also expected to take place.

It is recommended that vehicles speed should be restricted (speed limits) along all access routes in order to sufficiently reduce dust. Regular dust suppression should be included along access routes, when dust becomes an issue. No unnecessary revving of engines or operation of vehicles is allowed.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Dust & Air Quality	-VE	1	2	6	4	M	L

### 13.2.2 Noise Impact

Noise pollution along the access routes is expected due to movement of heavy-duty drilling vehicles and the rest of the fleet. Target noise levels should be <85dB.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Noise	-VE	1	2	4	2	L	L

### 13.2.3 Contamination of Surface and Groundwater

Groundwater quality could be impacted through hydrocarbon and oil leakages from the heavy-duty drilling machinery and associated fleet along the access routes. Care must be taken to avoid contamination of soil and groundwater. Drip trays and/or plastic sheeting should be used to contain any leaks emanating from the drilling machinery and fleet.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Surface & Groundwater	-VE	2	2	2	2	L	L

### 13.2.4 Generation of Waste

No littering along the access routes is prohibited during the exploration phase. The contractor must provide sufficient containers to staff to store any waste produced while travelling along this routes.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Waste	-VE	2	2	2	2	L	L





### 13.2.5 Heritage Impacts

A Heritage Impact Assessment specialist study was conducted and a grave site and an old farm building were identified as sensitive heritage resources. A 100m buffer zone should be created and maintained around the burial sites and old farm house building found within the EPL. Should any archaeological remains or objects with cultural values (e.g. military shells, arterially, weapons, ancient clothing, ancient cutlery, graves etc) are uncovered along the access routes or surrounding, it should be barricaded off and the relevant authorities should be contacted immediately.

Impact  
Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Cultural Impacts	-VE	2	2	3	2	H	L

### 13.2.6 Ecological Impacts

Removal and/or damage of natural vegetation should be avoided. Existing tracks should be used as much as possible and making of new tracks should be avoided. Minimise the area of disturbance by restricting movement to the designated access routes.

Smoking while driving along the access routes should be avoided. Emergency equipment and procedure for fire fighting should be in place.

Impact  
Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Ecology	-VE	1	2	4	2	L	L

### 13.2.7 Traffic

A slight increase in traffic will be experienced along district road D2403 and access routes and tracks within the area, leading to the project location. The impact is expected to be minimal. Care should be taken when driving along these tracks as to avoid accidents with wild and domestic animals in the area. Animals have a right of way during this phase. Speed limits and road signs as set out by the authorities should be adhered to.

Impact  
Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Traffic	-VE	1	4	6	3	M	L

#### Summary of all potential impacts during mobilization to and from site:

In general, impacts are expected to be low, short lived and site to local specific. An Environmental Management Plan (EMP) will ensure that the impacts along the access routes are minimised and includes measures to reduce all impacts identified. Existing tracks should be used, and making of new tracks must be avoided as much as possible.



The drilling contractor should be made aware of the content and environmental requirements of this report through proper induction training.

## 14. CUMULATIVE IMPACTS

These are impacts on the environment, which results from the incremental impacts of the mineral exploration project when added to other past, present, and reasonably foreseeable future actions regardless of what person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. In relation to an activity, it means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts resulting from similar or diverse activities or undertakings in the area.

Possible cumulative impacts associated with the exploration project includes, groundwater pollution, excessive groundwater abstraction, noise emissions, land disturbance, traffic and possible accidents involving vehicles frequenting the area. These impacts could become significant if potential polluting activities are allowed. This could collectively impact on the environmental conditions in the area. Cumulative impacts could occur in both the exploration, and planning phase. Impacts from exploration activities on EPLs neighbouring EPL 8634 should be monitored and managed collectively.

*Impact Evaluation:*

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Cumulative impacts	-VE	1	3	4	3	L	L

## 15. ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (EMP) provides management options to ensure impacts of the proposed exploration phase are minimised. An EMP is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of mineral exploration are prevented, and the positive benefits of the projects are enhanced.

The objectives of the EMP are:

- ✓ to include all components of the exploration phase;
- ✓ to prescribe the best practicable control methods to lessen the environmental impacts associated with the exploration phase;
- ✓ to monitor and audit the performance of the project personnel in applying such controls; and



- ✓ to ensure that appropriate environmental training is provided to responsible project personnel.

The EMP acts as a stand-alone document, which can be used during the various phases of the proposed project. All contractors taking part in the exploration activities should be made aware of the contents of the EMP. An EMP for the exploration phase is attached as Appendix A.

## **16. CONCLUSIONS**

All known environmental and social risks can be minimised and managed through implementing preventative measures and sound management systems. It is recommended that environmental performance be monitored regularly to ensure compliance and that corrective measures be taken if necessary. It is also recommended that this information be made available to the surrounding communities on a regular basis.

The study area holds less ecological and conservation values and the best option chosen is to explore minerals on EPL 8634 with strict consideration of environmental aspects. In general, the exploration phase would pose limited environmental risks, provided the EMP for the activity is used properly during planning and drilling phase. The Environmental Management Plan should be used as an on-site tool during all phases of the project. Parties responsible for non-conformances of the EMP will be held responsible for any rehabilitation that may need to be undertaken.

Should exploration activities be modified or extended to a different area, it is recommended that a different EIA be done for the probable new study locations.

### **MATRIX CONSULTING SERVICES**

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