A SCOPING REPORT ON THE ENVIRONMENTAL IMPACT ASSESSMENT FOR SAND MINING ACTIVITIES ON MINING CLAIM 72027, NORTHERN NAMIBIA

Impala Environmental Consulting cc

1 Hahnemann Street Windhoek West,
061301936 / 0856630598
eia@impalac.com
www.impalac.com

ENVIRONMENTAL ASSESSMENT FOR MINING ACTIVITIES ON MINING CLAIMS 72027 CENTRAL NAMIBIA

EXECUTIVE SUMMARY

1. Introduction

1.1 Overview

The proponent has applied for four mining claims, namely MC 72027, with the Ministry of Mines and Energy. The applicant intends to mine industrial minerals (sand) on a small scale. The area of interest sits predominantly karoo sediments.

Impala Environmental Consulting cc was appointed by the proponent to undertake an Environmental Assessment (EA) and Environmental Management Plan (EMP) for the mineral exploration project.

1.2 Location

The mining claim is located 12 km north of Ongwediva, within the Endola constituency area. The coordinates for the center of the mining claims are 15.755457 and -17.658834.

1.3 Environmental Assessment Requirements

The Environmental Regulations procedure (GN 30 of 2012) stipulates that no mining and mining activities may be undertaken without an environmental clearance certificate. As such, an environmental clearance certificate must be applied for in accordance with regulation 6 of the 2012 environmental regulations. It is imperative that the environmental proponent must conduct a public consultation process in accordance with regulation 21 of the 2012 environmental procedure, produce an environmental scoping report and submit an Environmental Management Plan for the proposed mining activities.

1.4 Project Alternatives

An alternative to the proposed mining activity would be to allocate the land-usage to other income generating activities such as tourism and farming. Although the above mentioned activities may generate revenue for the government and provide employment to a few individuals, they may not have a significant impact on the community in comparison to the proposed project. The proposed project will strictly employ locals from nearby towns and settlements.

2. Summary of Applicable acts

All mineral rights, related to mining and mining activities in Namibia, are regulated by the Ministry of Mines and Energy whereas the environmental regulations are regulated by the Ministry of Environment and Tourism. The acts that affect the implementation, operation and management of mining activities in Namibia are:

- Environmental Management Act of 2007
- Minerals Prospecting and Mining Act of 1992
- Water Resources Management Act of 2004
- Nature conservation ordinance, ordinance No. 4 of 1995
- National Heritage Act, 2004 (Act No. 27 of 2004)
- Petroleum Products and Energy Act No.13 of 1990
- Forest Act, No. 12 of 2001
- Atmospheric Pollution Prevention Ordinance (1976)
- Hazardous Substance Ordinance No. 14 of 1974
- Namibian Water Corporation (Act 12 of 1997)

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FINAL SCOPING REPORT

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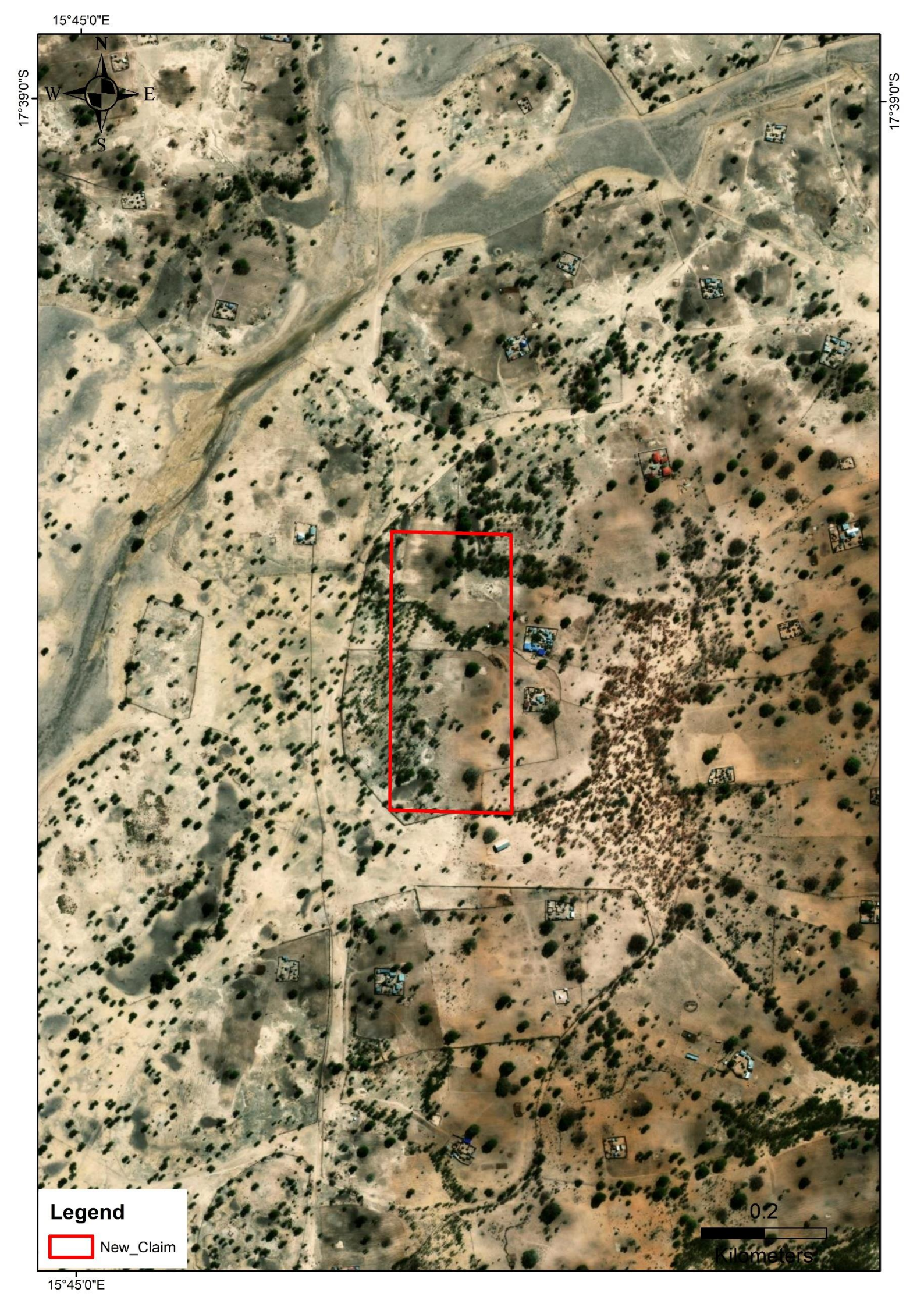
1. Project Background

1.1 Introduction

The proponent has applied for four mining claims, namely MC 72027, with the Ministry of Mines and Energy. The applicant intends to mine industrial minerals (sand) on a small scale. The area of interest sits predominantly on quaternary sediments. An outline of the area is shown in the image below.

Although Sand mining is costly, environmentally friendly Sand mining is a cornerstone, yet the Sand mining process must never be at the expense of people or the environment. The proponent believes that social and environmental responsibility is a prerequisite for providing a conducive environment for Sand mining and related activities. Impala Consulting cc was appointed by the proponent to undertake an Environmental Assessment (EA) and Environmental Management Plan (EMP) for the Sand mining project.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1.2 Project Location

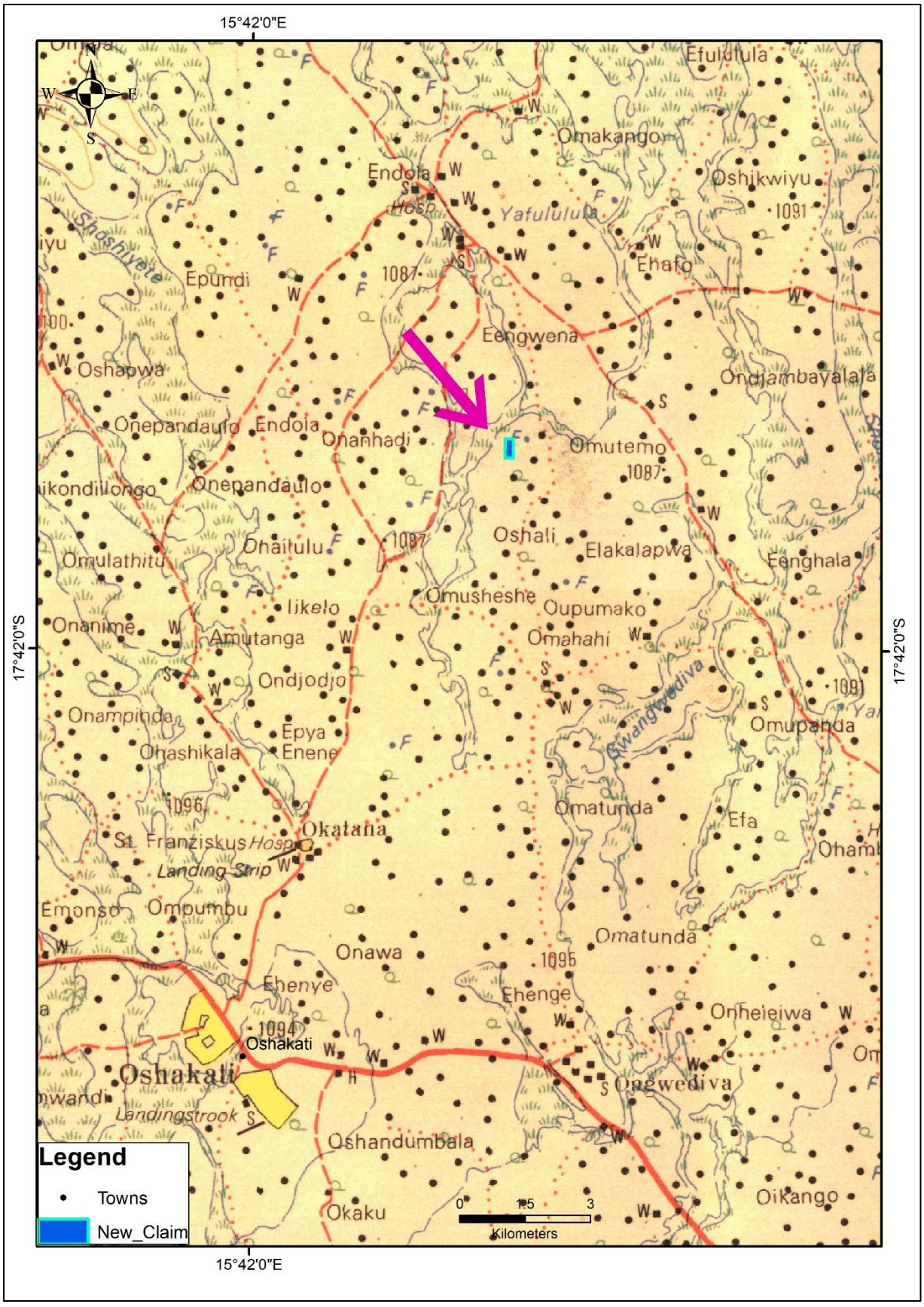

Figure 2 Locality map of the mining claim licence area

The mining claim is located 12 km north of Ongwediva, within the Endola constituency area. The coordinates for the center of the mining claims are 15.755457 and -17.658834.

1.3 Environmental Impact Assessment Requirements

The Environmental Regulations procedure (GN 30 of 2012) stipulates that no Sand mining activities may be undertaken without an environmental clearance certificate. As such, an environmental clearance certificate must be applied for in accordance with regulation 6 of the 2012 environmental regulations. It is imperative that the environmental proponent must conduct a public consultation process in accordance with regulation 21 of the 2012 environmental procedure, produce an environmental scoping report and submit an Environmental Management Plan for the proposed Sand mining activities.

1.4 Purpose of the Scoping Report

The scoping report is prepared for the Environmental Impact Assessment for Sand mining on an area which is located 12 km north of Ongwediva, within the Endola constituency area. Environmental scoping is a critical step in the preparation of an EIA for the proposed sand mining activities. The scoping process identifies the issues that are likely to be most important during the EIA and eliminates those that are of little concern. The scoping process shall be concluded with the establishment of terms of reference for the preparation of an EIA, as set out by the Ministry of Environment and tourism. The purpose of this scoping report is to:

- Identify any important environmental issues to be considered before commencing with Sand mining activities on the proposed mining claim sites.
- To identify appropriate time and space boundaries of the EIA study.
- To identify information required for decision-making.

As such, the key objectives of this scoping study are to:

- Inform the public about the proposed Sand mining activities.
- Identify the main stakeholders, their comments and concerns.
- Define reasonable and practical alternatives to the proposal.
- To establish the terms of reference for an EIA study.

1.5 Project Alternatives

An alternative to the proposed Sand mining activities would be to allocate the land-usage to other income generating activities such as communal farming activities. Although the above-mentioned activities may generate revenue for the government and provide employment to a few individuals, the proposed project will strictly employ locals from nearby Endola area.

2. Summary of applicable legislation

All mineral rights, related to Sand mining activities in Namibia, are regulated by the Ministry of Mines and Energy whereas the environmental regulations are regulated by the Ministry of Environment and Tourism. The acts that affect the implementation, operation and management of mining and mining activities in Namibia are shown below.

2.1 Environmental Management Act of 2007

Line Ministry: Ministry of Environment and Tourism

The regulations that accompany this act lists a number of activities that may not be undertaken without an environmental clearance certificate issued in terms of the Act. The act further states that any clearance certificate issued before the commencement of the act (6 February 2012) remains in force for one year. If a person wishes to continue with activities covered by the act, he or she must apply for a new certificate in terms of the Environmental Management Act.

2.2 The Minerals Prospecting and Mining Act of 1992

Line Ministry: Ministry of Mines and Energy

The Minerals Prospecting and Mining Act No.33 of 1992 approves and regulates mineral rights in relation to exploration, mining, prospecting, small scale mining, mining, large-scale mining and transfers of mineral licences.

2.3 Water Resources Management Act of 2004

Line Ministry: Ministry of Agriculture, Water and Forestry

The act provides for the management, protection, development, usage and

conservation of water resources; to provide for the regulation and monitoring of water resources and to provide for incidental matters.

2.4 Nature conservation ordinance, ordinance No. 4 of 1975

Line Ministry: Ministry of Environment and Tourism

The Nature Ordinance 4 of 1975 covers game parks and nature reserves, the hunting and protection of wild animals (including reptiles and wild birds), problem animals, fish, and the protection of indigenous plants. It also establishes a nature conservation board. The basic set of regulations under the ordinance is contained in GN 240/1976 (OG 3556). The topics covered in the regulations include tariffs (game parks), regulations relating to game parks, swimming baths, use of boats in game parks, inland fisheries, keeping game and other wild animals in capturing. In addition, the ordinance also regulates game dealers, game skins, protected plants, birds kept in cages, trophy hunting of hunt-able game, hunting at night, export of game and game meat, sea birds, private game parks, nature reserves, regulations of wildlife associations and registers for coyote getters.

2.5 National Heritage Act, 2004 (Act No. 27 of 2004)

Line Ministry/Body: National Heritage Council

The National Heritage Act provides for the protection and conservation of places and objects of heritage significance and the registration of such places and objects; to establish a National Heritage Council; to establish a National Heritage Register; and to provide for incidental matters.

2.6 Petroleum Products and Energy Act No. 13 of 1990

Line Ministry/Body: Ministry of Mines and Energy

The act regulates the importation and usage of petroleum products. The act reads as “To provide measures for the saving of petroleum products and an economy in the cost of the distribution thereof, and for the maintenance of a price thereof; for control of the furnishing of certain information regarding petroleum products; and for the rendering of services of a particular kind, or services of a particular standard; in connection with motor vehicles; for the establishment of the National Energy Fund

and for the utilization thereof; for the establishment of the National Energy Council and the functions thereof; for the imposition of levies on fuel; and to provide for matters incidental thereof".

2.7 Forest Act, No. 12 of 2001

Line Ministry/Body: Ministry of Agriculture, Water and Forestry

The act regulates the cutting down of trees and reads as follows "To provide for the establishment of a Forestry Council and the appointment of certain officials; to consolidate the laws relating to the management and use of forests and forest produce; to provide for the protection of the environment and control and management of forest trees; to repeal the preservation of Bees and Honey proclamation 1923, preservation of Trees and Forests Ordinance, 1952 and the Forest Act, 1968; and to deal with incidental matters".

The constitution defines the function of the Ombudsman and commits the government to sustainable utilization of Namibia's natural resources for the benefit of all Namibians and describes the duty to investigate complaints concerning the over-utilization of living natural resources for the benefit of all Namibians and describes the duties to investigate complaints concerning the over-utilization of living natural resources, the irrational exploitation of non-renewable resources, the degradation and the destruction of ecosystem and failure to protect the beauty and character of Namibia. Article 95 states that "*the state shall actively promote and maintain the welfare of the people by adopting; inter-alia policies aimed at maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of natural resources on a sustainable basis for the benefit of all Namibians both present and future*".

2.8 Atmospheric Pollution Prevention Ordinance (1976)

Line Ministry/Body: Ministry of Health and Social Services

This ordinance provides for the prevention of air pollution and is affected by the Health Act 21 of 1988. Under this ordinance, the entire area of Namibia, with the

exception of East Caprivi, is proclaimed as a controlled area for the purposes of section 4(1) (a) of the ordinance.

2.9 Hazardous Substance Ordinance, No. 14 of 1974

Line Ministry/Body: Ministry of Safety and Security

The ordinance provides for the control of toxic substances. It covers manufacture, sale, use, disposal and dumping as well as import and export. Although the environmental aspects are not explicitly stated, the ordinance provides for the importing, storage and handling.

2.10 Namibian Water Corporation (Act 12 of 1997)

Line Ministry/Body: Namibian Water Corporation

The act caters for water rehabilitation of prospecting and mining areas, environmental impact assessments and for minimising or preventing pollution.

3. Description of Proposed Sand Mining Project

3.1 Introduction

Sand mining is the extraction of sand from the environment. Sand mining is also known as ‘sand winning’. Sand is a naturally occurring granular material with a particle size between 0.06 to 2 mm in diameter. It is formed over time by the weathering of rock and is comprised mainly of silica. An important characteristic of sand is that it can be transported - by wind and water, for example and deposited. Natural sand tends to ‘accumulate in rivers, on beaches, in dunes and in valleys. Sand can also be artificially manufactured by crushing coarser aggregates such as stone and gravel that have already been mined from a quarry.

In Namibia, fine aggregate, generally in the form of river sand, is used mainly for the manufacture of concrete, mortar, and in road and dam construction. The local demand of fine aggregate in Namibia varies considerably, but the availability of river sand for fine concrete aggregate can be regarded as being not problematic, due to the presence of dry riverbeds throughout the entire country (Miller, 1992).

3.2 Mining Method

3.2.1 Sand Mining

Sand is extracted from the environment by sand mining. The operation is relatively unsophisticated and rudimentary. A sand miner would require basic equipment: a dozer to clear vegetation and build access roads; an excavator or front-end loader to scoop up sand from the deposit; and trucks to cart the sand away. The barriers to entry are, therefore, low and a sand mining operation can be set up with relatively low cost. In fact, sand mining is ideally suited to small-scale miners and new entrants to the industry. Profits on the sale of sand can be high making this industry quite lucrative.

A typical sand mining operation would take place on the banks of a river where alluvial sand has been deposited. The miner would, first, build an access road to the mining area and then bring plant (dozers, front-end loaders and excavators) onto site (Green, 2012).

The miner may then establish a temporary camp, usually a gazebo, and install portable toilets to provide shelter and sanitation to staff. There is generally no more than four to five staff on site at any given time. Excavators are used to scoop sand from the deposit and form stockpiles. Front-end loaders are then used to load sand from the stockpiles onto tipper trucks that arrive and depart from the mining area throughout the day. In some cases, the sand is processed on site by sieving or washing in order to obtain a uniform particle size. Once an area has been mined out the miner is required to rehabilitate the mined area before moving on to the next mining area which is usually located adjacent to the previous mining area (Green, 2012).

A sand mining operation can be viewed as being made up of some, or all, of the following sub-activities:

- clearing of vegetation;
- construction of access road;
- establishment of a temporary site camp;
- establishment of temporary ablutions;
- diverting the flow of a river;
- altering the banks of a river;
- extracting sand from a deposit;
- extracting water from a river;
- building of berms;
- temporary stockpiling of material;
- storage of diesel and oil;
- maintenance of vehicles and plant; and
- rehabilitation activities such as landscaping and seeding

Figure 3 below shows a general layout of the processes involved in Sand mining.

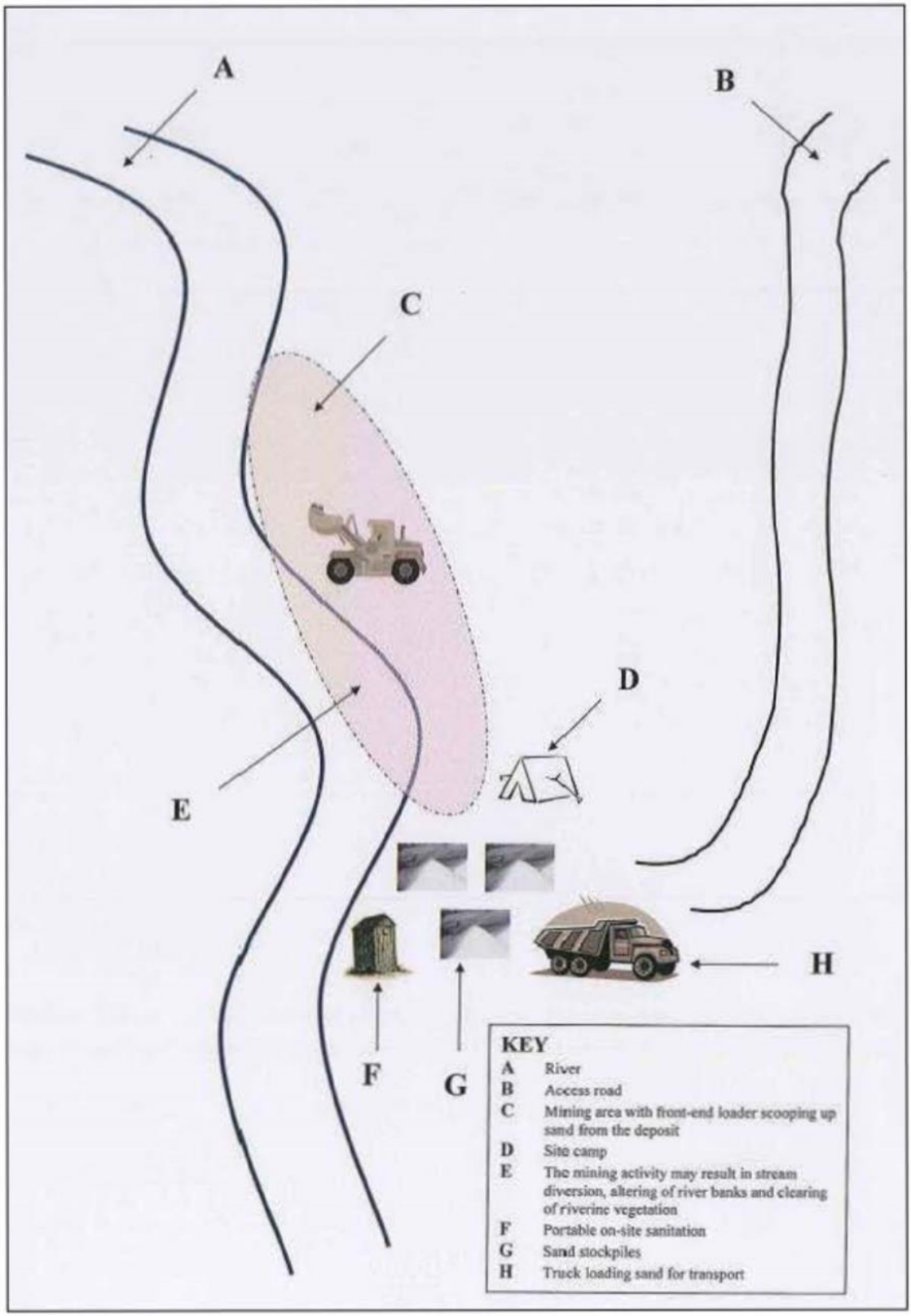

Figure 3 General layout of a typical sand mining operation in a river, modified after (Green, 2012).

3.2.2 Mineral Processing

It is understood that the proponent is considering establishing a dry screening plant at the excavation site. Almost certainly, the proponent will choose an elevated

location so as to be above river flood level and will need to create a bench on which to establish the plant, stockpiles and other facilities.

3.2.3 Site Residue and rehabilitation

The only noticeable mine residue will be the “waste” sand material not usable. This material can be used for rehabilitation purposes during decommissioning. The overburden removed during the opencast operation will be used to fill the excavations during rehabilitation with the result that on completion of sand mining no waste dumps will remain.

3.3 Labour Requirements

The proponent intends to employ more than 5 personnel, excluding management. The employees will be sourced from the local community including residence from the Endola area. All employees will undergo a safety induction, first aid training course and wildlife awareness program. The Labour Act of 2007 will always be adhered to.

3.4 Waste Rock Dumps

In choosing a waste rock dumpsite, the following aspects will be strongly considered by the miner:

- Topography
- Land-use in the area
- The presence of any hazardous geological structures
- Groundwater considerations
- The prevailing wind direction in the area
- Visual impacts that the waste dump might have
- Presence of surface water in the vicinity of the area
- Presence of sensitive ecological areas

There will be two types of waste dumps. The first is a general waste dump and the second will be for low-quality, inconsistent or uneconomic sand units.

3.5 Services

3.5.1 Electricity requirements

The bulk of the power supply to the sand mine will be sourced from the proponent's own generator of 120 KVA. The power requirements for the proposed project will be minimal as power will only be required for the following activities:

- Emergency lighting
- Powering small machinery during the sand mining process
- Power supply for office block or container.

3.5.2 Water Supply

For the purpose of the scoping study costing requirements, a separate geo-hydrological study will be undertaken at an advanced stage of the EIA. A dry screening process will be utilised, which requires no water. Water containers will be brought on site and utilised whenever necessary. The water will mostly be used for general consumption and cleaning.

3.6 Infrastructure

3.6.1 Refuse and waste removal

The proponent will negotiate directly will all suppliers of consumables such as grease, oil etc. to remove these materials for disposal once they have been used and need to be discarded. The Miner will provide adequate sanitary facilities and such facilities must be maintained in a hygienic condition. Sewerage must be disposed off in a manner not polluting the environment. The Miner will remove all refuse pertaining to the Miner's activities, domestic or otherwise, from the property. The Miner will undertake environmental rehabilitation, both during and at the conclusion of the sand mining operations.

3.6.2 IT Systems and communication

In future, provision will be made for a fixed-line telephone, computers, printers and offline equipment in the office block/container on site. This will ensure effective

communication between management and personnel for safety and production reasons. Provision will also be made for two-way radios to enable the machine operators and the on-site staff to communicate effectively.

3.6.3 Security and Fencing

No provision has been made for fencing although strict access to and from the quarry site will be facilitated by security personnel/guards.

3.6.4 Buildings

Provision will be made for prefabricated buildings and containers for the following purposes:

- General Office or administration purposes
- Workshop for Quarry
- Security control room
- Medical or first aid room

3.6.5 Roads

Access to the sand mining sites is limited as there are currently no convenient roads, except for 4x4 tracks. From Oshakati, the sand mining site will be accessed via the C45 road. Thereafter, a separate gravel road will be used by the miner.

3.6.6 Mobile Equipment

The proponent's vehicle fleet will be optimised during the next project phase. Provision will be made for:

- Excavator
- Tipper Trucks
- Front-End Loader
- 4x4 Vehicles

3.6.7 Fuel Distribution, storage and supply

Provision will be made for diesel storage and a curb-side pump for filling of the mobile equipment. Diesel will be delivered to an on-site fuel storage facility by road transport and offloaded into the storage tanks by offloading pumps.

3.6.8 Storage of Lubrication and consumables

Consumables and lubrication will be stored in a designated area within the workshop container. These substances will only be used for mechanical purposes and are assumed to be non-hazardous.

3.6.9 Fire Fighting Provision

Portable fire-extinguishers will be fitted, as required, in vehicles and earth-moving equipment, as well as in the workshop/ mobile containers.

4. Description of the Current Environment

4.1 Introduction

This section aims to document the present state of the environment, the likely impact of changes being planned and the regular monitoring to attempt to detect changes in the environment. The project area is positioned in a sparse grassland and shrubland biome. The sparse grassland have been variously defined, but most generally can be described as “communities or landscapes with a continuous grass layer and scattered trees” (Barnard, 1998).

4.2 Climatic Conditions

4.2.1 Temperature

In the proposed Sand mining area, December is the warmest month with an average temperature of 30-31°c at noon. July is the coldest month with an average temperature of 20°c. Ongwediva, which is in the vicinity of the project area, has distinct temperature seasons, the temperature varies during the year.

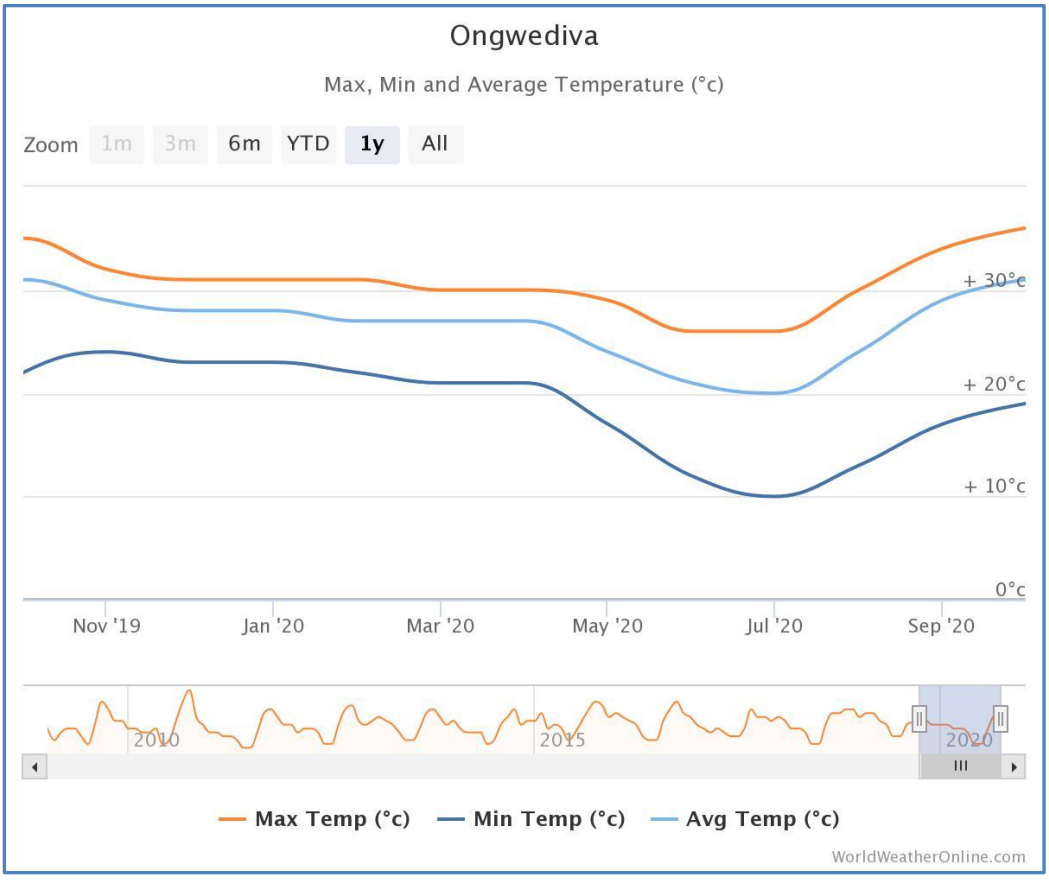

Figure 4 A graph showing the temperature patterns in Ongwediva, from www.worldweatheronline.com

Overall, winters are mild in temperature, with coldest month most often being July.

4.2.2 Precipitation

In the proposed Sand mining area, the highest rainfall is usually experienced in December which may reach 200 mm with average rainfall days of 1. In January months, rainfall may reach about 180 mm with average rainfall days. The graph below shows the rainfall patterns in the area.

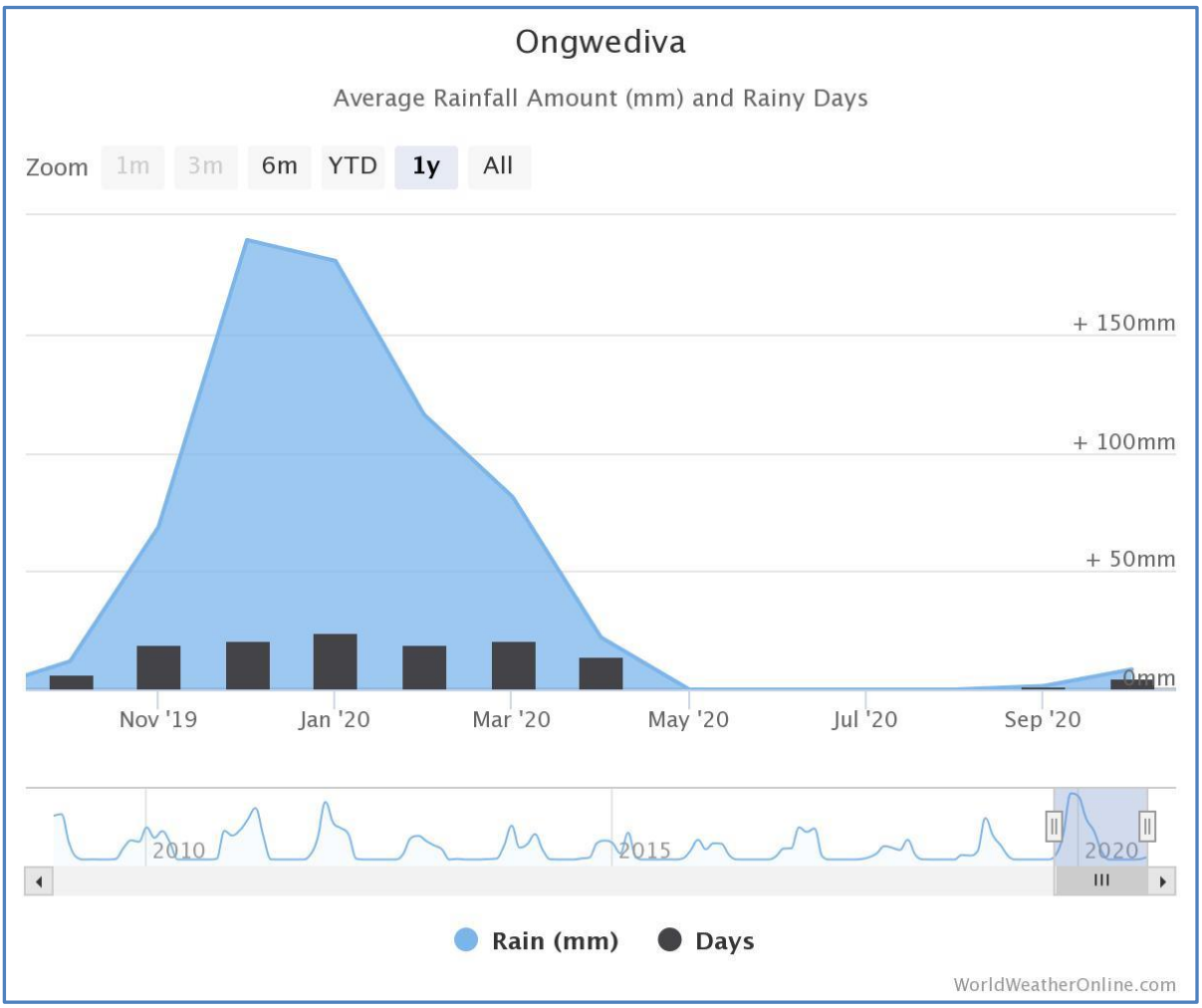

Figure 5 A graph showing rainfall patterns in Ongwediva, from www.worldweatheronline.com

4.2.3 Wind

Predominantly south easterly. Southerly, easterly and northerly airflow is common.

4.2.4 Humidity

The relative humidity during the least humid months of the year, i.e. September and October, is around 11-21% and the most humid month is March with 71-81% humidity. Namibia has a low humidity in general, and the lack of moisture in the air

has a major impact on its climate by reducing cloud cover and rain and increases the rate of evaporation.

4.3 Geology

4.3.1 Geological setting

The Sand mining area is located within the Congo Craton area and is mostly covered by quaternary sediments and karoo sediments.

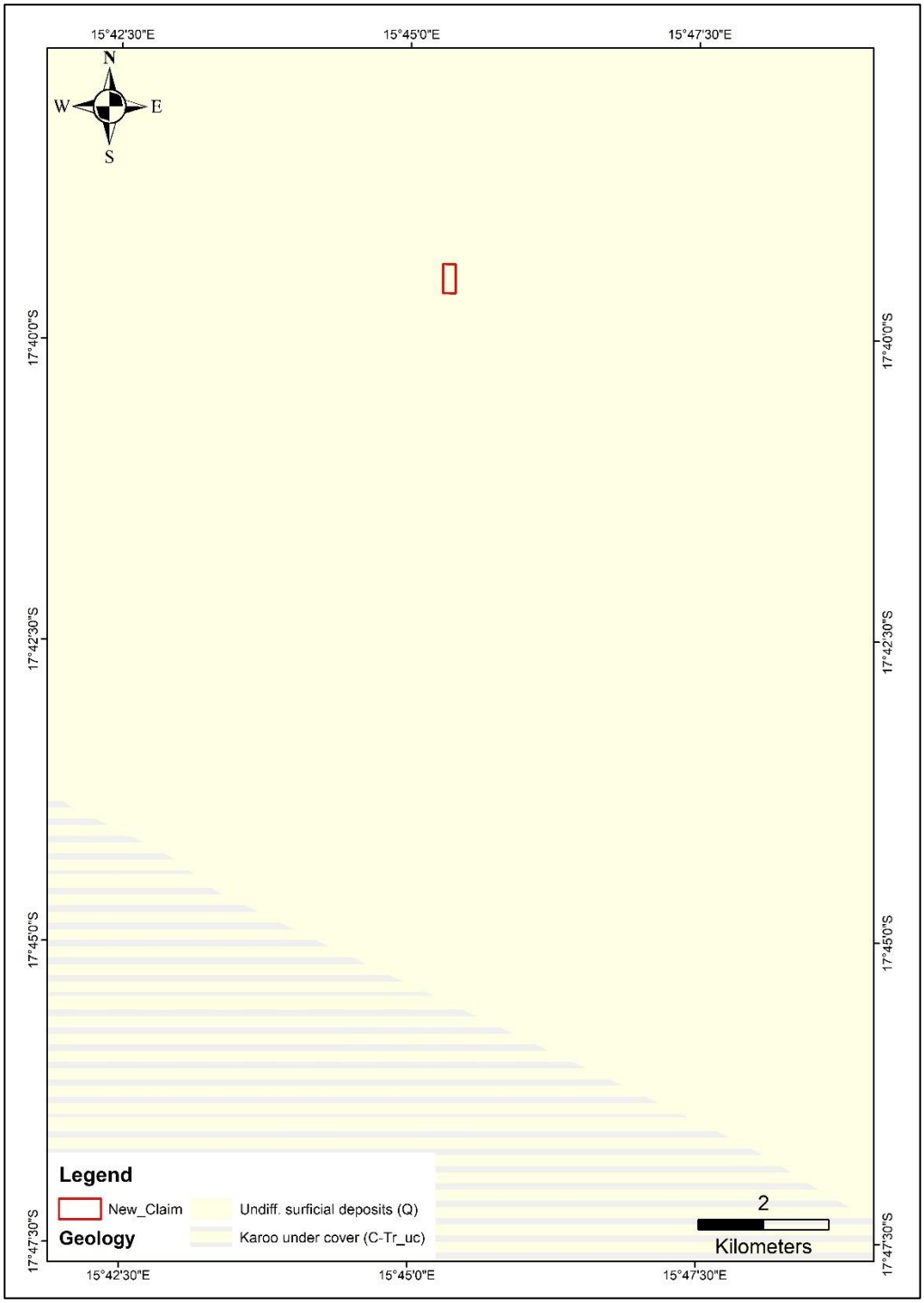

Figure 6 A geological map of the area

4.4 Hydrogeology and Water Resources

The area is underlain by a region with little or no ground water as shown by the hydrogeological map below.

4.5 Flora

Rainfall in the Ohangwena Region is usually extremely variable which means that years of abundant rain often followed by extreme dry conditions (Mendelsohn, et al., 2002). In form, vegetation is generally sparse, with few trees and a thin variety of grass. Plant cover varies in relation to rainfall. The surrounding area is characterised by high botanical diversity. Based on the literature review, all the vegetation that are found within the vicinity of the area are of “low” to “medium” sensitivity against external conditions. The growing season is very short due to the arid climate.

Grass is dependable on rainfall, which in-turn causes livestock and other animals to suffer during periods of minimal rainfall (Burke, 2003). Burke (2003) describes the presence of 15 (fifteen) vegetation species within the vicinity of the study area, which are namely:

Table 1 A table showing plant species which are likely to occur in the area

SCIENTIFIC NAME	COMMON NAME	STATUS IN NAMIBIA
Acacia erioloba	Camel thorn	Protected
Acacia mellifera	Black thorn	Secure
Acacia reficiens	False umbrella thorn	Secure
Acacia haematoxylon	Grey camel thorn	Protected
Acacia erubescens	Blue thorn	Secure
Acacia karroo	Sweet thorn	Secure
Acacia tortolis	Umbrella thorn	Secure
Acacia hereroensis	False hook-thorn	Secure
Commiphora tenuipetiolata	White-stem corkwood	Secure
Aloe littoralis		Protected
Ozoroa crassinervia	Namibian resin tree	Near endemic, protected
Boscia albitrunca	Shepherd’s tree	Protected
Albizia anthelmintica	Worm-bark false-thorn	Protected
Ziziphus mucronata	Buffalo-thorn	Protected
Catophractes alexandri	Trumpet thorn	Secure
Combretum apiculatum	Red bush willow	Secure
Commiphora dinteri		Endemic
Commiphora glandulosa	Tall common corkwood	Secure
Commiphora glaucescens	Blue-leaved corkwood	Nearendemic
Croton gratissimus	Lavender fever-berry	Secure
Cyphostemma bainesii		Endemic, protected
Dichrostachys cinerea	Sickle bush	Secure
Diospyros lycioides	Blue bush	Secure
Dombeya rotundifolia	Common wild pear	Endemic
Ehretia alba		Secure

Elephantorrhiza suffruticosa		Secure
Euclea pseudebenus	Ebony tree	Protected
Euclea undulata	Common guarri	Secure
Euphorbia guerichiana	Western woody milk bush	Secure
Euphorbia virosa		Secure
Ficus cordata	Namaqua fig	Protected
Ficus ilicina	Laurel fig	Secure
Ficus sycomorus	Common cluster fig	Protected
Grewia bicolor	White raisin	Secure
Grewia flava	Velvet raisin	Secure
Grewia flavescens	Sand paper raisin	Secure
Gymnosporia senegalensis	Red spike-thorn	Secure
Ipomoea adenioides		Secure
Lycium bosciifolium		Secure
Lycium cinereum		Secure
Lycium eenii		Secure
Lycium hirsutum		Secure
Lycium villosum		Secure
Maerua juncea		Secure
Maerua schinzii	Ringwood tree	Protected
Manuleopsis dinteri		Endemic
Melianthus comosus		Secure
Obetia carruthersiana		Near endemic
Pechuel-Loeschea leubnitziae		Secure
Sterculia africana	African star-chestnut	Protected
Tarchonanthus camphoratus		Secure
Tetragonia schenckii		Secure
Vernonia cinerascens		Secure
Searsia (Rhus) ciliata		Secure
Searsia (Rhus) lancea	Karree	Protected
Searsia (Rhus) marlothii		Secure

The density of vegetation in the vicinity of the Sand mining site is fairly sparse. Every effort will be made to protect the existing trees and schrubs, as these are very important to the ambience and visual appeal of the Sand mining site. Construction and land clearing of the mining site will be carefully planned to protect these endemic and protected vegetation species. A vegetation expert will be consulted throughout the lifecycle of the Sand mining site. The protected plant species in the project area are shown in the table below.

Table 2 Table of plant species which are protected under the Forestry Act and likely to occur in the area.

SCIENTIFIC NAME	COMMON NAME
Acacia erioloba	Camel thorn
Acacia haematoxylon	Grey camel thorn
Albizia anthelmintica	Worm-bark false-thorn
Boscia albitrunca	Shepherd's tree
Euclea pseudebenus	Ebony tree
Ficus cordata	Namaqua fig
Ficus sycomorus	Common cluster fig
Maerua schinzii	Ringwood tree
Ozoroa crassinervia	Namibian resin tree
Searsia (Rhus lancea)	Karree
Sterculia Africana	African star-chestnut
Ziziphus mucronata	Buffalo-thorn

4.6 Fauna

4.6.1 Introduction

The information is based on a detailed literature review and site visit which was carried out on the 17th to 20th of September 2020. The purpose of the Fauna literature review is to identify all potential amphibians, reptiles, and mammals expected on farm Ongwediva and the surrounding area in the vicinity of the mining claims. Griffin (1998) pointed out that the proposed Sand mining area supports numerous faunal species but there no species that are exclusive to the study area.

There are more than 150 species which occur in and around the project area (Griffin, 1998). The species that occur in the area are 14 types of amphibians, 75 types of reptiles and 85 types of mammals (Griffin, 1998). Larger types of animals such as zebras, giraffes, lions and elephants occur in the area but are relatively rare. Leopards, which play a major ecological role, have been observed in the granite mountains which occur in the southern part of the proposed area (Christian, 2005). There are no species which are exclusively endemic to the proposed mining site area. The proposed project shall not have any negative impact on the Marico Gecko. Based on literature review, development of a Sand mining site in the area will not have a negative impact on any of the species in the project area.

4.6.2 Amphibians

Based on the literature review, there are generally 14 types of amphibian species that occur in project area. Nine of these amphibian species occur abundantly, two occur rarely and six of them occur uncommonly. Griffin (1998) highlighted that amphibian species are declining throughout the world due to various factors such as climate change and habitat destruction. There are approximately 4000 species of amphibians worldwide of which over 200 species are present in Southern Africa and 57 in Namibia (Griffin, 1998). However, this low figure may be due to the lack of detailed studies carried out on amphibians. The table below shows the different amphibian species that are likely to occur within the study area.

Table 3 A list of amphibians species which may occur in the project area

SCIENTIFIC NAME	COMMON NAME	STATUS	OCCURRENCE	REFERENCE
PLATANNAS				
Xenopus laevis	COMMON PLATANNA	**SECURE**	ABUNDANTLY	(Daudin, 1802)
TOADS				
Breviceps adspersus	BUSHVELD RAIN FROG	**SECURE**	ABUNDANTLY	Peters, 1882
Bufo dombensis	DOMBE DWARF TOAD	**ENDEMIC & INADEQUETLY KNOWN**	ABUNDANTLY	Bocage, 1895
Bufo poweri	MOTTLED TOAD	**SECURE**	ABUNDANTLY	Hewitt, 1935
FOSSORIAL FROGS				
Phrynomantis affinis	SPOTTED RUBBER FROG	**AMBIGUOUS (RARE?)**	RARELY	(Boulenger, 1901)
Phrynomantis bifasciatus	BANDED RUBBER FROG	**SECURE**	ABUNDANTLY	(Smith, 1848)
SAND FROGS, BULLFROGS, RIDGED FROGS, CACOS, PUDDLE FROGS etc.				
Cacosternum boettgeri	COMMON CACO	**SECURE**	ABUNDANTLY	(Boulenger, 1882)
Hildebrandtia ornata	ORNATE FROG	**SECURE**	UNCOMMONLY	(Peters, 1878)
Phrynobatrachus mababiensis	MABABE PUDDLE FROG	**SECURE**	UNCOMMONLY	FitzSimons, 1932

Phrynobatrachus natalensis	SNORING PUDDLE FROG	**SECURE**	UNCOMMONLY	(A. Smith, 1849)
Pyxicephalus adspersus	GIANT BULLFROG	**SECURE**	ABUNDANTLY	Tschudi, 1838
Tomopterna krugerensis	KNOCKING SAND FROG	**SECURE**	RARELY	Passmore et al, 1975
Tomopterna tandyi	TANDY'S SAND FROG-	**SECURE**	ABUNDANTLY	Channing et al, 1996
TREE FROGS, REED FROGS & KASSINAS				
Kassina senegalensis	BUBBLING KASSINA	**SECURE**	ABUNDANTLY	(Dumèril et al, 1841)

4.6.3 Mammals

Based on the literature review, there are generally about 73 species of mammals expected to occur within the immediate mining site area. There are generally 25 species which rarely occur, 2 species that occur seasonally, 4 that occur occasionally, and 33 that occur abundantly within the project area. Considering the relative size of the proposed Sand mining area, the mammal fauna will not be affected by the Sand mining activities of the miner. Namibia is seemingly well endowed with mammal diversity with around 250 species know to be present within the country (Griffin, 1998). There are currently 14 mammal species which are endemic to Namibia, including 11 species of rodents and small carnivores which are not well known. Griffin (1998), points out that most of these endemic mammals are associated with the Namib and Escarpment with 60% of these appearing to be rock-dwelling species. The author, Griffin (1998) further highlights that the endemic mammal fauna is best characterized by the endemic rodent family *Petromuridae* (Dassie rat) and the rodent genera *Gerbillurus* and *Petromyscus*. The table below shows the mammal species which are likely to occur within the study area. A full list, of mammal species that are likely to occur within the area, is in the appendix section at the end.

4.6.4 Reptiles

The literature review showed that there are approximately 60 reptile species that are expected to occur in the mining site area. According to the Namibia Conservation Ordinance of 1975, there are four reptile species protected, namely:

Table 4 Protected reptile species in the project area

SCIENTIFIC NAME	COMMON NAME	STATUS
Psammobates Oculiferus	Kalahari Tent Tortoise	Protected
Python Natalis	Southern African Python	Protected
Geochelone Pardalis	Leopard Tortoise	Protected
Varanus Albigularis	Veld Leguaan	Protected

Griffin (1998) highlighted the presence of 261 species of reptiles which are present in Namibia. These reptiles make up 30% of the reptile species found on the continent. 55 species of Namibian Lizards are classified as endemic (Griffin, 1998). The author, Griffin (1998), describes that more than 60% of the reptiles found in Namibia are protected by the conservation Ordinance. Although Sand mining activities do affect reptile habitat, the small-scale project will not have any significant impact on the reptile species within the proposed Sand mining area. Namibia, with 129 species of lizards, has one of the continent's richest lizard Fauna. The table in the appendix shows the reptile species which are likely to occur within the vicinity of the Sand mining area.

4.7 Avifauna (Birds)

Simmons et al (2003) points that although Namibia's Avifauna is comperatively sparse compared to the high rainfall equatorial areas elsewhere in Africa, approximately 658 species have already been recorded with a diverse unique group of arid endemics. There are approximately 650 species of birds that have been recorded in Namibia, although the country's avifauna is comparatively sparse compared to the high rainfall equatorial areas in Africa (Brown & Lawson, 1989). Brown et al (1989) mentions that 14 species of birds are endemic or near endemic to Namibia with the majority of Namibian endemics occurring in the Savannah of which ten species occur in a north-south belt of dry Savannah in Central Namibia. Simmons (2003) recorded 63 species of birds within the vicinity of the mining site. 650 bird species are recorded in Namibia, of which 160 species are present in area, especially after good rains fall (Christian, 2005). These birds consist of raptors, chats, larks and karoid species. Christian (2005) recorded the presence of near-endemic bird species in the vicinity of the area, which include the Ruppell's Korhaan,

Rosy-faced Lovebird, Damara red Billed Hornbill, Montiero's Hornbill, Damara Redbilled Hornbill, Gray's Lark, Benguela Longbilled Lark, White-tailed Herero chat, Chestnut Weaver, Rockrunner, Carp's Tit and Southern Booted Eagle. A full list of bird species within the area is shown in the appendix.

4.8 Archaeology

There are no declared heritage sites within the area. No heritage sites appear to be in the area reserved exclusively for sand mining at this stage of the project. Should the miner find any archaeological/rock art sites during the next project phase, these will be acknowledged, and proper guidelines will be followed to have them protected.

4.9 Socio-Economic Environment

4.9.1 Overview of Ongwediva

Ongwediva is a town situated in the Oshana Province of Namibia. It is located in the Northern parts of the country and has a total population of approximately 27 000 residents. This town was established in the 1960' s and the majority of its residents speak the Oshiwambo language. Ongwediva is the second largest entertainment town after the country's capital city, Windhoek. An annual trade fair is held in this town which was started in 2000. When the town was established Namibia was still under South African occupation. Ongwediva has seven churches, two private schools and 13 government-run schools. Ongwediva hosts an annual trade fair, the Ongwediva Annual Trade Fair (OATF) since 2000, after one initial trade fair, the Northern Namibia Trade Fair, was held in 1995. Opposite of the open market, there is a shopping mall (Maroela Mall, Mandume Ndemufayo St.). Ongwediva is an urban area that experiences rapid growth. It had less than 11,000 inhabitants in 2001. Ongwediva is the second largest entertainment town in Namibia just behind the capital Windhoek. Ongwediva is a fast-growing town in terms of development and status as a second most livable town in Namibia. It also features one of the few private hospitals in Namibia.

4.9.2 Social Economic Impact

Although a few people might be negatively affected by dust and noise, the miner will ensure that these aspects are properly mitigated. With the potential employment of 30 people, this means that 30 families will benefit from the project. The mining site

project has great potential to improve livelihoods and make a contribution to sustainable development within Ongwediva and the surrounding community. Community meetings will be held from time to time by the miner wherever possible, with the purpose of effectively communicating with the local community and to avoid any unexpected social impacts.

5. Assessment of Impacts

The purpose of this assessments of impacts section is to identify and consider the most pertinent environmental impacts and to provide possible mitigation measures that are expected from the mining activities on mining claims 72027. Two different phases are associated with the proposed development. Two different phases are associated with the proposed development. Firstly, the construction phase, and secondly the operational phase is being covered by this assessment. Should the mining activities cease in the future, an EIA will need to be conducted to deal with the associated changes to environment. Mitigation measures for the identified impacts are also provided in this Section.

The following assessment methodology was used to examine each impact identified:

Table 5 Assessment methodology used to examine the impacts identified

Evaluation Criteria	Symbol	Significance of Rating
Nature of impact:	**P or N**	Effect the proposed activity would have on the affected environment which is positive (***P***) or negative (**N**)
Extent of impact:	**O**	**On-Site** (the site and it's immediate surrounds)
	L	**Local** (Mining Area)
	R	**Regional** (Ohangwena Region)
	N	**National** (Namibia)
	I	**International**
Duration of impact:	**SD**	Short Duration (0 to 5 years)
	MD	Medium Duration (5 to 15 years)
	LD	Long Duration (lifetime of the development)
Intensity of impact:	**L**	**Low** intensity where the natural, cultural and social functions and processes are not affected.
	M	**Medium** intensity where the affected environment is altered but natural, cultural and social functions and processes can continue.
	H	**High** intensity where the affected environment is altered to the extent that natural, cultural and social functions and processes will temporarily or permanently cease.

Probability of impact:	**LP**	**Low probability** is when the possibility of the impact occurring is low.
	P	**Probable** is when there is a distinct possibility that it will occur.
	HP	**Highly probable** is when the impact is most likely to occur.
	D	**Definite** where the impact will occur.
Significance of Impact: Further subdivided into impacts with mitigation (MM) measures and impacts with no mitigation measures (NMM).	**L**	**Low Significance** is when natural, cultural, social and economic functions and processes are not affected. If the impacts are adverse, mitigation is either easily achieved or little will be required, or both. If impacts are beneficial, alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time=consuming
	M	**Medium Significance** is when the affected environment is altered but natural, cultural, social and economic functions and processes can continue. An impact exists but is not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of beneficial impacts, other means of achieving this benefit are about equal in time, cost and effort.
	H	**High Significance** is when the affected environment is altered to the extent that natural, cultural, social and economic functions and processes will temporarily or permanently cease. If impacts are adverse, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time consuming or a combination of these. In the case of beneficial impacts, the impact is of a Substantial order within the bounds of impacts that could occur.

5.1. Overall socio-economic benefits and issues

5.1.1. Socio-economic benefits

With the potential employment of 30 people, this means that 30 families will benefit from the project during the construction phase. The project has great potential to improve livelihoods and make a contribution to sustainable development within the surrounding community. Community meetings will be held from time to time by the proponent wherever possible, with the purpose of effectively communicating with the local community and to avoid any unexpected social impacts.

5.1.1.1. Potential Direct Benefits

Direct capital investment: The mining project will require a significant capital investment of at least N$ 3 million. This will be used for purchasing plant and machinery required for the project.

Stimulation of skills transfer: Due to the nature of mining operations, the proponent will implement ad-hoc training programme for some of its staff members. Training programmes will be well structured and staff members will permanently benefit from these training programmes.

Job creation: With the potential employment of 30 people, this means that 30 families will benefit from the project during the on-going phase. The project has a great potential to improve livelihoods and contribute to sustainable development within the surrounding community.

5.1.1.2. Potential Indirect Benefits

- The data generated from the mining activities will be made available to the Ministry of Mines and Energy for future research purposes.
- General enhancement of the health conditions and quality of life for a few people in the surrounding settlements.
- Of significance is the prospect of diversification of the surrounding economy, which is presently mainly focussed on farming.

5.1.1.3. General socio-economic concerns

Notwithstanding the above benefits there are a few concerns that could reduce or counteract the above benefits related to the project, as follows:

- As the movement of staff and contractors to and from the area increases, the risk of spread of HIV/AIDS increases.
- Increased influx of people to the area as people come in search of job opportunities during the construction and operational phase of the mining project; and
- Increased informal settlement and associated problems.

Table 6 Impact evaluation for socio-economy

Identified	Significance		Duration	Extent	Intensity	Probability
Impact	NMM	MM				
Increased spread of HIV/AIDS	M	L	LD	N	M	LP
Increased influx of people to the area	L	L	SD	L	L	P
Increased informal settlement in the area	M	L	MD	L	L	LP

5.2. Mining phases and associated issues

5.2.1. Construction Phase of the Project

The following potential effects on the environment during the construction phase of the mining project have been identified:

5.2.1.1. Dust

Dust may be generated during this phase and might be aggravated during the winter months when strong winds occur. Dust will be generated by the vehicles moving in the area. Fall out dust settling on vegetation is likely to cause local disruptions in herbivorous and predatory complexes and should be minimised as far as possible.

5.2.1.2. Noise

Noise will most likely be generated by vehicles during the construction phase. It is recommended that vehicle movement be limited to normal daytime hours to allow nocturnal animals to roam freely at night.

5.2.1.3. Safety and Security

During construction, small tools and equipment will be used on site. This increases the possibility of injuries and the responsible manager must ensure that all staff members are briefed about the potential risks of injuries on site. The manager is further advised to ensure that adequate emergency facilities, including first aid kits, are available on site. All Health and Safety standards specified in the Labour Act should be complied with.

Should a camp be necessary at a later stage, it should be located in such a way that it does not pose a risk to the community members and wildlife that roam the area.

5.2.1.4. Visual

The proposed mining area is situated more than 1 km from any main road. As such, any visual impact that might be caused by the team are minimal. In some parts of the area, the topography of the mining site is slightly elevated.

Table 7 Impact evaluation for the construction phase of the project

Identified	Significance	Duration	Extent	Intensity	Probability

Impact	NMM	MM				
Dust	L	L	SD	L	L	P
Noise	M	L	SD	L	M	D
Safety & Security	L	L	SD	O	L	P
Visual	L	L	MD	O	L	LP

5.2.2. Operational phase of the Project

During the operation phase of the project, gravel will be excavated. Most of the vehicles and trucks will be refilled in Windhoek.

5.2.2.1. Air Quality

In terms of air quality, emissions will be given off by 4x4 vehicles, excavators, and front-end loaders but not to an extent that warrants concern. Dust will also be produced by the machinery and the movement of vehicles in the area.

5.2.2.2. Fire and Explosion Hazard

Hydrocarbons are volatile under certain conditions and their vapours in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise.

It must further be assured that sufficient water is available for firefighting purposes. In addition to this, all personnel must be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials including rubbish, dry vegetation, and hydrocarbon-soaked soil from the vicinity of the mining area. Regular inspections should be carried out to inspect and test firefighting equipment and pollution control materials at the site.

All fire precautions and fire control at the site must be in accordance with SANS 10089-1:1999, or better. A holistic fire protection and prevention plan is needed.

Experience has shown that the best chance to rapidly put out a major fire, is in the first 5 minutes. It is important to recognise that a responsive fire prevention plan does not solely include the availability of firefighting equipment, but more importantly, it involves premeditated measures and activities to timeously prevent, curb and avoid

conditions that may result in fires. An integrated fire prevention plan should be drafted before excavating.

5.2.2.3. Generation of Waste

Waste in the form of contaminated soil due to minor spillage might occur but should be prevented through the use of containment areas as provided. Solid waste will also be generated from contractors, staff members and other visitors to the area. Care should be taken when handling waste material.

5.2.2.4. Health and Safety

Occupational exposures are normally related to the dermal contact with tools, lubricants and fuel. For these reason adequate measures must be brought in place to ensure safety of staff on site, and includes:

- Proper training of operators;
- First aid treatment;
- Medical assistance;
- Emergency treatment;
- Prevention of inhalation of fumes;
- Protective clothing, footwear, gloves and belts; safety goggles and shields;
- Manuals and training regarding the correct handling of materials and packages should be in place and updated as new or updated material safety data sheets becomes available;
- And Monitoring should be carried out on a regular basis, including accident reports.

5.2.2.5. Fauna

Mining activities may have minor disturbances on the habitat of a few species but no significant impacts on the animals are expected. The proponent shall ensure that no animal shall be captured, killed or harmed by any of the employees in any way. Wildlife poaching will strongly be avoided as this is an offence and anyone caught infringing in this regard will face suspension from the project and will be liable for prosecution.

5.2.2.6. Vegetation

The natural vegetation is seemingly undisturbed in the project area except for grasses, which have been grazed by livestock and wild animals. Some vegetation species in the area may be adversely impacted by the project. The type of vegetation that might be affected by the project are:

- Bushes
- Ephemeral grasses
- Small trees

Some of the sensitive vegetation types in the area include:

- Shallow drainage line vegetation
- Scrublands surrounding the mining area

Certain species regarded as particularly important for conservation may yet be identified and made known via an Addendum to this report. If particularly important species are found, they will be located by GPS and their locations communicated to the Ministry of Environment and Tourism. Such locations will then be demarcated and completely avoided.

5.2.2.7. Avifauna

Birds or Nest sites will not be disturbed by any employee, tourist or contractor. Should the employees observe any bird nesting sites for vultures, they will be reported to the Ministry of Environment and Tourism and the site will be avoided.

5.2.2.8. Alien Invasive Plants

Disturbance to the natural environment often encourages the establishment of alien invasive weed species. Some of the plant species that could become invasive in the area are listed below:

- Prosopis glandulosa
- Lantana camara
- Cyperus esculentus
- Opuntia imbricate

- Cereus jamacara
- Melia azedarach
- Harissia martini

There are numerous ways in which invasive species can be introduced deliberately or unintentionally.

5.2.2.9 Heritage Impacts

Although no archaeological sites have been identified yet in the project area, appropriate measures will be undertaken upon discovering any new archaeological sites. All archaeological remains are protected under the National Heritage Act (2004) and will not be destroyed, disturbed or removed. The Act also requires that any archaeological finds be reported to the Heritage Council in Windhoek.

Table 8 Impact evaluation for the operational phase of the project

Identified	Significance		Duration	Extent	Intensity	Probability
Impact	**NMM**	**MM**				
Air Quality	M	L	LD	L	M	HP
Fire & Explosion Hazard	H	M	SD	O	M	LP
Generation of waste	M	L	LD	O	L	D
Health and Safety	H	M	MD	N	L	P
Fauna	M	L	MD	L	M	D
Vegetation	M	L	MD	L	M	D
Avifauna	M	L	MD	L	M	LP
Alien Invasive Plants	M	L	MD	L	M	P
Heritage	M	L	LD	O	H	LP