A SCOPING REPORT ON THE ENVIRONMENTAL IMPACT ASSESSMENT FOR QUARRYING ACTIVITIES ON MINING CLAIMS 72100, 72101, 72102, 72103, 72104, 72105 AND 72106

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EXECUTIVE SUMMARY

1. Introduction

1.1 Overview

The proponent, Tala Mining cc, has applied for mining claims namely MC 71896, 71897, 71898, 71899 and 71900, with the Ministry of Mines and Energy. The proponent intends to mine (quarry) dimension stone (marble) in the area. The area of interest sits predominantly on marble rock units of the Arandis Formation, within the Damara Orogen.

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

1.2 Location

The proposed development is located 35 km northeast of Arandis, on farm Hakskeen within the Erongo Region.

1.3 Environmental Assessment Requirements

The Environmental Regulations procedure (GN 30 of 2012) stipulates that no mining and quarrying 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 quarrying activities.

FINAL SCOPING REPORT

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1. Project Background

1.1 Introduction

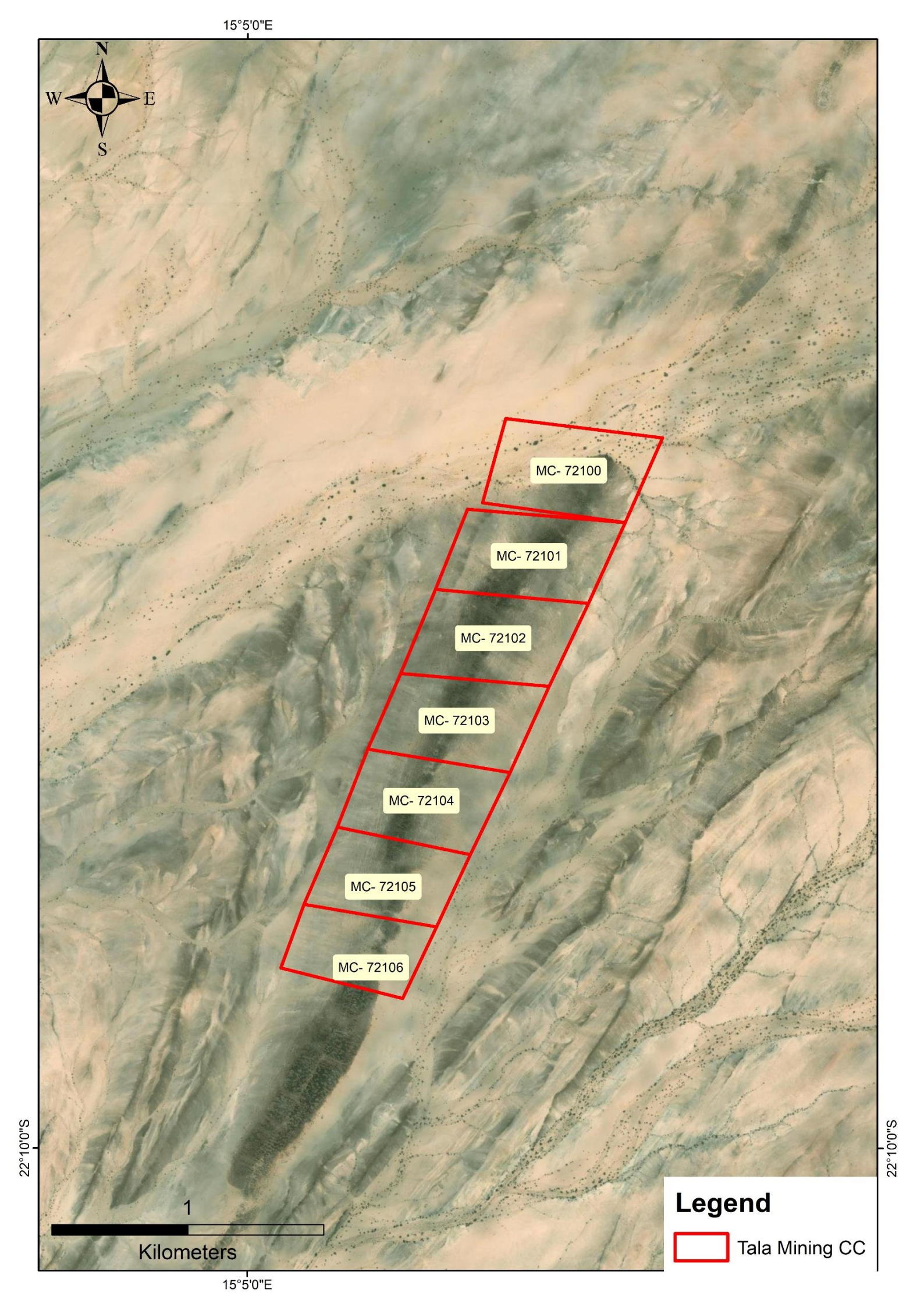
The proponent, Tala Mining cc, applied for mining claims, namely MC 72100, 72101, 72102, 72103, 72104, 72105 and 72106, with the Ministry of Mines and Energy. The proponent intends to mine (quarry) dimension stone (marble) in the area. The area of interest sits predominantly on marble rock units of the Arandis Formation, within the Damara Orogen. An outline of the area is shown in the image below.

Although quarrying is costly, environmentally friendly quarrying is possible, yet the mineral quarrying 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 mineral quarrying and future mining activities.

Impala Environmental Consulting was appointed by the proponent to undertake an Environmental Assessment (EA) and Environmental Management Plan (EMP) for the quarrying project. Figure 3 below shows the surrounding farms of the project area.

The coordinates for the centre of the mining claims are:

Claim Number	Latitude	Longitude
72100	-22.143702	15.094330
72101	-22.146840	15.093050
72102	-22.149381	15.091768
72103	-22.151921	15.090647
72104	-22.155059	15.089366
72105	-22.157151	15.088084
72106	-22.159841	15.087124


15°5'0"E
N
W
E
S
MC- 72100
MC- 72101
MC- 72102
MC- 72103
MC- 72104
MC- 72105
MC- 72106
22°10'0"S
1
Kilometers
Legend
Tala Mining CC

1.2 Project Location

The mining claims are located 35 km northeast of Arandis, on farm Hakskeen within the Erongo Region. A map showing the surrounding farms is shown in figure 4.

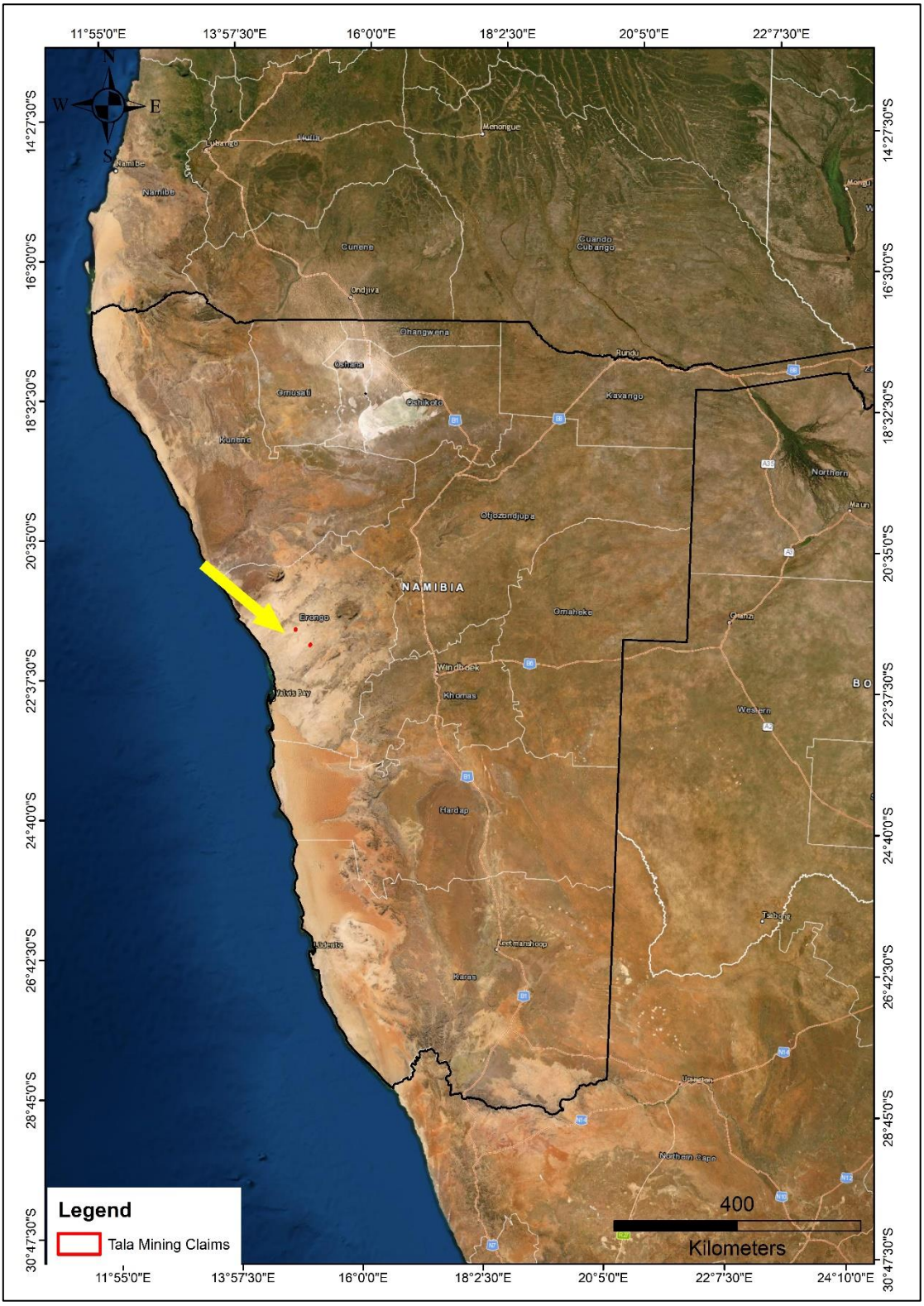
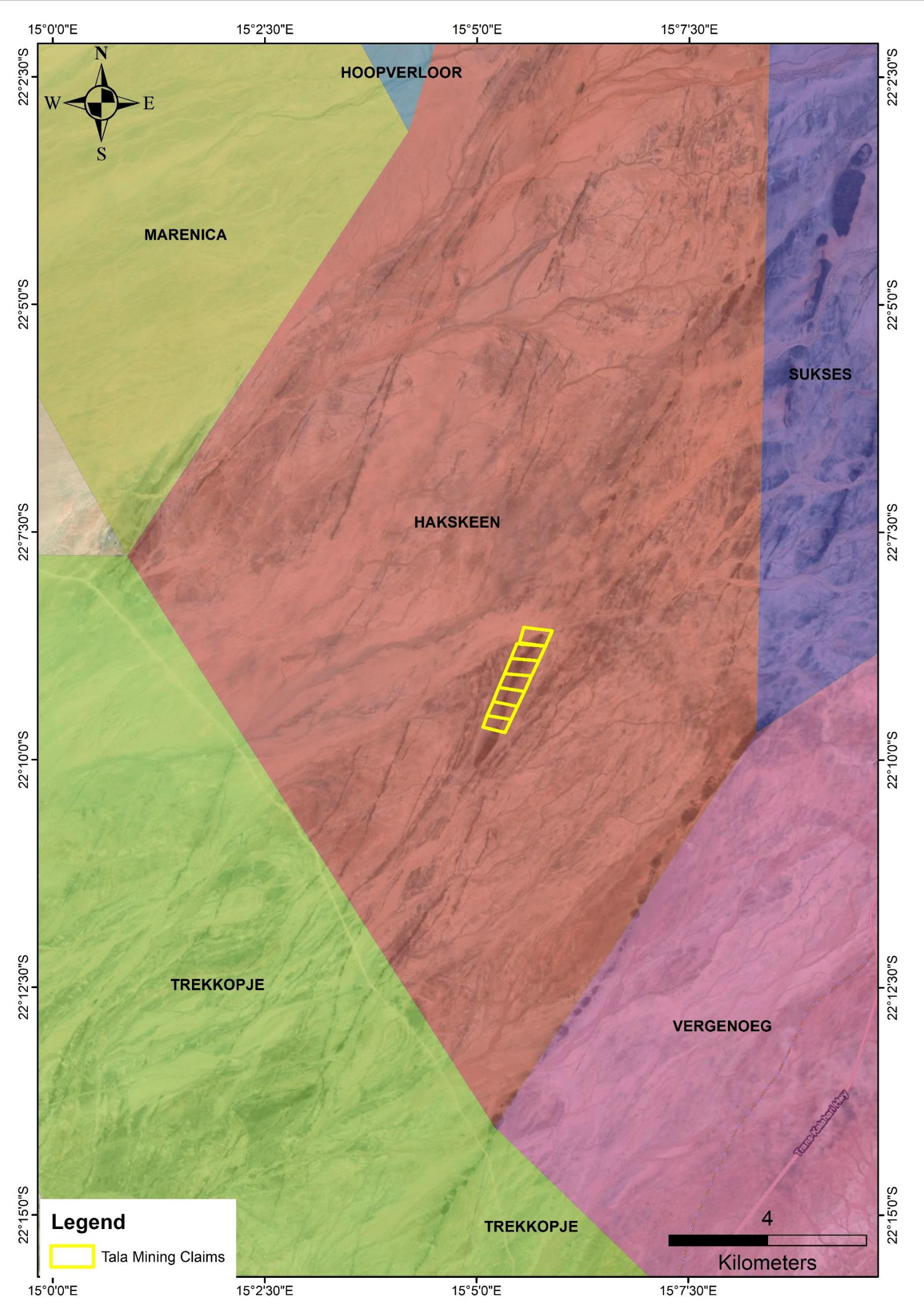


Figure 2 Locality map of the mining claim licence area


15°0'0"E
15°2'30"E
15°5'0"E
15°7'30"E
22°2'30"S
22°5'0"S
22°7'30"S
22°10'0"S
22°12'30"S
22°15'0"S
N
W
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HOOPVERLOOR
MARENICA
SUKSES
HAKSKEEN
TREKKOPJE
VERGENOEG
TREKKOPJE
Legend
Tala Mining Claims
4
Kilometers

1.3 Environmental Impact Assessment Requirements

The Environmental Regulations procedure (GN 30 of 2012) stipulates that no mining and quarrying 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 mineral quarrying activities.

1.4 Purpose of the Scoping Report

The scoping report is prepared for the Environmental Impact Assessment for marble quarrying on mining claims which are located 35 km northeast of Arandis, on farm Hakskeen within the Erongo Region. Environmental scoping is a critical step in the preparation of an EIA for the proposed quarrying 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 mineral quarrying activities on the proposed mining 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 mineral quarrying 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 quarrying activities would be to allocate the land-usage to other income generating activities such as farming and tourism activities.

2. Summary of applicable legislation

All mineral rights, related to quarrying 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 quarrying 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 several 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, quarrying, prospecting, small scale mining, quarrying, 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 quarrying areas, environmental impact assessments and for minimising or preventing pollution.

3. Description of Proposed Quarrying Project

3.1 Introduction

The Erongo region is known for vast occurrences of marble units of the Arandis formation and Swakop group (Miller, 1992). The first attempts to quarry marble in Namibia date back to the early years of the century when the Koloniale Marmorsyndikatwas founded.

3.2 Marble Quarrying Method

There are various options for mining out a marble deposit. In choosing a method, important considerations are the kind of material, the shape and size of the geologic formation, the thickness of the overburden, the topography, the production level, the locality of the quarry and imposed restrictions by the government. If the calcitic marble proves to be homogeneous, the quarrying method will be by a regular bench design with the aid of diamond-based cutting technologies. Diamond-based cutting technologies are the best methods to use these days. The following operations will be carried out:

- Undercutting by using a diamond-wire saw.
- Vertical cuts with diamond wire
- Block shaping cuts with diamond wire or drill and shear techniques.

Basically, marble quarrying involves cutting channels on all sides of large, rectangular sections of marble called quarry blocks. These blocks usually have an open face, and once the ends and backs of the doorstep-like ledges are channelled loose, horizontal lift holes are drilled along the bottom of the open face. These long quarry blocks are being freed from the surrounding mass, with diamond wire sawing. The diamond saw which basically consists of an engine pulling wire cable through a system of pulleys and return wheels. The wire is a steel cable on which diamond grit-impregnated beads are held in place by plastic spacers.

The wire saw strand is threaded through intersecting vertical and horizontal holes; the wire is jointed together making a large loop which simultaneously cuts the top, bottom, and one end of the granite mass. Water is fed continuously through the

narrow cuts to cool the wire. If a ledge has two open sides, the wire saw can cut the entire block free. However, the attached side must still be channelled by way of drilling or light blasting. This entire block will now be moved over with a water bag jacking plant. The big block is then cut with dressing diamond wire saws into smaller blocks of 10 – 35 tons.

3.2.1 Mineral Processing

The smaller marble blocks will then be moved to the dressing yard. The yard is in very close proximity to the mining activities itself. While most dimension stone mine merely “rough-dress” the cut block by jack hammer trimming, the produced at this mining area will mostly be diamond wire dressed. A derrick boom is slowly raised, tightening the hooks in their holes and the block is lifted from the quarry to be placed on a waiting truck for transporting to the dressing yard. After final dressing and quality control these dimensioned saw blocks are removed by mobile crane onto trucks and shipped to monument plants for processing.

3.2.2 Quarry Residue and rehabilitation

The only noticeable mine residue will be the “waste” marble 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 mining no waste dumps will remain.

3.4 Labour Requirements

The proponent intends to employ more than 26 personnel, including 4 management staff for the first phase of the project. The employees will be sourced from the local community including people from Arandis. 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.

3.5 Waste Dumps

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

- 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

Since the area is located on privately-owned farm, all waste will be transported and disposed out of the area.

3.6 Services

3.6.1 Electricity requirements

At this stage, electricity requirements for the project are minimal. The bulk of the power supply to the quarrying site will be sourced from the proponent's own generator. 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 mineral quarrying process
- Power supply for temporary office block or container if necessary.

3.6.2 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. The water requirements for the project are minimal. Water containers will be brought on site and utilised whenever necessary. The water will mostly be used for general consumption and cleaning. The water used for granite drilling or wire-saw cutting will be recycled.

3.7 Infrastructure

3.7.1 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 proponent will provide adequate temporary sanitary facilities and such facilities must be maintained in a hygienic condition. Sewerage must be disposed in a manner not polluting the environment. The proponent will remove all refuse pertaining to the proponent's activities, domestic or otherwise, from the property. Domestic waste will be disposed of at a waste dump in Arandis. The Miner will undertake environmental rehabilitation, both during and at the conclusion of the quarrying operations. Unusable oil will be collected in drums and sold to dealers for recycling.

3.7.2 IT Systems and communication

Provision will be made for two-way radios to enable the drill rig operators and the on-site staff to communicate effectively.

3.7.3 Security and Fencing

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

3.7.4 Buildings

At this stage, no permanent camp will be set up and so provision will be made for prefabricated buildings and containers.

3.7.5 Roads

The access roads to the quarrying site are quite good. From Arandis, the quarrying sites will be accessed via the B2 road. The sites are located 8 kms from the B2 road.

3.7.6 Mobile Equipment

The proponent's vehicle fleet will be optimised during the next project phase. Provision will be made for 2 off-road vehicles, an excavator and a front-end loader.

Other tools include a genset, wire saws, an electric compressor and a water jacking plant.

3.7.7 Storage of Fuel, Lubrication and consumables

Consumables and lubricants will be stored in a designated area within a container. These substances will only be used for mechanical purposes and are assumed to be non-hazardous. Diesel will be delivered to a small temporary on-site fuel storage facility by road transport and offloaded into the storage tanks by offloading pumps.

3.7.8 Fire Fighting Provision

Portable fire-extinguishers will be fitted, as required, in vehicles and, as well as in the mobile containers where possible.

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 at the interface of the Nama Karoo, Desert Biome and Savannah in Namibia (Barnard, 1998). As such, this area represents a high fauna diversity.

Namibia has four very large and arid regions which set them apart in various ways from the rest of the country; Kunene and Erongo region in the west and Karas and Erongo in the south (Mendelsohn, et al., 2002). Rainfall in Erongo is usually both low and variable which implies that years of abundant rain are often followed by extreme dry conditions (Mendelsohn, et al., 2002). Mammals, birds, reptiles and amphibians are generally spaced out within the region due to low rainfall. The eastern parts of the Erongo region have more trees and grass than the Western, coastal areas (Mendelsohn, et al., 2002). As such, farming ventures are challenging with low livestock densities in most parts of the Erongo Region.

There is generally an absence of fences in most parts of the Erongo Region. This makes livestock farming easier which means that both wild and domestic animals

can move widely in many places, migrating from areas of poor grazing to other places with more abundant pastures.

4.2 Climatic Conditions

4.2.1 Temperature

In the proposed quarrying area, August is the warmest month with an average temperature of 21°c at noon. September is the coldest month with an average temperature of 15.5°c at night. Arandis, which is in the vicinity of the project area, has distinct temperature seasons, the temperature varies during the year.

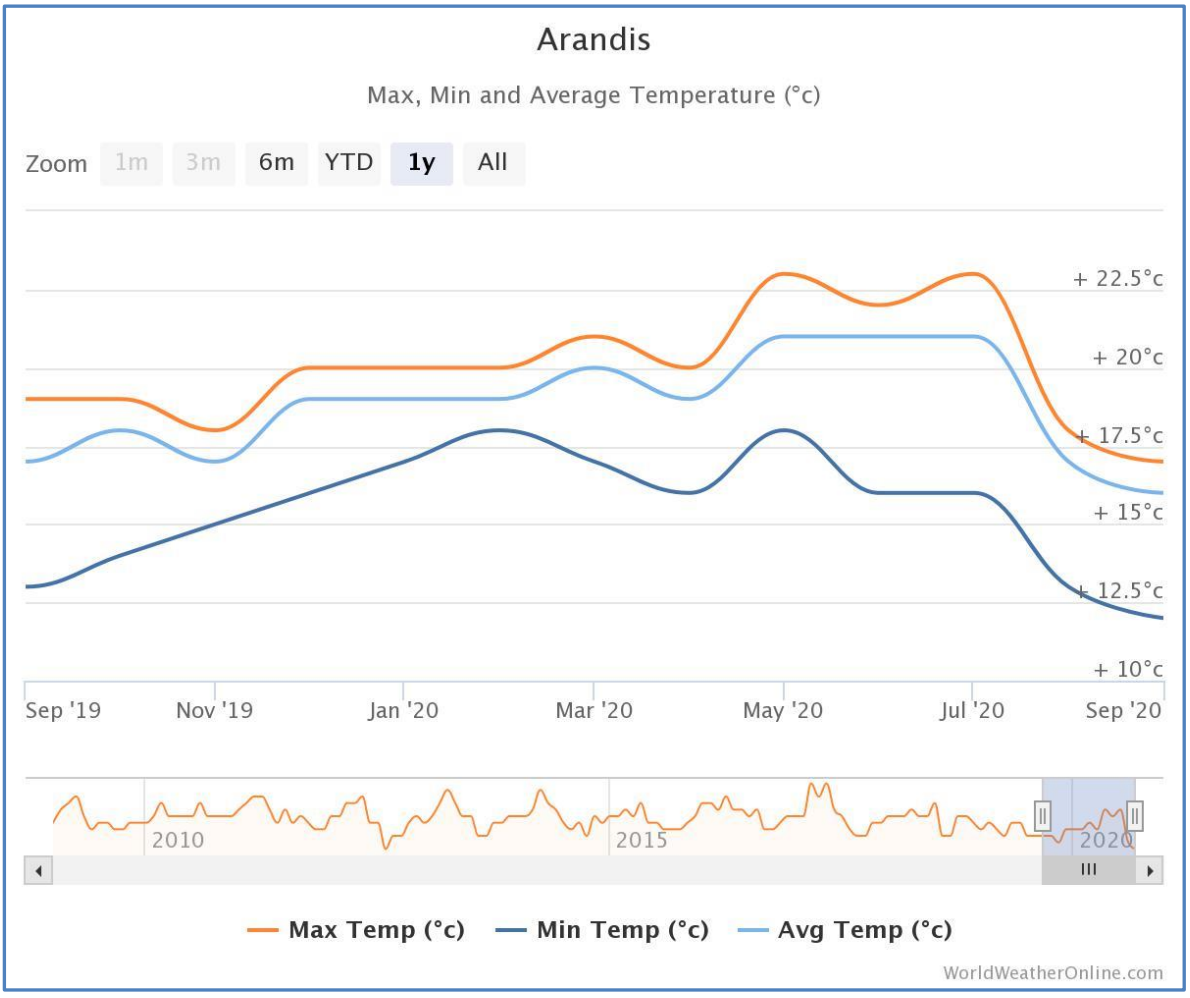

Figure 4 A graph showing the temperature patterns in Arandis, from www.worldweatheronline.com

In winter, temperatures can get to below degrees 12°c. Overall, winters are mild in temperature, with coldest month most often being September.

4.2.2 Precipitation

In the quarrying area, the highest rainfall is usually experienced in April which may reach 6 mm with average rainfall days of 4. In January months, rainfall may reach about 2 mm with 7 average rainfall days. The graph below shows the rainfall patterns in the area.

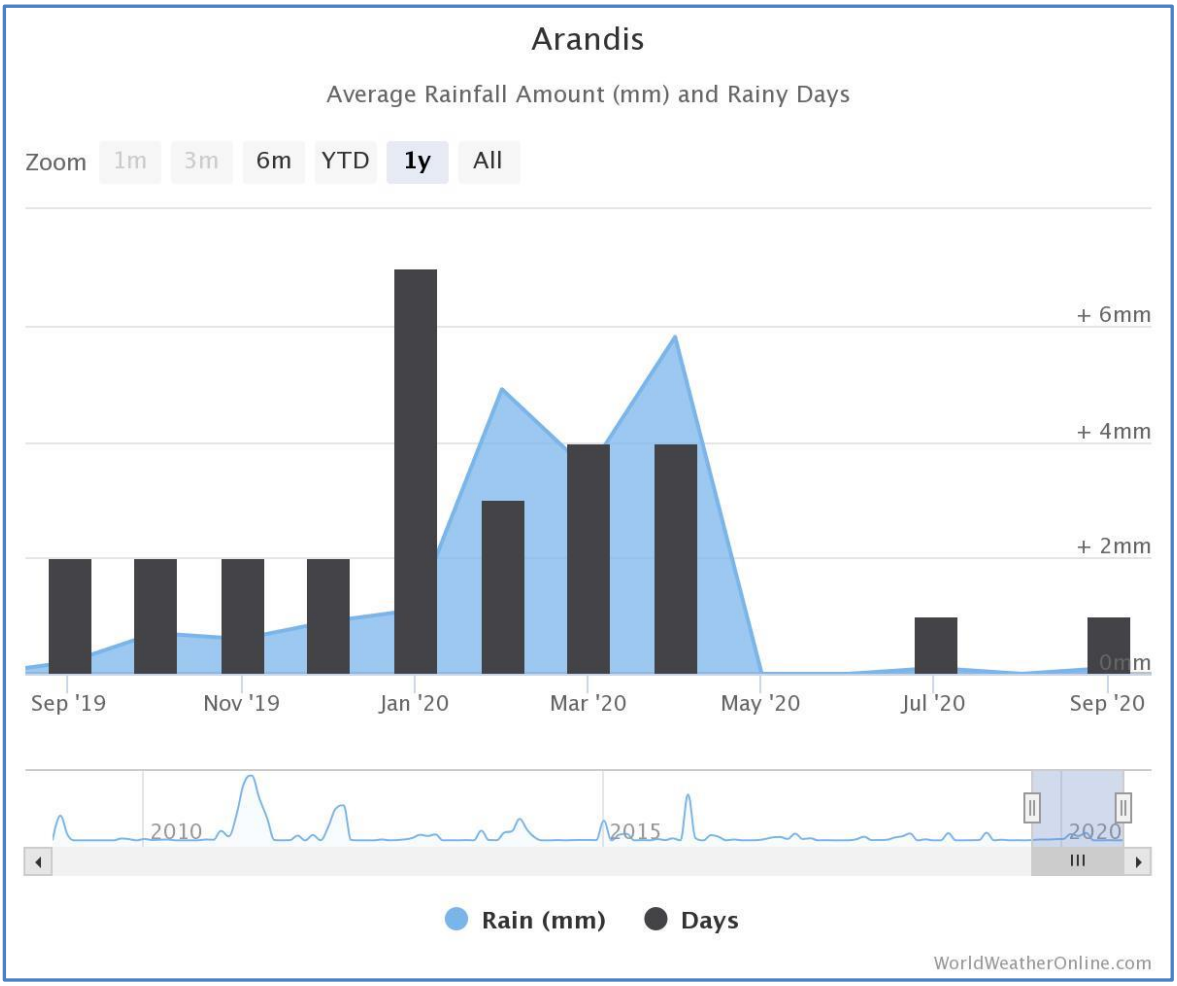

Figure 5 A graph showing rainfall patterns in Arandis, from www.worldweatheronline.com

4.2.3 Wind

Predominantly south easterly. Southerly, easterly and northerly airflow is common. The Arandis area is subject to erratic winds and considerable discrepancies despite short distances, due to the hilly terrain.

4.2.4 Humidity

The relative humidity during the least humid months of the year, i.e. August and June, is around 3% and the most humid month is February with 25% 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.

Figure 6 A graph showing the humidity patterns in Arandis, from www.worldweatheronline.com

4.3 Geology

4.3.1 Geological setting

The rocks in the area have been eroded in rocks of the Neoproterozoic Damara Orogenic Belt, which forms the bedrock to most of the Namib Desert. These rocks unconformably overly the 2 Ga Mesoproterozoic Abbabis Basement Complex of granite gneiss. The sedimentary rocks of the Damara Belt consist of arenites and argillites of the Nosib Group, overlain by pelitic sediments and carbonates of the Swakop Group. During metamorphism between 550 Ma and 450 Ma, Nosib and

Swakop Group sedimentary rocks were partially mobilized and granitized and then intruded back into the Damara Supergroup to form what is today known as the Damara granites. These various Damaran granitoids have variably weak to strongly radiogenic characteristics.

The main rock types in the area include Karibib marble, Kuiseb schist, Damara aged leucogranites, Salem granite, Karoo dolerite, Klein Spitzkoppe granite and Gross Spitzkoppe granite.

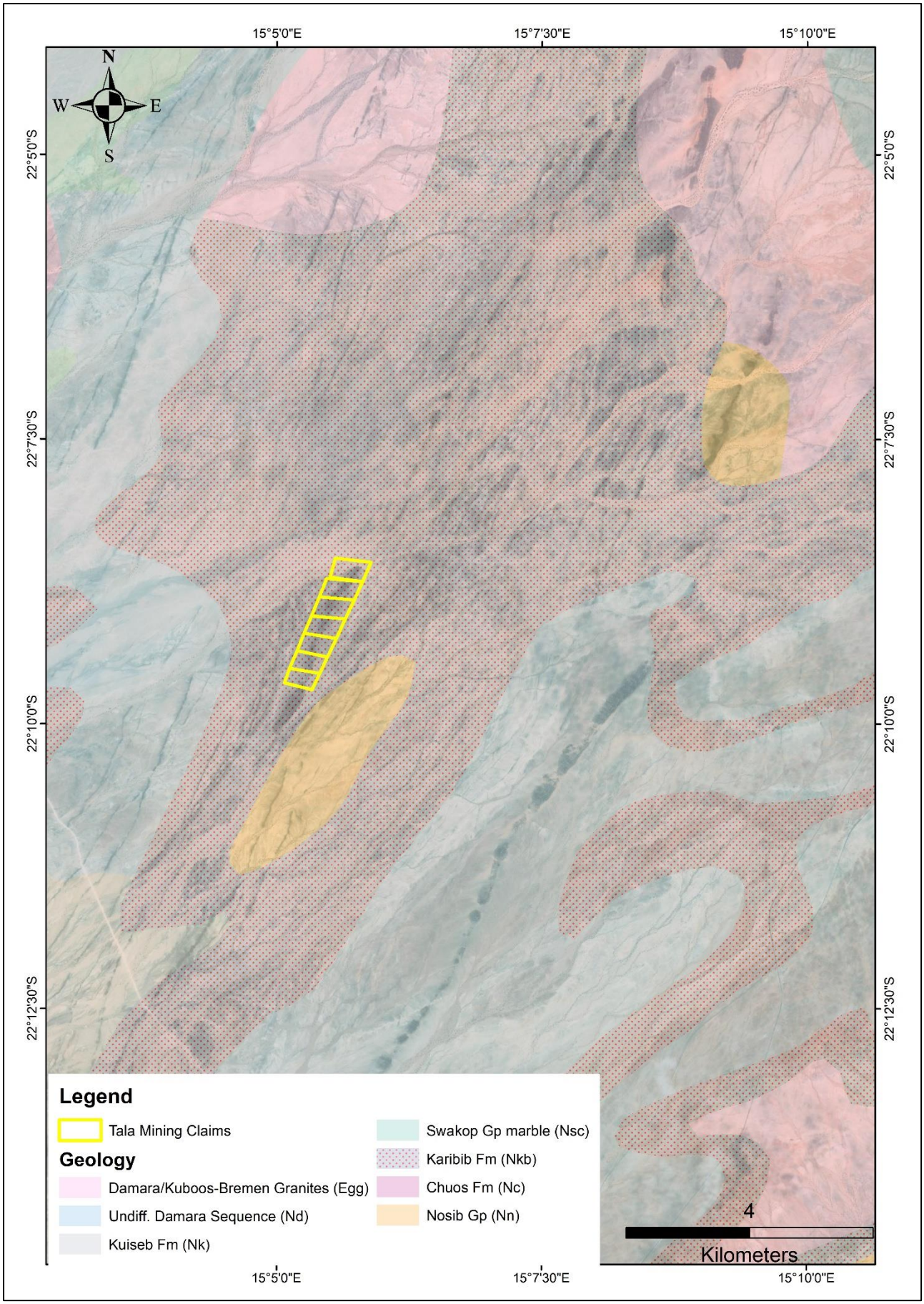

Figure 7 A geological map of the area

4.4 Hydrogeology and Water Resources

There are no river systems which pass through the mining site areas. The project area is underlain by a region with little or no groundwater.

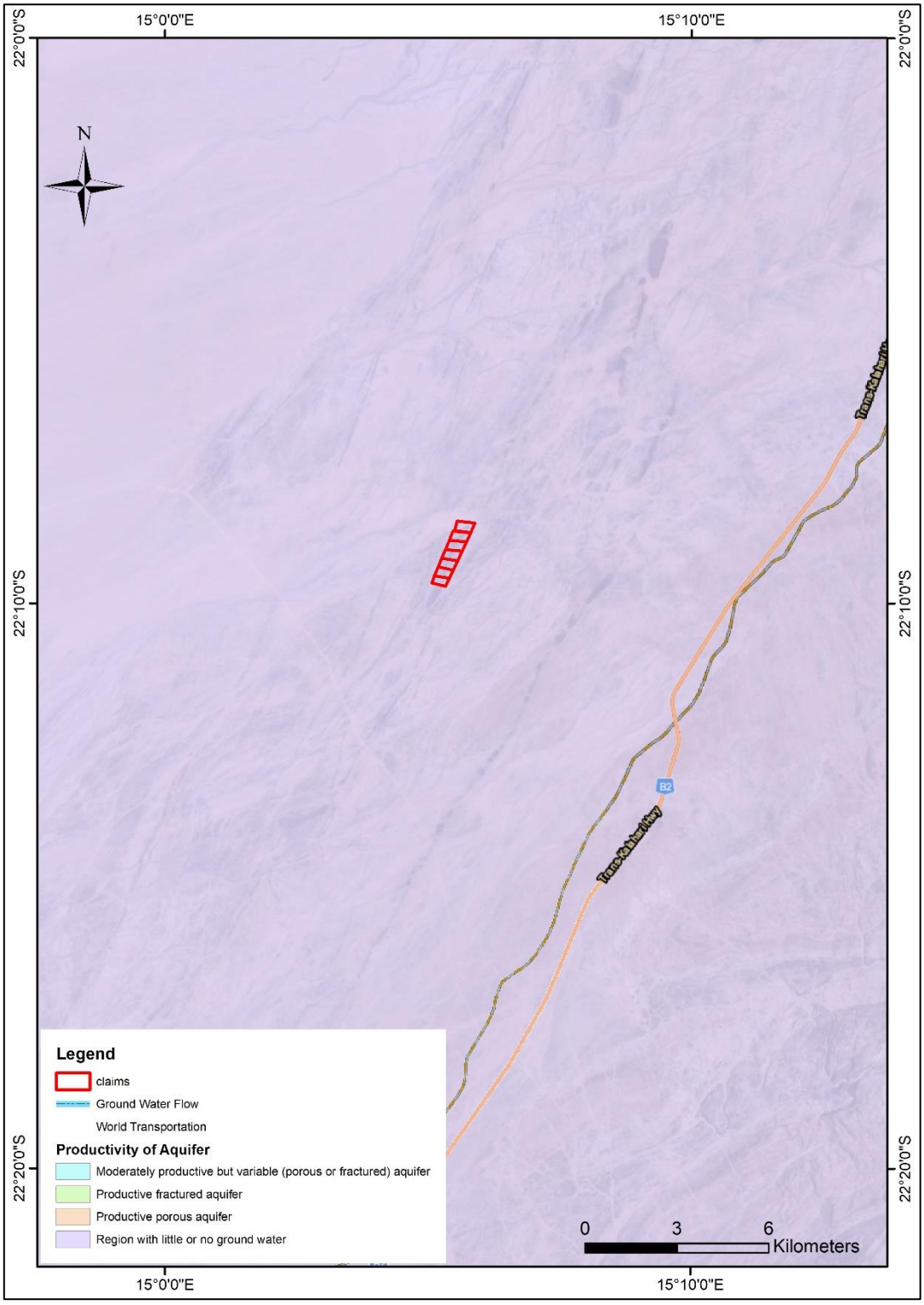

Figure 8 Map showing the groundwater flow in the area.

4.5 Flora

Rainfall in the Erongo Region is usually both low and 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 and so the eastern parts of Erongo have more grass and trees than the Western, coastal areas (Christian, 2005). The surrounding area is characterised by low-medium botanical diversity. Based on site visits and the literature review, all the vegetation that are found within the vicinity of the area are considered to be of “medium” to “high” sensitivity against external conditions. The growing season is relatively short due to the semi-arid climate. The most notable protected plant species in the area is the Welwitschia mirabilis.

Climatically the coastal area is referred to as Cool Desert with a high occurrence of fog (Mendelsohn, et al., 2002). The Namib Desert Biome makes up a large proportion (32%) of the land area with parks in this biome making up 69% of the protected area network or 29.7% of the biome (Barnard, 1998). Four of 14 desert vegetation types are adequately protected with up to 94% representation in the protected area network in Namibia (Barnard, 1998).

According to Curtis and Barnard (1998) the entire coast is viewed as sites with special ecological importance in Namibia. The known distinctive values along the Coastline are its biotic richness (arachnids, birds and lichens) and its biotic richness and migrant shorebirds and being the most important Ramsar site in Namibia (Mendelsohn, et al., 2002). The cold Benguela Current sustains a wealth of marine life. It continually produces fog that supports an intriguing variety of animals and plants, including over a hundred species of lichens. Providing stability to the fragile desert environment, vast lichen fields occur at Mile 30 south of Henties Bay and north of the turnoff to Cape Cross Seal Reserve (Brown & Lawson, 1989). The vegetation in the Desert Biome is characterised by a dominance of therophytes which persist in the form of seeds during unfavourable conditions.

The average plant production is extremely low with 0-5% variation in green vegetation biomass. The overall plant diversity (all species) in the general area is estimated to be less than 50 species (Mendelsohn, et al., 2002). These estimates are limited to “higher” plants as information regarding “lower” plants is sparse. Burke

(2003) estimates that over 400 species – 10% of the flora of Namibia – occur in the central Namib and although it has not been identified as a centre of endemism, it is dominated by endemics such as *Arthraerua leubnitziae*. The greatest variants affecting the diversity of plants are habitat and climate with the highest plant diversity generally associated with high rainfall areas (Burke, 2003).

Table 1 A table showing plant species which 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
Welwitschia mirabilis	Welwitschia	Protected

The density of vegetation in the vicinity of the tourism development site is fairly sparse. Every effort will be made to protect the existing plant species, especially the Welwitschia, as these are very important to the ambience and visual appeal of the tourism development site. A vegetation expert will be consulted throughout the lifecycle of the project. 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
Welwitschia mirabilis	Welwitschia

4.6 Fauna

4.6.1 Introduction

The information is based on a detailed literature review and a site visit which was carried out on the 6th to 8th of October 2020. The purpose of the Fauna literature review is to identify all potential amphibians, reptiles, and mammals expected on the project area and the surrounding farms in the vicinity of the quarrying area. The proposed quarrying area supports numerous faunal species but there are no species that are exclusive to the study area.

Larger types of animals such as zebras, giraffes, lions and elephants are very rare in this area. There are no species which are exclusively endemic to the quarrying area. Based on literature review, development of a quarrying project 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 amphibian 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 68 species of mammals expected to occur within the immediate 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 quarrying area, the mammal fauna will not be affected by the quarrying activities of the proponent. 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 considered to be 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.

Table 4 Mammal species which are likely to occur within the project area.

SCIENTIFIC NAME	COMMON NAME
Acinonyx jubatus	Cheetah
Antidorcas marsupialis	Springbok
Atelerix frontalis angolae	Southern African Hedgehog
Canis mesomelas	Black-backed Jackal
Caracal caracal	Caracal
Crocuta crocuta	Spotted Hyena
Cynictis penicillata	Yellow Mongoose
Equus zebra hartmannae	Hartmann's Mountain Zebra
Felis nigripes	Black-footed Cat
Felis silvestris/lybica	African Wild Cat
Galerella sanguinea	Slender Mongoose
Genetta genetta	Small Spotted Genet
Ictonyx striatus	Striped Polecat
Lepus capensis	Cape Hare Secure
Lepus saxatilis	Scrub Hare
Manis temminckii	Ground Pangolin
Mellivora capensis	Honey Badger/Ratel
Oreotragus oreotragus	Klipspringer
Oryx gazella	Gemsbok
Otocyon megalotis	Bat-eared Fox
Panthera pardus	Leopard

Parahyaena (Hyaena) brunnea	Brown Hyena
Phacochoerus africanus	Common Warthog
Proteles cristatus	Aardwolf
Raphicerus campestris	Steenbok
Suricata suricatta marjoriae	Suricate
Sylvicapra grimmia	Common Duiker
Tragelaphus strepsiceros	Greater Kudu
Vulpes chama	Cape Fox

4.6.4 Reptiles

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

Table 5 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. 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 quarrying area.

4.7 Avifauna (Birds)

Simmons et al (2003) points that although Namibia's Avifauna is comparatively 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 project area. 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 the following bird species in the vicinity of the area, which include:

Table 6 Bird scpecies which are likely to occur within the site area.

SCIENTIFIC NAME	COMMON NAME
Agapornis roseicollis	Rosy-faced Lovebird
Eupodotis rueppellii	Rüppell's Korhaan
Lanioturdus torquatus	White-tailed Shrike
Parus carpi	Carp's Tit
Phoeniculus damarensis	Violet Wood-Hoopoe
Poicephalus rueppellii	Rüppell's Parrot
Pternistis hartlaubi	Hartlaub's Spurfowl
Tockus damarensis	Damara Hornbil
Tockus monteiri	Monteiro's Hornbill

A full list of bird species within the area is shown in the appendix.

4.8 Archaeology and Heritage Sites

A separate archaeological specialist study is attached to this report.

4.9 Socio-Economic Environment

4.9.1 Overview of the surrounding settlements

Arandis is a town situated in the Erongo Province of Namibia. This town is also known as the "Uranium Capital of the World" because the largest open-pit uranium mine is located 15 km from it. This mine, the Rössing Uranium Mine, was established in 1978 and the town of Arandis was established in 1994. Arandis has a

total population of approximately 8 000 residents and houses the Namibian Institute of Mining and Technology. It has been called the Uranium Capital of the World as it is located just 15 km outside the world's largest open-pit uranium mine, the Rössing Uranium Mine. Established for the workers of Rössing Uranium in 1978, Arandis was granted self–administration and "town" status in 1994. Currently it has 7,600 inhabitants, most of whom are somehow connected to the mine, and owns 29 square kilometres of land. Besides Rössing, Arandis also serves the Husab and Trekkopje uranium mines. It is the home of the Namibian Institute of Mining and Technology, a technical institute focusing on training skilled industrial workers. The 2000s saw a resurgence in economic growth in Arandis. With the global energy crisis, a significant rise in demand occurred for nuclear energy, increasing demand for Arandis' Uranium. Banks, which had previously closed and youth who had previously left the town seeking employment elsewhere, returned. In 2008, negotiations were at an advanced stage for a Chinese company, Namibia Industrial Mining Limited to build a factory for making building materials in Arandis. After an investment conference was held in 2011, investors have decided to erect a shopping mall in town.

4.9.2 Social Economic Impact

Although a few people and animals might be negatively affected by dust and noise, the miner will ensure that these aspects are properly mitigated. With the potential employment of 27 people, this means that 27 families will benefit from the project during the initial phase. The project has great potential to improve livelihoods and contribute 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. 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 quarrying activities on the proposed mining sites. 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 quarrying 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 7 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** (Quarrying Area)
	R	**Regional** (Erongo 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 27 people, this means that 27 families will benefit from the project during the construction phase. The project has great potential to improve livelihoods and contribute 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 quarrying project will require a significant capital investment of at least N$ 40 million. This will be used for purchasing plant and machinery required for the project.

Stimulation of skills transfer: Due to the nature of quarrying 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 27 people, this means that 27 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 quarrying 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, tourism and small-scale mining of semi-precious stones.

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 quarrying project; and
- Increased informal settlement and associated problems.

Table 8 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. Quarrying 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 quarrying 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 quarrying 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 quarrying site is slightly elevated.

Table 9 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, rock units will be cut by using a wire saw and sand will be excavated. For the purpose of conveniently refuelling company vehicles without driving long distances, a small fuel storage tank will be kept on site.

5.2.2.1. Air Quality

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

All fuel storage and handling facilities in Namibia must however comply with strict safety distances as prescribed by SANS 10089. SANS 10089 is adopted by the Ministry of Mines and Energy as the national standard.

It must further be assured that enough 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 quarrying area. Regular inspections should be carried out to inspect and test firefighting equipment and pollution control materials at the drilling 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 drilling.

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

The drilling programme operations can cause serious health and safety risks to workers on site. Occupational exposures are normally related to the dermal contact with fuels and inhalation of fuel vapours during handling of such products. For this 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

Quarrying 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 quarrying 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 Windhoek.

Table 10 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