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# Environmental Assessment (EA) for Exploration Drilling Activities on Exclusive Prospecting Licence (EPL) 6669 in the Kunene Region

## Scoping Report

Version - Final

23 June 2020

Nangolo Trading Enterprise CC

GCS Project Number: 19-0759

Client Reference: N/A



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## EXECUTIVE SUMMARY

Nangolo Trading Enterprise CC (The Proponent) proposes to undertake exploration drilling activities on Exclusive Prospecting License (EPL) 6669 in the Kunene Region. EPL 6669 is in the north western part of Namibia approximately 200 km north west of Opuwo and 18 km south west of Epupa Village (**Figure 1-1 and 1-2**). EPL 6669 measures approximately 18847 Hectares in extent.

EPL 6669 is owned by Nangolo Trading Enterprise CC. The proponent wishes to invest in the exploration of the EPL for precious stones.

This report documents the assessment of potential impacts from the proposed exploration. The preliminary findings within this Scoping Report indicate that potential impacts will be of a low-medium significance during exploration. Should the project proceed to mining a full Environmental Impact Assessment (EIA) would have to be conducted prior to commencing which should be inclusive of a detailed Archaeological Specialist Study. These potential impacts can be further mitigated by implementation of an effective Environmental Management Plan (EMP).

Based on the information provided in this report, GCS is confident the identified risks associated with the proposed development can be reduced to acceptable levels, should the measures recommended in the EMP be implemented and monitored effectively. It is therefore recommended that the project receive Environmental Clearance, provided that the EMP be implemented.

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## 1 INTRODUCTION

Nangolo Trading Enterprise CC (The Proponent) proposes to undertake exploration drilling activities on Exclusive Prospecting License (EPL) 6669 in the Kunene Region. EPL 6669 is located in the north western part of Namibia approximately 200 km north west of Opuwo and 18 km south west of Epupa Village (**Figure 1-1** and **Figure 1-2**). EPL 6669 measures approximately 18847 Hectares in extent.

According to the Namibia Mining Cadastral map (2019), EPL 6669 is owned by Nangolo Trading Enterprise CC. Based on desktop studies and previous exploration activities in the surroundings of the subject area it was ascertained that EPL 6669 has the potential for the occurrence of precious stones such as diamonds, alexandrite, amazonite and emerald (Nangolo, n.d.).The proponent thus wishes to undertake drilling exploration activities for precious stones with a particular focus on diamonds. The approximate location of EPL 6669 is shown on the maps in **Figure 1-1** and **Figure 1-2** below.

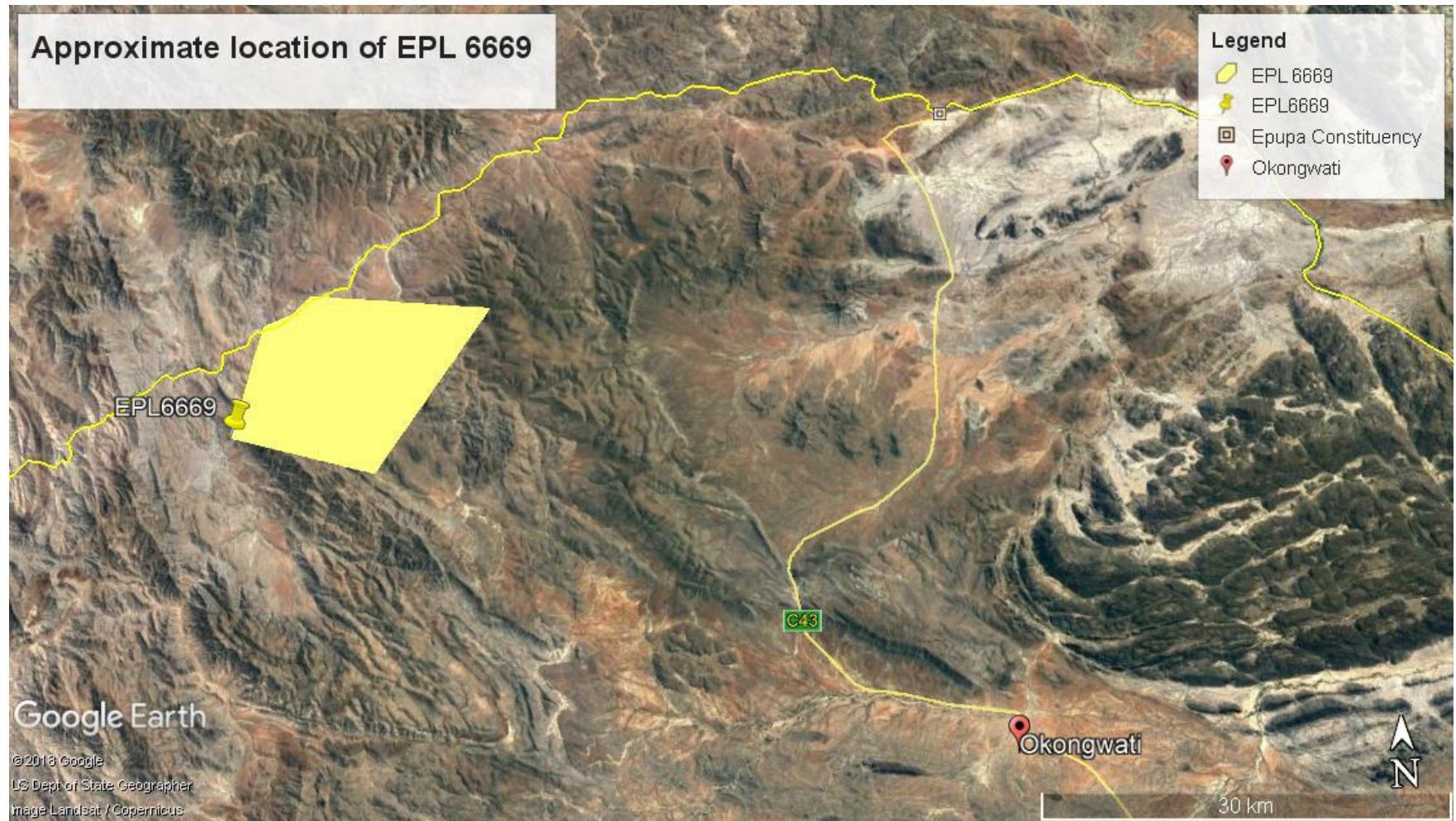


Figure 1-1: Location of EPL 6669 in the Kunene Region

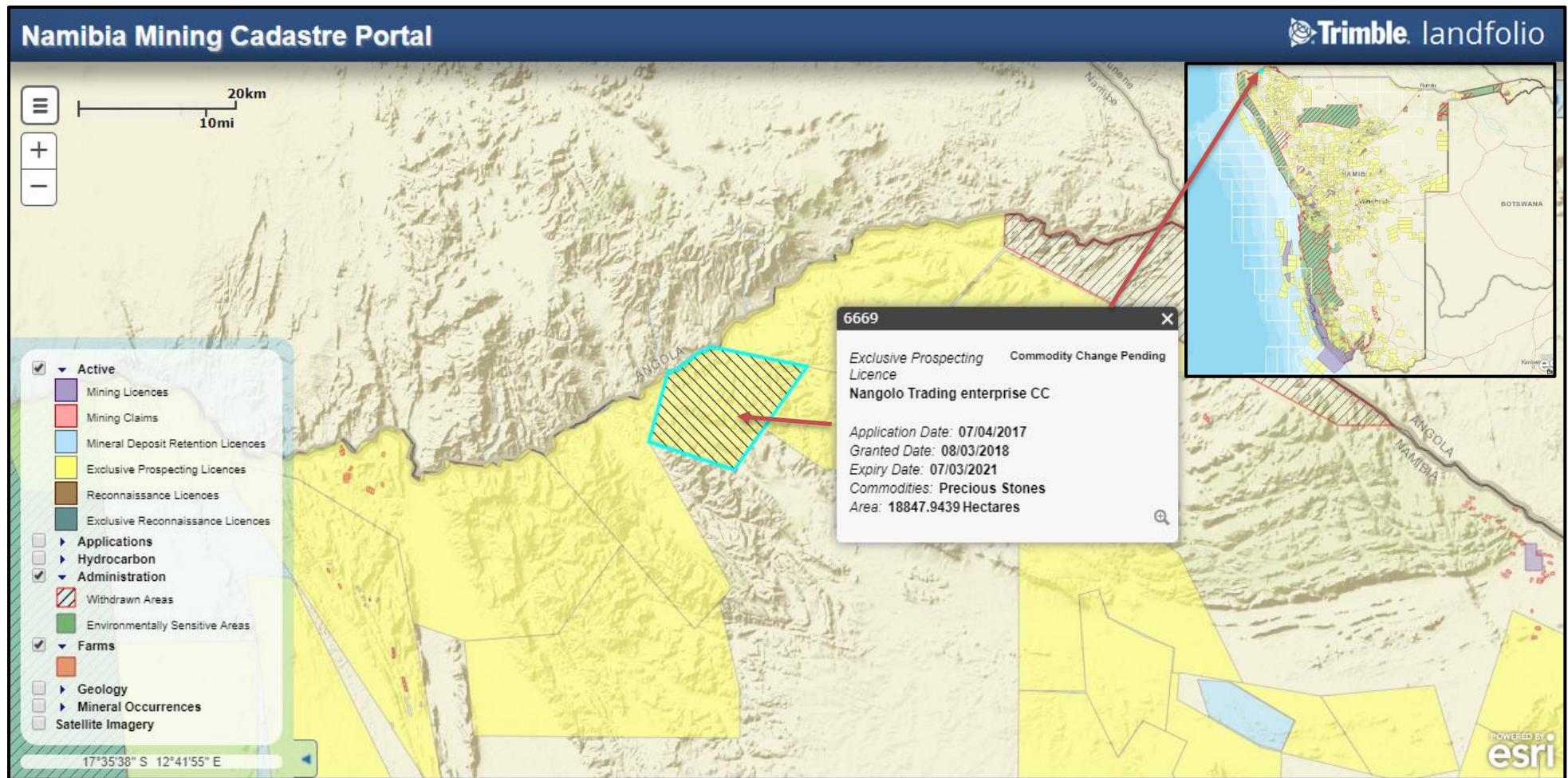


Figure 1-2: EPL 6669 on Namibia's Ming Cadastral Portal (<http://portals.flexicadastre.com/Namibia/>, 2019)



## 1.1 The Need for an Environmental Assessment (EA)

Under the 2012 Environmental Impact Assessment (EIA) Regulations of the Environmental Management Act (EMA) No. 7 of 2007, the proposed development is a listed activity that may not be undertaken without an Environmental Clearance Certificate (ECC). This activity is listed under the following relevant sections:

- *3.1 The construction of facilities for any process or activities which requires a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation, in terms of the Minerals (Prospecting and Mining Act), 1992.*
- *3.2 Other forms of mining or extraction of any natural resources whether regulated by law or not.*
- *3.3 Resource extraction, manipulation, conservation and related activities.*
- *8.1 The abstraction of ground or surface water for industrial or commercial purposes.*
- *9.1 The manufacturing, storage, handling or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974.*
- *9.2 Any process or activity which requires a permit, licence or other form of authorisation, or the modification of or changes to existing facilities for any process or activity which requires an amendment of an existing permit, licence or authorisation or which requires a new permit, licence or authorisation in terms of a law governing the generation or release of emissions, pollution, effluent or waste.*

In order to fulfil the requirements of the EMA and its 2012 EIA Regulations, Nangolo Trading Enterprise CC appointed GCS Water and Environmental Engineering Namibia (Pty) Ltd (GCS Namibia hereafter), an independent Environmental Consultant to conduct an Environmental Assessment (EA) inclusive of public consultation. The required documents will be submitted as part of an application for an ECC in terms of the EMA and its EIA Regulations. The findings of the EA process are incorporated into an environmental scoping report (this report) and together with the draft Environmental Management Plan (EMP) will be submitted as part of an application for an ECC to the Environmental Commissioner at the Department of Environmental Affairs (DEA), Ministry of Environment and Tourism (MET).

Stephanie Strauss, a qualified Environmental Assessment Practitioner (EAP) conducted this EA process under the supervision of Sharon Meyer, a qualified and experienced Senior Environmental Scientist. The team was assisted with Lloyd McFarlane, qualified and experienced Environmental and Social Scientist. The CV's of the consultants are attached as **Appendix A** at the end of this report.

## 1.2 Need and Desirability of the Project

Namibia's Vision 2030, National Development Plan 4 (NDP4) and Harambee Prosperity Plan (HPP) all recognize a need for and place significant value on economic growth and employment creation.

Mining is one of the main contributing sectors to Namibia's Gross Domestic Product (GDP), accounting to 25%. Diamonds are well known for their scarcity and exquisiteness and is thus consumed by people across Namibia and the world at large.

In order to mine/extract these minerals from the earth, a proper reconnaissance, prospecting, exploration and resource/reserve determination need to be done. These processes are followed to ensure that the mineral ores are worth mining, for economic gains (commercially viable).

The proposed exploration activities, and potential mining activities will contribute to these priorities at a local, regional and national level. It is for these reasons that the project is needed in the area.

### 1.3 Scope of Work

This scoping study was carried out in accordance with the Environmental Management Act (EMA) (7 of 2007) and its 2012 EIA Regulations (GG No. 4878 GN No. 30).

After submitting an application for ECC to the DEA, the first stage in the EA process is to submit a scoping report. This report provides the following:

Description	Section of the Report
The need and desirability of the proposed project	Subchapter 1.2
Project description and the need for it	Chapter 2
Alternatives considered for the proposed project in terms of no-go option, location, drilling methods and services infrastructure	Chapter 3
The relevant laws and guidelines pertaining to the proposed project	Chapter 4
Baseline environment in which the proposed activity will be undertaken	Chapter 5
The public consultation process followed (as described in Regulation 7 of the EMA Act) whereby interested and affected parties (I&APs) and relevant authorities are identified, informed of the proposed activity and provided with a reasonable opportunity to give their concerns and opinions on the project;	Chapter 6
The identification of potential impacts, impacts description, assessment, mitigation measures and recommendations	Chapter 7
Recommendations and Conclusions to the report	Chapter 8

The next chapter will be focusing on the description of the proposed project and its associated activities.

## 2 PROJECT DESCRIPTION

The proposed activity on the respective EPL will entail drilling activities for the exploration of the precious stones.

### 2.1 Project History

The existing geological data from the Geological Survey of Namibia (GSN) indicated that the subject area has potential to host base metals, precious metals and industrial mineral deposits. An aero-magnetic study carried out on the EPL found that moderate magnetic responses which indicate the potential occurrence of magnetic bodies was found in the central part of the EPL and as such exploration is proposed to be conducted on this area in particular. Furthermore, based on desktop studies and previous exploration activities in the surroundings of the subject area it was ascertained that EPL 6669 has the potential for the occurrence of the following:

- Precious Stones: Diamonds, Alexandrite, Amazonite and Emerald;
- Copper: granitic gneiss and amphibolite bodies;
- Lead-Zinc: associated with copper in sandstone of Nosib group; and
- Iron: Hosted in granite gneiss, anorthositic gneiss, massive anorthosite and granodiorite (Nangolo, n.d.).

The proponent thus wishes to undertake drilling exploration activities for precious stones with a focus on diamonds.

### 2.2 Description of Activity

The proposed activity will involve detailed exploration and reconnaissance for precious stones. This will entail both the non-invasive and invasive exploration methods. Non-invasive exploration methods usually include geological field mapping, ground geophysical survey, surface sampling, etc. whereas invasive exploration methods include more destructive methods of exploration such as reverse circulation or diamond drilling. The activities recommended to be undertaken during the exploration phase include the following:

#### 1) Data set gathering

Acquisition of all geological, geochemical and geophysical data set from the Geological Survey of Namibia (GSN). The data set will include all geological maps, Aerial photographs, satellite images, Geochem plots and geophysical filters.

#### 2) Data set Interpretation

An integrated Geological, Geochemical and Geophysical data interpretation should be carried out to delineate exploration targets.

### 3) Ground Truthing Exploration

Reconnaissance and field-based mapping is recommended to map out all geological units on local scale since the area was only mapped on regional scale by the (GSN). Focus on Purros Fault and Otjihaa amazonite occurrences.

### 4) Soil/Rock chips/Trench sampling

Soil & Rock chips sampling should be carried on the delineated exploration targets and all existing trenches that were dug by previous exploration work should be sampled for analysis.

The proposed work programme for the intended exploration activity are as follows:

- Construction of an 8km gravel road 1km before Epupa turning left up to the Kunene River;
- Construction of a 1km pipeline from the river to the mining house;
- Detailed geological mapping and sampling;
- SkyTEM electromagnetic and magnetic airborne survey;
- Geophysical interpretations and ground truthing; and
- Exploration drilling.

#### 2.2.1 Site Location and Jurisdiction

As mentioned, EPL 6669 is located in the north western part of Namibia approximately 200 km north west of Opuwo and 18 km south west of Epupa Village. EPL 6669 measures approximately 18847 Hectares in extent. **Table 2-1** below provides a summary of the site location details.

**Table 2-1:** Site location details

<b>Location</b>	200 km north west of Opuwo and 18 km south west of Epupa Village
<b>Area size</b>	18847 Hectares
<b>Constituency</b>	Epupa Constituency
<b>Regional Administration:</b>	Kunene Regional Council

## 2.3 Infrastructure and Services

It is anticipated that power supply required for drilling will be supplied by generators and/or electric drives. Water required for drilling works will potentially be sourced from the Kunene River (an abstraction permit will need to be obtained from the Ministry of Agriculture Water and Forestry). If there will be no sufficient water supply in the project area, water for drilling will need to be trucked or piped from elsewhere, outside the exploration site. Colleague

## 2.4 Resources and Working Team

The drilling will be done by an appointed drilling contractor, and it is expected that they will have their own workforce (drilling crew). However, some three to four people may be employed to carry out other exploration drilling related works. The nearest populated towns are Opuwo and Ruacana from which unskilled labour can be sourced. It is anticipated that the workforce will be housed in temporary site camps throughout the drilling period.

### 2.4.1 Exploration Drilling Process

The proposed exploration drilling is aimed at obtaining as much data as possible on the geology of the area in the subsurface. This will also aid in identifying the presence of the mineral ores of interest that can be evaluated to economically feasible resources.

The proposed exploration programme will consist of both non-invasive and more invasive exploration methods as outlined in Section 2.2 above. The process will be conducted in a phased approach. The first phase being the non-invasive exploration and dependent on the results the second phase (invasive) exploration will be conducted.

During the invasive phase, target areas that may accommodate base metals, are defined and delineated where drilling will be conducted (Enviro Dynamics Namibia, 2014). The typical drilling methods used for mineral exploration is either reverse circulation or diamond core drilling. The exploration on EPL 6669 is proposed to use diamond core drilling.

Subsurface sampling using the trenching method is proposed to be undertaken to determine the local geological structure of the area. Trenches can be excavated either by manual labour or by bulldozer or mechanical digger. Trenching can thus impact the receiving environment in a negative way but are not believed to be very severe in comparison to an extensive drilling programme. Mitigation measures nevertheless need to be applied to ensure that the negative environmental impacts are kept minimal.

Furthermore, wire line drilling (which is a type of diamond drilling) will be used to drill 6 holes for solid core sampling, a diamond drill is to be used at one hole in the river. Drilling will target depths in the range of 30-50 meters. Wire line drilling is a drilling method used in the exploration of minerals.

### ***2.4.2 Power and Water Supply***

It is anticipated that power supply required for drilling will be supplied by generators and/or electric drives. Water required for drilling works will be sourced from the Kunene River, should there be sufficiently available. It is not known how much water will be required for the exploration at this stage. Research has shown that approximately 10 000L of water is required for every 100 meters of core drilling. A permit for the abstraction of water would have to be obtained from the Ministry of Agriculture, Water and Forestry prior to commencing. If there will be no sufficient water supply in the project area, water for drilling will need to be trucked or piped from elsewhere, outside the exploration site.

### ***2.4.3 Site Access***

Access to EPL 6669 can be obtained via the C43 Road from Okangwati to Epupa Village. There is an existing track which is being utilised. However due to the rocky terrain the proponent proposed to construct an 8km gravel road 1km before Epupa turning left up to the Kunene River to allow access to the EPL.

### **3 PROJECT ALTERNATIVES CONSIDERED**

Alternatives are defined as: “different means of meeting the general purpose and requirements of the activity” (Environmental Management Act (2007) of Namibia [and its regulations (2012)]. This chapter will highlight the different ways in which the project can be undertaken and to identify the alternative that will be the most practical but least damaging to the environment.

Various alternatives have been identified in terms of the proposed exploration drilling and its related activities. The most significant alternatives considered are; no-go option, location, services infrastructure and exploration drilling methods.

The above-mentioned alternatives considered for the proposed activity are discussed in the following subchapters.

#### **3.1 No-Go Option**

The “No-Go” alternative is the option of not proceeding with the activity, which typically implies a continuation of the status quo. Should the proposed works on the EPL be discontinued, none of the potential impacts (positive and negative) identified would occur. Furthermore, the EPL will remain unused, i.e. the potential mineral ores occurring within the EPL will remain unexplored and depending on the exploration findings, unmined. This would also mean that the potential employment creation from exploration works and eventually mining will not occur. Therefore, no local, regional and national economic contribution from EPL 6669 would be realized.

Should the proposed drilling works be discontinued, the current land use for the proposed site will remain unchanged.



### 3.2 Project Location

The exact location of the exploration activities on the EPL is not defined yet, however from the previous studies conducted an area of interest has been identified in the center of the EPL and one area by the river. The location which allows for the least environmental and social harm is the preferred option. Additionally, the proposed drilling activity is an exercise to determine whether the mineral is available in the area and thus the exploration will not occur on the entire EPL area. The EPL location is also determined by the potential mineral ores in an area, which is geology specific. This will be determined during phase 1 of the exploration activities such as surface mapping and sampling. The preference of an EPL also depends on the individual or company interested in utilizing the EPL through exploration and eventually mining. With this type of activity, it is impossible to find an alternative location for the project because the presence of mineral ores to be explored is area specific, which is primarily determined by the site geology. Therefore, the site of interest would be the only viable location to undertake the proposed exploration drilling activities.

### 3.3 Services Infrastructure

In terms of the services that may be required for the proposed drilling works, their alternatives are presented in Table 3-1 below.

**Table 3-1: Alternatives considered in terms of services infrastructure**

Services	Proposed source	Alternative source
<b>Water</b>	Water to be sourced from the Kunene River via a pipeline.	Hauling water from other sources out of the project area.
<b>Power (electricity) for drilling</b>	Electric drives and generators.	Solar
<b>Power for cooking</b>	Gas stoves	Firewood (purchased from permit holding suppliers)
<b>Workers accommodation</b>	Accommodation in the nearest accommodation facility which is possibly Epupa Lodge or in Okangwati.	Campsite on site.
<b>Road (site accessibility)</b>	Accessed via the C43 Road and use of existing track to access the site.	An 8 km access road connecting the EPL with the C43 road.

Waste Management		
<b>Sewage</b>	Portable toilet - these are easily transportable and have no direct impact on the environment and ecology (if properly disposed). These are proposed at the drill sites.	Ventilated improved pit (VIP) latrine. This would be best suited at the contractors' camp.
<b>Domestic waste</b>	Onsite waste bins, regularly emptied at the nearest landfill.	Driving waste to the nearest town landfill which is in Okangwati/Opuwo.
<b>Drilling waste (chemicals)</b>	Waste generated is to be transported to and disposed of at an appropriate facility in the nearest town equipped for the disposal of hazardous waste	

### 3.4 Exploration drilling methods

The commonly used method in exploration drilling is diamond core drilling. However, another method used is reverse circulation drilling which is often the preferred method.

### 3.5 Conclusions on the Considered Alternatives

The alternatives considered for the project are summarized as follow:

- **No-go vs. continuation of the proposed project:** The no-go alternative is not considered to be the preferred option. Should the proposed works on the EPL be discontinued none of the potential impacts (positive and negative) identified would occur. Furthermore, the current land use for the proposed site will remain unchanged.
- **Project location:** The location of the EPL is determined by the potential mineral ores in an area, which is geology specific. No alternative location is considered viable due to the site determination resulting from the presence of mineral ores to be explored which is area specific, and primarily determined by the site geology.

- **Services Infrastructure:** Water for the proposed activity is to be sourced from the Kunene River. However, should this not be a sustainable option water would have to be trucked to the site from elsewhere. Increased use of solar technologies is promoted within the development, where it cannot be successfully employed the use of generators would be required. Domestic and hazardous waste are to be disposed of appropriately. No alternative route for access is available, and as such the identified route should be utilised. Portable toilets are to be made available at the drilling site and the contractor's camp and these are easily transportable and have no direct impact on the environment and ecology (if properly disposed).
- **Exploration drilling method:** The reverse circulation method is often the preferred method, as it produces a sample of rock cuttings rather than a sample of rock core as produced by diamond core drilling. Reverse circulation drilling is also relatively insensitive to ground conditions thus making it easier to penetrate any soil type (Northspan Explorations Ltd, 2019). This drilling method does not usually require a lot of site preparation. It often only requires truck-mounted rigs and one or two support vehicles to transport the drill rods and air compressor (NSW Mining, 2013). However, "the drilling method and size of the drilling hole depends on the type of rock and the information sought" (NSW Mining, 2013).

## **4 LEGAL FRAMEWORK**

A review of applicable and relevant Namibian legislation, policies and guidelines to the proposed development are given in this chapter. This review serves to inform the Proponent (Nangolo Trading Enterprise CC), Interested and Affected Parties and the decision makers at the DEA of the requirements and expectations, as laid out in terms of these instruments, to be fulfilled in order to undertake the drilling activities.

### **4.1 The Environmental Management Act No. 7 of 2007**

This scoping assessment was carried out according to the Environmental Management Act (EMA) and its Environmental Impact Assessment (EIA) Regulations (GG No. 4878 GN No. 30). The EMA has stipulated requirements to complete the required documentation in order to obtain an Environmental Clearance Certificate (ECC) for permission to undertake certain listed activities.

### **4.2 Minerals (Prospecting and Mining) Act No. 33 of 1992**

To provide 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.

The Proponent should ensure compliance with the conditions set in the Minerals Act regarding exploration works.

The full list of all applicable legislation identified and conducted during the EA process are presented in **Table 4-1** below.

**Table 4-1: Applicable and relevant Namibian and international legislations, policies and guidelines conducted during the EA process**

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Environmental Management Act (EMA) No. 7 of 2007	Requires that projects with significant environmental impacts are subject to an environmental assessment process (Section 27).  Details principles which are to guide all EAs.	The EMA and its regulations should inform and guide this EA process.
Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878)	Details requirements for public consultation within a given environmental assessment process (GN 30 S21).  Details the requirements for what should be included in a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15).	
The Constitution of Namibia Act No. 1 of 1990	According to Legal Assistance Centre (LAC), there is no clear right to health in the Namibian Constitution. But under the Article 95 of the Namibian Constitution that deals with Principles of State Policy, the Namibian Constitution states, “the state shall enact legislation to ensure consistent planning to raise and maintain an acceptable standard of living for the country’s people” and to improve public health.	The Proponent should ensure compliance with the conditions set in the Act.
Water Act No. 54 of 1956	The Water Resources Management Act 11 of 2013 is presently without regulations; therefore, the Water Act No 54 of 1956 is still in force:	The protection of ground and surface water resources should be a priority during the drilling works.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
	<ul style="list-style-type: none"> <li>• Prohibits the pollution of water and implements the principle that a person disposing of effluent or waste has a duty of care to prevent pollution (S3 (k)).</li> <li>• Provides for control and protection of groundwater (S66 (1), (d (ii))).</li> </ul> <p>Liability of clean-up costs after closure/abandonment of an activity (S3 (l)).</p>	
Water Resources Management Act No.11 of 2013	<p>The act provides for the management, protection, development, use and conservation of water resources; and provides for the regulation and monitoring of water services and to provide for incidental matters. The objects of this Act are to:</p> <p>Ensure that the water resources of Namibia are managed, developed, used, conserved and protected in a manner consistent with, or conducive to, the fundamental principles set out in Section 66 - protection of aquifers, Subsection 1 (d) (iii) provide for preventing the contamination of the aquifer and water pollution control (Section 68).</p>	
Soil Conservation Act No. 76 of 1969	<p>The Act makes provision for the prevention and control of soil erosion and the protection, improvement and conservation of soil, vegetation and water supply sources and resources, through directives declared by the Minister.</p>	<p>Duty of care must be applied to soil conservation and management measures must be included in the EMP.</p>

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Nature Conservation Ordinance No.4 of 1975	To consolidate and amend the laws relating to the conservation of nature; the establishment of game parks and nature reserves; the control of problem animals; and to provide for matters incidental thereto.	The Proponent should ensure that their activities do not in any way compromise the wildlife in the area of operations and the ordinance requirements are adhered to.
Agricultural (Commercial) Land Reform Act No. 6 of 1995 (Agricultural (Commercial) Land Reform Amendment Act No. 1 of 2014 ))	To 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 preferred 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.	The Proponent should ensure that relevant regulations sets under this Act are adhered to.
Forestry Act No. 12 of 2001	The Act provides for the management and use of forests and related products / resources. It offers protection to any living tree, bush or shrub growing within 100 metres of a river, stream or watercourse on land that is not a surveyed erven of a local authority area. In such instances, a licence would be required to cut and remove any such vegetation.	There are shrubs and trees within the proposed site to be explored. A permit to remove protected species will need to be obtained from the Forestry office in Opuwo.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
	These provisions are only guidelines.	
Atmospheric Pollution Prevention Ordinance No. 11 of 1976	This ordinance provides for the prevention of air pollution.	Measures should be instituted to ensure that dust emanating from drilling activities is kept at acceptable levels.
Public Health Act No. 36 of 1919	Section 119 states that “no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.”	The Proponent and all its employees / contractors should ensure compliance with the provisions of these legal instruments.
Health and Safety Regulations GN 156/1997 (GG 1617)	Details various requirements regarding health and safety of labourers.	
The Regional Councils Act No. 22 of 1992	<p>This Act sets out the conditions under which Regional Councils must be elected and administer each delineated region. From a land use and project planning point of view, their duties include, as described in section 28 “to undertake the planning of the development of the region for which it has been established with a view to physical, social and economic characteristics, urbanisation patterns, natural resources, economic development potential, infrastructure, land utilisation pattern and sensitivity of the natural environment.”</p> <p>The main objective of this Act is to initiate, supervise, manage and evaluate development.</p>	<p>The relevant Regional Council are considered to be IAPs and must be consulted during the Environmental Assessment (EA) process.</p> <p>The Kunene Regional Council is the responsible Regional Authority of the area in which the proposed activity will be undertaken, therefore should be consulted for this EA.</p>



Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Labour Act No. 6 of 1992	Ministry of Labour (MOL) is aimed at ensuring harmonious labour relations through promoting social justice, occupational health and safety and enhanced labour market services for the benefit of all Namibians. This ministry insures effective implementation of the Labour Act no. 6 of 1992.	The Proponent should ensure that the proposed activity does not compromise the safety and welfare of workers.
Minerals (Prospecting and Mining) Act No. 33 of 1992	To provide 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.	The Proponent should ensure compliance with the conditions set in the Minerals Act regarding exploration works.
Communal Land Reform Act No 5 of 2002 General Regulations	Regulation 30 provides that every person who wants to carry out any prospecting or mining operations on communal land must notify the Chief or Traditional Authority of the community and the relevant Communal Land Board.	These stakeholders are to be engaged during the process.
Best Practice Guide: Environmental Principles for Mining in Namibia- Exploration	Outlines the regulatory and legislative requirements for exploration in Namibia.  Serves as a guiding framework during the exploration phase of the mining life cycle.	The proponent should consult this guide as a framework for best practice mining and exploration activities in Namibia.

The environmental baseline (features) of the project area and the surrounding areas are presented and discussed in the following chapter.

## 5 ENVIRONMENTAL AND SOCIAL BASELINE

The proposed drilling activities will be undertaken in an environment with specific conditions. Prior to any development in an area and as part of an environmental assessment process, it is vital to firstly understand the pre-project/development conditions. This is also important to form a baseline understanding of the area and make reasonable conclusions on certain issues that may arise years later during or after the project's operations. The environmental and social baseline for the project area is presented under the subchapters below.

### 5.1 Biophysical Environment

The Kunene Region is largely characterized by arid conditions with the area experiencing less than the regional average rainfall annually. Its landscape is characterized by open grassland and shrubland interspersed between rocky mountainous terrain. The area experiences high temperatures in the summer and relatively low temperatures in the winter. The biophysical environment will be described below for the subject area.

#### 5.1.1 Climate

The climate of the Kunene Region can be described as semi-arid characteristic of occasional thundershowers. Annual temperatures range between 18-20 °C with the maximum temperatures ranging between 30-32 °C and the minimum temperatures between 8-10 °C (Mendelsohn, Jarvis, Roberts, & Robertson, 2002). Rainfall is recorded to fall mostly in the summer months of January, February and March with the average annual rainfall recorded to be between 100 mm to 200 mm for the subject area (Mendelsohn, Jarvis, Roberts, & Robertson, 2002).

#### 5.1.2 Topography, Soils and Geology

The Kunene Regions' geological formations date back to 250 million years (Kunene Regional Council, 2015). The local geology is underlain by basement rocks of the Okapuka Suite, Damaran rocks of the Nosib Group and Alluvium sediments (Nangolo, n.d.). The Okapuka Suite in this area predominantly consists of porphyritic and migmatitic gneisses, and amphibolite. "The Okapuka amphibolite is only exposed on the south western corner of the EPL. The Nosib Group mainly consists of feldspathic quartzite to arkose" (Nangolo, n.d.).

#### 5.1.3 Landscape

The subject area is very mountainous as it forms part of the Kaokoveld as depicted in Figure 5-1 below. Prominent landmarks in the Kunene Region are the Baynes and Hartmann's Mountains in the north and the Etendeka table mountain landscape in the south-west. East of Khorixas are the Ugab terraces with the famous Fingerklip (Ministry of Agriculture Water and Rural Development, 2011).



*Figure 5-1: Mountainous landscape*

#### **5.1.4 Water Resources: Surface and Groundwater**

The majority of the Kunene Region falls under the Northern Namib and Kaokoveld groundwater region. The region generally has low groundwater potential.

The Kunene River is one of the few permanent rivers in Namibia. All rivers in the region except for the Kunene are ephemeral. These include the tributaries of the Kunene such as Otjinjange, Omuhongo and Ondoto and the westward flowing ephemeral rivers (from north

to south), Nadas, Sechomib, Khumib, Hoarisib, Hoanib, Uniab, Koigab, Huab and Ugab (Ministry of Agriculture Water and Rural Development, 2011).

#### 5.1.5 Fauna and Flora

The subject area is characteristic of the Western Highlands biome and vegetation type. Open woodland Acacia and Mopane trees (*Acacia commiphora* and *Colophospermum mopane*) occur dominantly within the region. The area boasts a plant diversity of between 150 - 299 species (Environmental Resource Management, 2009).

The local Himba community use many of the plant resources for food, medicinal and ornamental purposes (Enviro Dynamics, 2013). Trees such as *Commiphora glaucescens* are used for various purposes. Trees in the region which play a vital role in the livelihood of the locals although they are not protected include: *Boscia tomentosa*, *Boscia foetida*, *Catophractes alexandrii*, *Terminalia prunoides*, *Commiphora tenipetiolata* and *Commiphora angolensis* (Enviro Dynamics, 2013).



**Figure 5-2:** Trees occurring within the region

The Kunene Region is home to the Skeleton Coast National Park which is classified as a faunal hotspot. The Park is located west of the EPL. The animals commonly found within the park include desert elephants, desert lion, cheetah, leopard and hyena (Enviro Dynamics, 2013). As there is no fence separating the Park from the surrounding area, these animals may roam through the EPL from time to time.

A rich fish diversity is experienced within the Kunene River with seven species which are endemic. There are at least 72 reptile species, 13 amphibian species and 379 bird species which have been found to occur along the Kunene River (Environmental Resource Management, 2009). The number of mammals in the area have been reported to decline with the mountain ground squirrel, the Kaokoveld dassie and the black-faced impala known to be endemic to the area (Environmental Resource Management, 2009).

#### *5.1.6 Archaeological and Anthropological Resources*

The Kunene Region has various archaeological sites of significance such as the declared Twyfelfontein Heritage site and the Petrified Forests.

Based on previous exploration activities within the region and archaeological knowledge the subject area is considered sensitive (Kinahan, 2013). This was further confirmed during the public consultation with the community that there are graves located within the EPL. It has been found in previous specialist studies in the general area that the archaeological density is expected to be in the region of 1.46 archaeological sites per 1 km<sup>2</sup> (Kinahan, 2013).

Due to the sensitivity of the area it is essential that an archaeological reconnaissance survey of the EPL be conducted with the assistance of a qualified Archaeological Specialist in the areas where drilling is expected to take place. Should it be determined that the exploration activities will occur within proximity of these sites the mitigation measures as outlined in the attached EMP with regards to Archaeology should be implemented immediately.

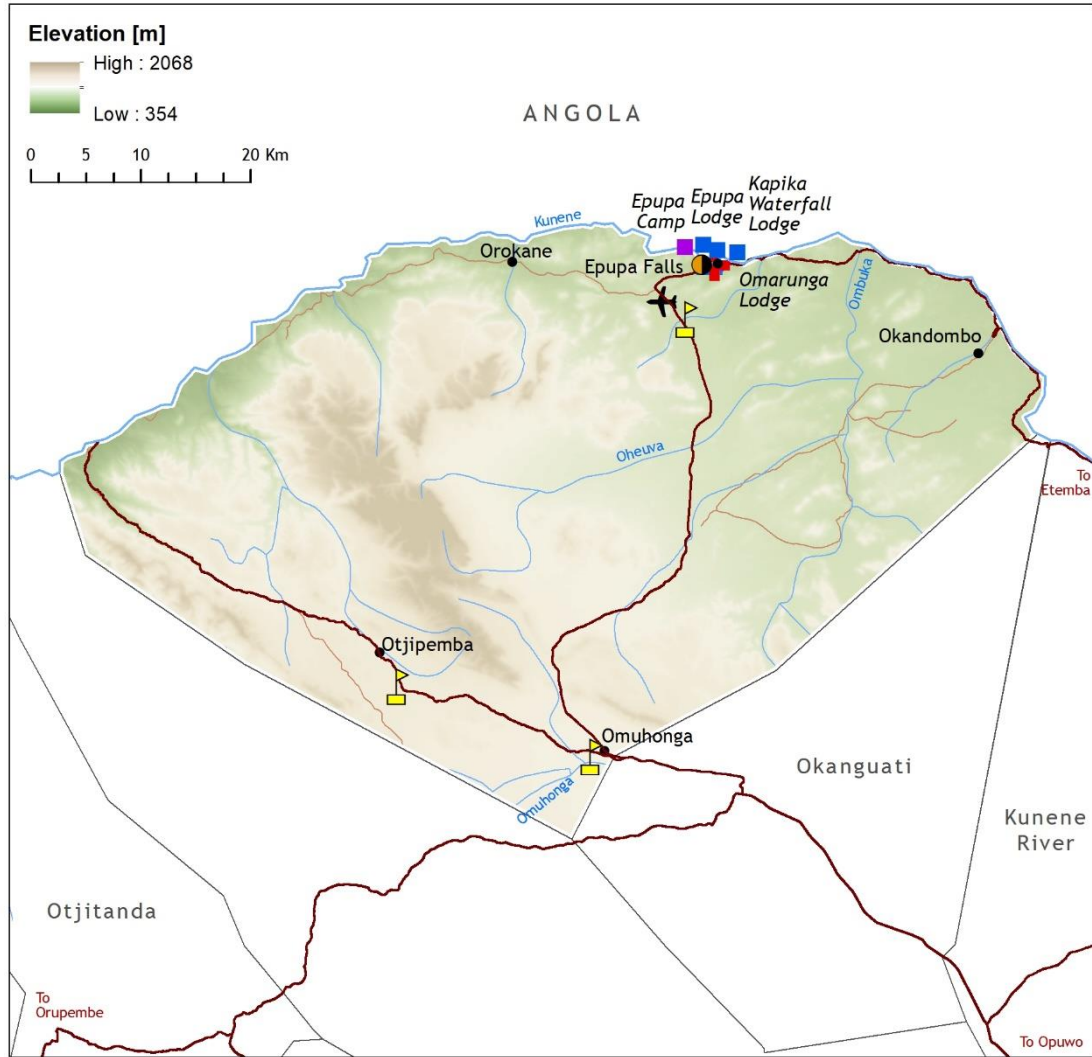
Additionally, the community must be consulted prior to any exploration commencing, enabling them to indicate which areas are to be strictly avoided. Exploration activities must ensure that they do not cause harm to these sites and any sites which are protected under the National Heritage Act.

It is further recommended to ensure that these impacts are adequately addressed that a detailed Archaeological Specialist study should be conducted should the project proceed to mining as part of the detailed Environmental Impact Assessment.

#### *5.1.7 Administration of the site*

The subject EPL is located within the Epupa Conservancy which is depicted in **Figure 5-3** below. The area is not classified as a protected area. The resources within the area belong to the state and are managed and administered by the community through the conservancy. As such the community shares the benefits that are derived from the land and the natural resources within the conservancy inclusive of the benefits derived from mining (Odendaal &

Hebinck, 2019). Access to the EPL needs to be negotiated with the conservancy representatives prior to exploration commencing.



**Legend**

- Settlement
- ▲ Place of interest
- Border post
- Conservancy office
- ▢ School
- ✚ Health facility
- Joint Venture Lodge
- Lodge/Campsite
- ✈ Air field

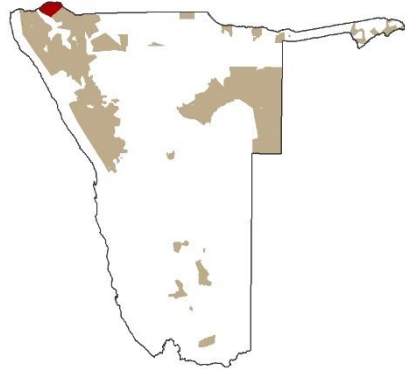


Figure 5-3: Epupa Conservancy (NACSO, 2017)

## 5.2 Social Environment

### 5.3 Social Baseline

The Kunene region of Namibia is in the north west of the country. It is bordered to the south by the Erongo region, to the east the Omusati region and to the north it borders the country of Angola. As a result of the harsh environment it is evident that there is a relatively low population in the area. This section will describe the prevailing socio-economic conditions of the region as well as the site-specific area with the objective of providing the proponent with a practical socio-economic blueprint from which various developmental considerations can be assessed.

### 5.4 Demographics

According to the Namibia Statistics Agency the Population of the Kunene Region is 87,019 (Namibia Statistics Agency, 2011). This has shown an increase of 26.6% since 2001, indicating an annual percentage increase in population of 2.3%, which is higher than the national population growth rate of 1.4% annually (Namibia Statistics Agency, 2011). As expected, the region is sparsely populated with a population density of 0.8 people per square kilometer as of 2011. This is significantly lower than the national population density of 2.6 people per square kilometer (Namibia Statistics Agency, 2011). Regionally, males slightly outnumber females at 101 males per 100 females, which is slightly unusual as most regional statistics indicate females slightly outnumbering males. This may simply be as a result of the relatively small population of the region.

**Table 5-1: Kunene Region Population by age Source:** (Namibia Statistics Agency, 2011)

Age	2001	2011
0-14 years	41 %	42 %
15- 64 years	54 %	53 %
65 + years	5 %	5 %

As per **Table 5-1** above, the population breakdown is indicative of what would be expected in developing countries. Most notably the larger proportions of youth in the age bracket of 0 -14 years of age (41%). This typically shows a population that is expanding. This does come with certain developmental challenges as it means a large proportion of the population is dependent on those of working age. Others of working age typically described as people between the ages 15 and 64 years of age make up 53% of the population as of 2011 (Namibia Statistics Agency, 2011). The regional population shows a small percentage of those above the age of 65 which indicates a relatively low life expectancy for the area. From the table above it is apparent that the region is experiencing developmental challenges.

According to the qualitative data collected during the site visit, the Epupa Regional Councilor indicated that between the settlements that are in the proximity of the project, their



population is approximately 2 500 and there are slightly more females than males that live here. This is not uncommon in rural Southern Africa but differs slightly to the regional statistics. It was also indicated that most households vary between 4 and 5 members per household. This is consistent with the national statistics and is not unusual for societies in southern Africa. As a result of predominantly subsistence livelihoods, family members are used as a human resource to further the production of the household (Namibia Statistics Agency, 2011).

## 5.5 Economic

According to the Namibian Statistics Agency, the regional unemployment rate is 41%. A total of 27,168 people are formally employed, which translates to approximately 31% (Namibia Statistics Agency, 2011).

**Table 5-2: Primary source of Income Kunene Region Source:** (Namibia Statistics Agency, 2011)

Main Source of Income	2001	2011
Farming	35 %	32 %
Salaries/wages	37 %	41 %
Remittances	7 %	5 %
Business	7 %	8 %
Pension	10 %	12 %

**Table 5-2** above, breaks down the main sources of income for the households in the region. Approximately 32% of household incomes were derived from subsistence agriculture and pastoral activities. As much as 41% of incomes were derived from formal salaries and wages, while 5% was derived from remittances sent home by members of the family that may be working in urban areas further away. There is some entrepreneurial activity in the region with 8% of household incomes coming from those who own their own businesses. Lastly, 12% of household incomes was as a result of pensions from retired employees (Namibia Statistics Agency, 2011).

Much of the economic data presented above was confirmed at site specific level from the qualitative data. It was stated that a large majority of the population relies on subsistence agriculture for their livelihood, as well as the rearing of cattle and goats. Although, it was indicated in the qualitative data collection that currently severe drought is impacting these subsistence households and the livestock are being affected. This is detrimental to the livelihoods. Furthermore, as a result of increasing frequency of drought there is a tendency to engage less in farming, but this is largely dependent on the rainfall received in a particular season.

## 5.6 Education and skills

Much like other rural areas in Southern Africa, education levels for the Kunene Region are relatively low. According to the Namibian Statistics Agency, the literacy rate amongst the population older than 15 years is 65% as of 2011, this is an increase of 8% since 2001. Although there has been an improvement in this regard, there is still a large need for basic education amongst the population.

**Table 5-3: School attendance Source:** (Namibia Statistics Agency, 2011)

Attendance	2001	2011
Never attended school	41 %	37 %
Currently attending school	9 %	9 %
Left School	39 %	45 %

Table 5-3 above, shows the statistics for school attendance according to the Namibian Statistics Agency. A large proportion of the population had no schooling at all (37%) thus there is a general lack of skills necessary to develop at the rate needed to improve socio economic conditions of the region (Namibia Statistics Agency, 2011). Currently, 9% of the population is enrolled at school and 45% has left school (Namibia Statistics Agency, 2011). They have either completed their studies, or had to leave school prematurely, most likely for financial reasons.

These regional statistics are supported by the site-specific qualitative data in which it was indicated that most of the population are uneducated. It was stated by the councilor that there are more people without education than those that have gone to at least primary school, which indicates that general skill levels of the area are low. Although, it was indicated that some people can drive, others have artisanal skills that can be made use of by the proponent.

## 5.7 Land Use

The area is mostly rural and therefore most use of land is for pastoralists and subsistence agriculture. This was echoed by the regional councilor for the site-specific area. The councilor also confirmed that the settlements have been present in the area for over 100 years. The main ethnicity is Himba and other ethnicities in the area include the Akoana and the Owathemba groups.

It was further stated that newcomers come to the area from the north of Namibia and even as far as Angola. When newcomers come to the area, they have to present themselves to the village chief. Following this, the chief will then call a meeting of the entire community to

establish whether the newcomers are welcome and where they can be allocated land to continue with their livelihoods.

## 5.8 Health

The life expectancy in the region is 55 for males as well as females, this has decreased from 65 in 1991, this can be attributed to the onset of HIV which has reduced the life expectancy for most countries in Southern Africa in the last 30 to 40 years. This was supported by qualitative data where it was indicated that although HIV rates are dropping, it is still largely prevalent in the area. It was also indicated that malaria is a common disease, and this can also reduce the life expectancy (Namibia Statistics Agency, 2011).

The region experiences an infant mortality rate of 55 deaths per 1000 births, this is almost double what is experienced in urban areas of the country. This could be a contributor to relatively high birth rates and subsequently, population growth. Improved health care can reduce the infant mortality rate, which, in turn, can improve the social development of the region. The regional councilor stated however, that the site-specific area has not experienced a high infant mortality rate, and that the settlements in the site-specific area have access to a clinic in Okangwati. Although, many make use of traditional healers who make use of traditional plants and animals. While this practice can achieve some levels of health care, there is scope for the clinic to work with these traditional healers.

Lastly, it was stated by the regional councilor that there is alcohol abuse in the area especially amongst the youth, and this can lead to further social risks for both households and the wider community.

## 5.9 Services and Infrastructure

In terms of housing, 8.7% of the households make use of informal housing, 40.1% of the households reside in traditional dwellings with 41.8% of the households residing in detached or semidetached households, Information for the remaining 9.4% is not available (Namibia Statistics Agency, 2011).

**Table 5-4: Source of energy Heating Source:** (Namibia Statistics Agency, 2011)

Electricity	Solar energy	Paraffin	Wood or wood charcoal	Coal	Other	None
11 %	0.5 %	0.5 %	30 %	1%	1%	6%

According to the data available from the Namibian Statistics Agency, data pertaining to the energy source used for heating was only collected for 50% of the households in the Kunene Region. Out of the total population, 11.5 % had access to formal electricity or solar energy. 30% of the population made use of wood or charcoal with 1% making use of coal. 6% of the

population had no access to an energy source whatsoever and data for the remaining 50% of the households is not available (Namibia Statistics Agency, 2011).

**Table 5-5: Source of energy lighting Source:** (Namibia Statistics Agency, 2011)

Electricity	Solar energy	Paraffin	Wood or wood charcoal	Candles	Other
36 %	8 %	17 %	12 %	23%	4%

According to the Namibian Statistics Agency, 36% of the region use electricity for their source of lighting, 8% use solar energy, 17% paraffin, 12% wood or charcoal, 23% candles and 4% other (Namibia Statistics Agency, 2011). This is indicative of poor regional development, and there is scope for electricity provision, which can improve social development in the area.

**Table 5-6: Source of drinking water Source:** (Namibia Statistics Agency, 2011)

Piped Water	Groundwater	Stagnant water	Flowing water	Other
58 %	25 %	9 %	5 %	3 %

In terms of access to drinking water, 58% of the region gets its water from reticulated piped water, 25% from groundwater, 9% from stagnant water, 5% from flowing water and 3% from another source. Furthermore, 63% of the population does not have access to adequate sanitation facilities in the form of flushed toilets. This can have severe consequences to health, and can also lead to the degradation of groundwater, increasing the risk of disease.

The region has good roads, which promotes trade, and benefits transport for the region. The larger regional and national roads are tarred, and generally in good condition. At the site-specific level, the tarred roads are discontinued from the town of Opuwo. There is a gravel road that connects Okangwati with the town of Epupa. There are no other roads in the area and those who live in remote villages, have to travers rough terrain to access other parts of the region.

## 6 PUBLIC CONSULTATION

### 6.1 Objective:

Public consultation forms an important component of an Environmental Assessment (EA) process. Public consultation provides potential Interested and Affected Parties (I&APs) with an opportunity to comment on and raise any issues relevant to the project for consideration as part of the assessment process. Public consultation has been done in accordance with both the EMA and its EIA Regulations.

The public consultation process assists the Environmental Assessment Practitioner (EAP) in identifying all potential impacts and to what extent further investigations are needed. Public consultation can also aid in the process of identifying possible mitigations measures.

### 6.2 Approach:

#### Interested and Affected Parties (I&APs)

GCS identified specific I&APs, whom were considered interested in and/or affected by the proposed exploration activities. The I&APs identified include; applicable organs of state (national, regional and local) and other interested members of the public. These I&APs were contacted directly and registered as I&APs. In addition, notices regarding the project were placed in widely circulated national newspapers for two consecutive weeks inviting members of the public to register as I&APs. A summary of the I&APs identified are presented in **Table 6-1**. The complete list of I&APs is provided in **Appendix C**.

**Table 6-1: Summary of Identified IAPs**

List of IAPs	Description
	Ministry of Environment and Tourism
	Ministry of Mines and Energy
	Kunene Regional Council
	Epupa Constituency
	Traditional Authorities
	Tourism facilities in the area

#### Communication with I&APs

Regulation 21 of the EIA Regulations details steps to be taken during a given public consultation process and these have been used in guiding this process.

Communication with I&APs about the proposed development was facilitated through the following means and in this order:

- A Background Information Document (BID) containing descriptive information about the proposed drilling activities was compiled (**Appendix D**) and sent out to all identified and registered I&APs per email dated 21 October 2019;
- Notices were placed in *The New Era* and *The Sun* newspapers dated 21<sup>st</sup> and 28<sup>th</sup> October 2019, briefly explaining the activity and its locality, inviting members of the public to register as I&APs (**Appendix E**);
- Site Notices were fixed at conspicuous locations in Okangwati (**see Appendix F**);
- A meeting was held with the Epupa Constituency Councillor and the relevant Traditional Authorities on 23 October 2019.
- A community meeting was held at the Omuhonga Village Council on 24 October 2019. Details regarding the proposed drilling activity and environmental assessment was provided. Opportunity was then given to ask questions or make comments with respect to the proposed activity. The minutes of the meeting is provided in **Appendix G**.

The following points were raised during the community meeting:

- The potential impacts on graves within the subject area.
- Consultation to be conducted with the community prior to any activity taking place on site.

The issues raised during the community meeting are further presented in the Issues and Response Report in **Appendix H**.

The scoping report was made available to all I&APs for public review from 5<sup>th</sup> February 2020 until 19<sup>th</sup> February 2020. I&APs had until 19<sup>th</sup> February 2020 to submit their comments on the project. The comment period remained open until the final scoping report is submitted to MET.

## 7 IMPACTS IDENTIFICATION, DESCRIPTION AND ASSESSMENT

### 7.1 Impact Assessment Methodology

The proposed drilling activities have impacts on certain biophysical and social features. The identified impacts were assessed in terms of probability (likelihood of occurring), scale/extent (spatial scale), magnitude (severity) and duration (temporal scale) as presented in **Table 7-1**, **Table 7-2**, **Table 7-3** and **Table 7-4**. To enable a scientific approach to the determination of the environmental significance, a numerical value is linked to each rating scale. This methodology ensures uniformity and that potential impacts can be addressed in a standard manner so that a wide range of impacts are comparable.

It is assumed that an assessment of the significance of a potential impact is a good indicator of the risk associated with such an impact. The following process will be applied to each potential impact:

- Provision of a brief explanation of the impact;
- Assessment of the pre-mitigation significance of the impact; and
- Description of recommended mitigation measures.

The recommended mitigation measures prescribed for each of the potential impacts contribute towards the attainment of environmentally sustainable operational conditions of the project for various features of the biophysical and social environment.

The following criteria were applied in this impact assessment:

#### 7.1.1 Extent (spatial scale)

Extent is an indication of the physical and spatial scale of the impact. **Table 7-1** shows rating of impact in terms of extent of spatial scale.

**Table 7-1: Extent or spatial impact rating**

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Impact is localised within the site boundary: Site only	Impact is beyond the site boundary: Local	Impacts felt within adjacent biophysical and social environments: Regional	Impact widespread far beyond site boundary: Regional	Impact extend National or over international boundaries

#### 7.1.2 Duration

Duration refers to the timeframe over which the impact is expected to occur, measured in relation to the lifetime of the project. **Table 7-2** shows the rating of impact in terms of duration.

**Table 7-2: Duration impact rating**

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Immediate mitigating measures, immediate progress	Impact is quickly reversible, short term impacts (0-5 years)	Reversible over time; medium term (5-15 years)	Impact is long-term	Long term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources

### 7.1.3 Intensity, Magnitude / severity

Intensity refers to the degree or magnitude to which the impact alters the functioning of an element of the environment. The magnitude of alteration can either be positive or negative. These were also taken into consideration during the assessment of severity. **Table 7-3** shows the rating of impact in terms of intensity, magnitude or severity.

**Table 7-3: Intensity, magnitude or severity impact rating**

Type of criteria	Negative				
	H-(10)	M/H-(8)	M-(6)	M/L-(4)	L-(2)
Qualitative	Very high deterioration, high quantity of deaths, injury of illness / total loss of habitat, total alteration of ecological processes, extinction of rare species	Substantial deterioration, death, illness or injury, loss of habitat / diversity or resource, severe alteration or disturbance of important processes	Moderate deterioration, discomfort, partial loss of habitat / biodiversity or resource, moderate alteration	Low deterioration, slight noticeable alteration in habitat and biodiversity. Little loss in species numbers	Minor deterioration, nuisance or irritation, minor change in species / habitat / diversity or resource, no or very little quality deterioration.

### 7.1.4 Probability of occurrence

Probability describes the likelihood of the impacts occurring. This determination is based on previous experience with similar projects and/or based on professional judgment. See **Table 7-4** for impact rating in terms of probability of occurrence.

**Table 7-4: Probability of occurrence impact rating**

Low (1)	Medium/Low (2)	Medium (3)	Medium/High (4)	High (5)
Improbable; low likelihood; seldom. No known risk or vulnerability to natural or induced hazards.	Likely to occur from time to time. Low risk or vulnerability to natural or induced hazards	Possible, distinct possibility, frequent. Low to medium risk or vulnerability to natural or induced hazards.	Probable if mitigating measures are not implemented. Medium risk of vulnerability to natural or induced hazards.	Definite (regardless of preventative measures), highly likely, continuous. High risk or vulnerability to natural or induced hazards.



### 7.1.5 Significance

Impact significance is determined through a synthesis of the above impact characteristics. The significance of the impact “without mitigation” is the main determinant of the nature and degree of mitigation required. As stated in the introduction to this chapter, for this assessment, the significance of the impact without prescribed mitigation actions was measured.

Once the above factors (Table 7-1, Table 7-2, Table 7-3 and Table 7-4) have been ranked for each potential impact, the impact significance of each is assessed using the following formula:

$$SP = (\text{magnitude} + \text{duration} + \text{scale}) \times \text{probability}$$

The maximum value per potential impact is 100 significance points (SP). Potential impacts were rated as high, moderate or low significance, based on the following significance rating scale (Table 7-5).

**Table 7-5: Significance rating scale**

<i>SIGNIFICANCE</i>	<i>ENVIRONMENTAL SIGNIFICANCE POINTS</i>	<i>COLOUR CODE</i>
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	>-60	H

For an impact with a significance rating of high, mitigation measures are recommended to reduce the impact to a low or medium significance rating, provided that the impact with a medium significance rating can be sufficiently controlled with the recommended mitigation measures. To maintain a low or medium significance rating, monitoring is recommended for a period of time to enable the confirmation of the significance of the impact as low or medium and under control.

The impact assessment for the proposed drilling activities is given in subchapter 7.2, 7.3 and 7.4.

## 7.2 Pre-operational Phase Impact Assessment

The pre-operational phase is mostly concerned with the preparation of the site for the drilling activities. As previously mentioned not much site preparation is required for the proposed drilling method. The potential impacts during this phase include biodiversity impacts.

### 7.2.1 Impact Assessment of Biodiversity Loss

The proposed construction of an access road and pipeline may impact the existing biodiversity in the area. This is due to the fact that the track would have to be cleared of vegetation to make way for the access road and proposed infrastructure. Care should be taken during the removal of vegetation for site preparation to ensure minimal disturbance in the area. The envisaged impact at the project site, is thus not of such magnitude and/ or significance that it will have irreversible impacts on the biodiversity and endemism of the area and Namibia at large. The assessment of this impact is presented in **Table 7-6**.

**Table 7-6: Assessment of the impacts of the drilling activities on biodiversity loss**

	Extent	Duration	Intensity	Probability	Significance
<b>Pre-mitigation</b>	L/M - 2	M - 2	M - 6	M - 3	<b>M - 30</b>
<b>Post-mitigation</b>	L - 1	L - 1	M/L - 4	M/L - 2	<b>L - 16</b>

#### 7.2.1.1 Mitigations and recommendation to biodiversity loss

- Large indigenous trees on site need to be identified, marked, surveyed and are not to be removed.
- Trees with a trunk size of 150 mm and bigger should be surveyed, marked with paint (readily visible) and protected.

## 7.3 Operational Phase Impact Assessment

The potential impacts associated with the operational phase of the drilling activities have been identified and assessed in this subchapter. The main impacts identified are; wildlife, soil and groundwater, waste, social and health and safety. Temporary potential impacts identified include dust and noise impacts.

### 7.3.1 Impact Assessment of Wildlife

The project area is home to wild animals, such as leopard, hyenas and cheetah. The impact may occur beyond the site boundary by the wildlife roaming in that area, as they would not be able to roam freely due to the drilling activities taking place. This is expected to occur for the duration of the drilling activities and could potentially become permanent should the project commence to mining (this will however be considered once the full EIA is commenced for the possible mining activities). The envisaged impact at the project site, is however not of such magnitude and/ or significance that it will have irreversible impacts on the biodiversity and endemism of the area and Namibia at large. The assessment of this impact is presented in Table 7-7.

**Table 7-7: Assessment of the impacts of the drilling activities on wildlife**

	Extent	Duration	Intensity	Probability	Significance
<b>Pre-mitigation</b>	M - 3	M - 3	M - 6	M - 3	<b>M - 36</b>
<b>Post-mitigation</b>	L/M - 2	L/M - 2	L/M - 4	L/M - 2	<b>L - 16</b>

#### 7.3.1.1 Mitigations and recommendation to wildlife

- Working hours should be limited to during the day, thus enabling the wildlife to roam freely at night.

### 7.3.2 Impact Assessment of Soil, Surface and Groundwater

Improper handling, storage and disposal of hydrocarbon products and hazardous materials at the site may lead to soil, surface and groundwater contamination, in case of spills and leakages. The assessment of this impact is presented in Table 7-8.

**Table 7-8: Assessment of the impacts of the drilling activities on soil, surface and groundwater**

	Extent	Duration	Intensity	Probability	Significance
<b>Pre-mitigation</b>	M/H - 4	M/H - 4	M/H - 8	M - 3	<b>M - 48</b>
<b>Post-mitigation</b>	M - 3	L/M - 2	M - 6	L/M - 2	<b>L - 22</b>

#### 7.3.2.1 Mitigations and recommendation to soil, surface and groundwater

- Careful storage and handling of hydrocarbons on site is essential.
- Potential contaminants such as hydrocarbons and wastewater should be contained on site and disposed of in accordance to municipal wastewater discharge standards so that they do not contaminate surrounding soils and eventually groundwater.

- An emergency plan should be available for major / minor spills at the site during operation activities (with consideration of air, groundwater, soil and surface water) and during the transportation of the product(s) to the site.

### 7.3.3 Impact Assessment of Waste

Improper disposal of waste materials at the site may lead to pollution of the site and resultant environmental degradation. The assessment of this impact is presented in Table 7-9.

**Table 7-9: Assessment of the impacts of the drilling activities on waste**

	Extent	Duration	Intensity	Probability	Significance
<b>Pre-mitigation</b>	M/L - 2	M/L - 2	M/L - 4	M - 3	<b>L - 24</b>
<b>Post-mitigation</b>	L - 1	L - 1	L - 2	M/L - 2	<b>L - 12</b>

#### 7.3.3.1 Mitigations and recommendation to waste

- Waste generated on site is to be collected and disposed of daily at the nearest licenced landfill.

### 7.3.4 Impact Assessment of Health and Safety

Exploration activities may cause health and safety risks to people operating on the site. The assessment of this impact is presented in Table 7-10.

**Table 7-10: Assessment of the impacts of the drilling activities on health and safety**

	Extent	Duration	Intensity	Probability	Significance
<b>Pre-mitigation</b>	M/L - 2	M/L - 2	M - 6	M/H - 4	<b>M - 40</b>
<b>Post-mitigation</b>	L - 1	L - 1	M/L - 4	M - 3	<b>L - 18</b>

#### 7.3.4.1 Mitigations and recommendation to Health and Safety

- Drilling operation workers should be provided with awareness training about the risks associated with hydrocarbon handling and storage.
- During the works conducted, workers should be properly equipped with personal protective equipment (PPE) such as coveralls, gloves, safety boots, safety glasses etc.

### 7.3.5 Impact Assessment of Dust

Dust generation may occur during drilling activities. The assessment of this impact is presented in Table 7-11.

**Table 7-11: Assessment of the impacts of the drilling activities on dust generation**

	Extent	Duration	Intensity	Probability	Significance
<b>Pre-mitigation</b>	L/M - 2	L/M - 2	M/H - 8	M - 3	<b>M - 36</b>

<b>Post-mitigation</b>	L - 1	L - 1	M - 6	M/L - 2	L - 16
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#### 7.3.5.1 Mitigations and recommendation to dust generation

- Dust abatement techniques should be implemented e.g. Spraying of water.

#### 7.3.6 Impact Assessment of Noise

Exploration equipment and machinery may produce high levels of noise during operations. Similarly, the use of aircrafts for remote sensing techniques during exploration over large areas may disrupt animals and human activity due to excessive noise. The assessment of this impact is presented in **Table 7-12**.

**Table 7-12: Assessment of the impacts of the drilling activities on noise**

	<b>Extent</b>	<b>Duration</b>	<b>Intensity</b>	<b>Probability</b>	<b>Significance</b>
<b>Pre-mitigation</b>	L/M - 2	L/M - 2	M/H - 8	M - 3	M - 36
<b>Post-mitigation</b>	L - 1	L - 1	M - 6	L/M - 2	L - 16

#### 7.3.6.1 Mitigations and recommendation to noise

- Drilling operations should not take place between dusk and dawn unless otherwise arranged with neighbouring farms in proximity.
- Avoid flying aircrafts directly over human settlements.
- Consult with the relevant stakeholders when would be the best suited time to fly.
- Noise levels should adhere to the South African National Standards (SANS) regulations 10103.

#### 7.3.7 Impact Assessment of Archaeological and Heritage Resources

The proposed exploration activities are proposed to take place in an area that has culturally significant archaeological or heritage resources. The community has indicated the presence of graves in the area which is culturally significant for the community. It needs to be ensured prior to exploration where these are located and that exploration activities are avoided in these areas. Should these be encountered during the exploration activities mitigation measures need to be in place to ensure that these resources are not harmed. The assessment of this impact is presented in **Table 7-13**.

**Table 7-13: Assessment of the impacts of the drilling activities on archaeological and heritage resources**

	<b>Extent</b>	<b>Duration</b>	<b>Intensity</b>	<b>Probability</b>	<b>Significance</b>
<b>Pre-mitigation</b>	M/H/M - 4	M/H - 4	M/H - 8	M/H - 4	H - 64
<b>Post-mitigation</b>	L/M - 2	L/M - 2	M - 6	M - 3	M - 30

### 7.3.7.1 Mitigations and recommendation to archaeological and heritage resources

- The community should be consulted prior to any exploration activities commencing to indicate where the graves are located, and which areas should be avoided during exploration.
- A cultural heritage expert must be appointed to undertake a detailed desktop study of the site and a site investigation in order to identify artefacts or areas of cultural heritage importance.
- A cultural heritage expert must be on site when any activity is carried out within 500m of an identified cultural heritage site / artefact / grave.
- All works are to be immediately ceased should an archaeological or heritage resource be discovered during activities on site. A cultural heritage expert must be brought to site in order to instruct the applicant on minimisation of further impact.
- The National Heritage Council of Namibia (NHCN) should advise with regards to the removal, packaging and transfer of the potential resource.

### 7.3.8 Impact Assessment of Social Environment

The proposed activity may provide employment opportunities for the local people. Additional benefits may arise depending on the agreements reached between the community and the proponent. These include the upgrading of the access road. The assessment of this impact is presented in Table 7-14.

**Table 7-14: Assessment of the impacts of the drilling activities on social environment**

	Extent	Duration	Intensity	Probability	Significance
<b>Pre-mitigation</b>	L - 1	L/M - 2	L - 2	M - 3	L - 15
<b>Post-mitigation</b>	L - 2	M- 3	M- 6	M/H - 4	M - 44

#### 7.3.8.1 Mitigations and recommendation to social environment

- Should any job opportunities result it should be made available to the local people in the area.

## 7.4 Decommissioning Phase

Once the drilling activities are decommissioned, the main potential impacts are; groundwater pollution and loss of jobs to the people employed by the activities.

#### 7.4.1 Impact on Groundwater

Should the drilling activities be decommissioned, and the exploration area be rehabilitated groundwater pollution may occur if contaminated soils are utilised during rehabilitation. The assessment of this impact is presented in **Table 7-15**.

**Table 7-15: Assessment of the impacts of decommissioning of drilling activity on groundwater**

	Extent	Duration	Intensity	Probability	Significance
<b>Pre-mitigation</b>	M/H - 4	M/H - 4	M/H - 8	M - 3	<b>M - 48</b>
<b>Post-mitigation</b>	M - 3	L/ML- 2	M- 6	M/L - 2	<b>L - 22</b>

##### 7.4.1.1 Mitigations and recommendation on groundwater

- Rehabilitation of the site to acceptable standards should be commenced once exploration works cease.
- Landowners should be consulted to indicate acceptance of the rehabilitation.

#### 7.4.2 Impact on Employment

Once the drilling activities are decommissioned those employed on contract basis may lose their jobs. The assessment of this impact is presented in **Table 7-16**.

**Table 7-16: Assessment of the impacts of decommissioning of drilling activity on employment**

	Extent	Duration	Intensity	Probability	Significance
<b>Pre-mitigation</b>	M/HL/M - 4	M/H - 4	M/H - 8	M - 3	<b>M - 48</b>
<b>Post-mitigation</b>	L/M - 3	L/M- 2	M- 6	L/M - 2	<b>L - 22</b>

##### 7.4.2.1 Mitigations and recommendation on loss of employment

- The Proponent should inform the employees, of its intentions to end the exploration activities, and the expected date.
- The Proponent should raise awareness of the possibilities for work in other related sectors.

## 8 RECOMMENDATIONS AND CONCLUSION

### 8.1 Conclusion

The key potential biophysical impact related to the pre-operational, operational and maintenance and decommissioning phases of the proposed project were identified and assessed. Suitable mitigation measures (where required and possible) were recommended, and the impacts can be summarised as follows:

- **Impacts on biodiversity loss (during pre-operational phase):** There is the possibility of loss of vegetation during the site clearing for the proposed activity. For the proposed method utilized it is not anticipated that much site preparation would be needed. However, the impact can be adequately addressed by the recommendations given under subchapter 7.2.1 and management actions given in the EMP (Chapter 3).
- **Impacts on wildlife (during operational phase):** The site is located within an area that is home to wild animals such as: leopard, hyenas and cheetah. It thus may disturb their roaming patterns. The impact can be adequately addressed by the recommendations given under subchapter 7.3.1 and management actions given in the EMP (Chapter 3).
- **Impacts on soil and groundwater (during operational and decommissioning phases):** Improper handling, storage and disposal of hydrocarbon products and hazardous materials at the site may lead to soil and groundwater contamination, in case of spills and leakages. Should the drilling activities be decommissioned, and the excavated areas be rehabilitated groundwater may be polluted if contaminated soils are used. The impact can be adequately addressed by the recommendations given under subchapters 7.3.2, 7.4.1 and also management actions given in the EMP (Chapter 3).
- **Impacts on waste (during operational phase):** Improper disposal of waste materials at the site may lead to pollution of the site and resultant environmental degradation. The impact can be adequately addressed by the recommendations given under subchapters 7.3.3 and also management actions given in the EMP (Chapter 3).
- **Impacts on dust and noise (during operational phase):** Exploration activities may increase dust and noise generated around the site area. The impact can be adequately addressed by the recommendations given under subchapter 7.3.5 and 7.3.6 and also management actions given in the EMP (Chapter 3).



- **Impacts on health and safety (during operational phase):** Exploration activities may cause health and safety risks to people operating on the site. The impact can be adequately addressed by the recommendations given under subchapter 7.3.4 and management actions given in the EMP (Chapter 3).
- **Impacts on archeological and heritage resources (during operational phase):** The proposed exploration activities are proposed to take place in an area that has culturally significant archaeological or heritage resources. The community has indicated the presence of graves in the area which is culturally significant for the community. A cultural heritage desktop and on-site investigation must be carried out prior to exploration in order to confirm where cultural heritage sites/artefacts/graves are located. These sites must be demarcated with a buffer to ensure exploration activities are avoided in these areas. Should these be encountered during the exploration activities mitigation measures need to be in place to ensure that these resources are not harmed. The impact can be adequately addressed by the recommendations given under subchapter 7.3.7 and management actions given in the EMP (Chapter 3).
- **Impact on social environment (during operational and decommissioning phase):** The proposed activity may provide employment opportunities for the local people. Additional benefits may arise depending on the agreements reached between the community and the proponent. These include the upgrading of the access road. Once the drilling activities are decommissioned those employed on contract basis may lose their jobs. The impact can be adequately addressed by the recommendations given under subchapter 7.3.7, 7.4.2 and also management actions given in the EMP (Chapter 3).

## 8.2 Recommendation

Based on the information provided in this report, GCS is confident the identified risks associated with the proposed development can be reduced to acceptable levels, should the measures recommended in the EMP be implemented and monitored effectively. It is therefore recommended that the project receive Environmental Clearance, provided that the EMP be implemented.

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