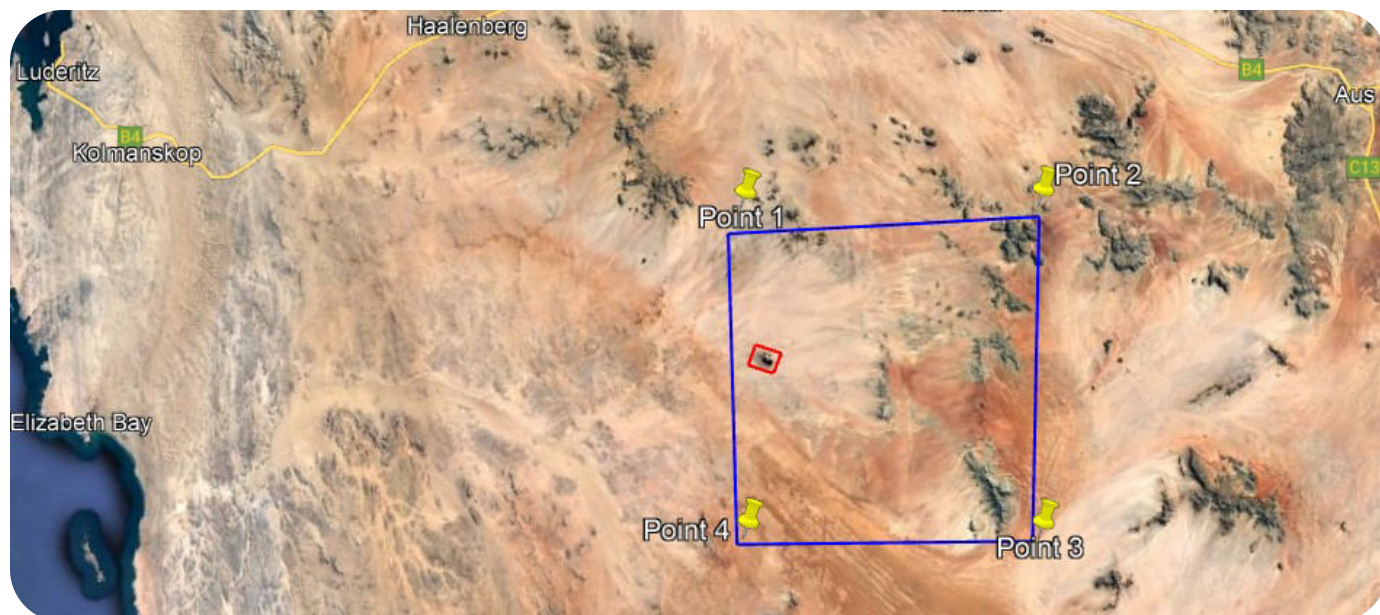


ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE ONGOING EXPLORATION AND PROPOSED MINING ACTIVITIES ON EPL 6691, LÜDERITZ DISTRICT, KARAS REGION

ENVIRONMENTAL ASSESSMENT REPORT



Prepared for

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DOCUMENT DESCRIPTION

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Report type:	Environmental Assessment Report
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Project Location:	Lüderitz District, Karas region
EAP:	Joseph Kondja Amushila
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LIST OF ACRONYMS

BID:	Background Information Document
DWNP:	Directorate of Wildlife and National Parks
DWSSC:	Directorate of Water Supply and Sanitation Coordination
EAP:	Environmental Assessment Practitioner
ECC:	Environmental Clearance Certificate
EIA:	Environmental Impact Assessment
EMA:	Environmental Management Act
EMP:	Environmental Management Plan
EPL:	Exclusive Prospective Licence
GDP:	Gross Domestic Product
HWC:	Human-Wildlife Conflicts
I&APs:	Interested and Affected Parties
IUCN:	International Union for Conservation of Nature
IWRM:	Integrated Water Resources Management
MAWLR:	Ministry of Agriculture, Water and Land Reform
MC:	Mining Claim
MEFT:	Ministry of Environment, Forestry and Tourism
MME:	Ministry of Mines and Energy
MoHSS:	Ministry of Health and Social Services
NBRI:	National Botanical Research Institute
NEPL:	Non-Exclusive Prospective Licence
NGO:	Non-Governmental Organizations
PPP:	Public Participation Process
QDS:	Quarter Degree Square
TKSNP:	//Tsau Khaeb (Sperrgebiet) National Park
ToR:	Terms of Reference

EXECUTIVE SUMMARY

Bonya Exploration (Pty) Ltd, hereinafter referred to as the proponent, holds mineral rights under Exclusive Prospective Licence (EPL) 6691 hereinafter referred to as the study area, located about 80 km southwest of Aus in Karas region. EPL 6691 is registered for the following commodity groups: *base and rare metals, dimension stones, industrial minerals, precious metals, precious stones, and semi-precious stones.*

Exploration activities on the study area have taken place since 2016. Exploration activities undertaken to date include geological mapping, rock chip sampling, channel sampling, float bulk sampling, Niton hand-held XRF mapping, and ground magnetic, gravity, and resistivity surveys. Although exploration activities in the area have been taking place for some times now, there has not been any formal EIA study conducted. Hence, previously activities were issued with Environmental Clearance (ECC) upon completion of Environmental questionnaires and signing Pro-forma Environmental Contracts to the Ministry of Environment, Forestry and Tourism (MEFT).

Bonya Exploration (Pty) Ltd intends to continue with the exploration activities and commence with the mining activities. In terms of the Environmental Management Act 07 of 2007 and Environmental Impact Assessment (EIA) Regulations of February 2012, the proponent is required to undertake an EIA study and apply for the ECC.

The EIA study was conducted in a systematic approach, as outlined in the EIA Regulations of February 2012. The objective of the EIA is to identify the potential impacts associated with the exploration and mining activities and to provide mitigation measures and ensure that potential impacts to the environment are managed effectively and that positive impacts are enhanced. Given the fact that the proposed activities are taking place within a pristine environment where conservation is a priority, a specialist study on the ecological impacts of the proposed exploration and mining was conducted and a report has been attached hereto this report.

This report constitutes an Environmental Assessment report which details a description of the historic and ongoing exploration and proposed mining activities. It also provides a description of the receiving or affected environment in terms of the biophysical aspects of climate, water, vegetation, geography, topography, and the socio-economic environments. The report is to be read in conjunction with the Environmental Management Plan (EMP) appended to this report.

1. INTRODUCTION

1.1 Background

The proponent (Bonya Exploration (Pty) Ltd) holds mineral rights under the EPL 6691 located about 80 km southwest of Aus in Karas region. The exploration activities which include geological mapping, rock chip sampling, channel sampling, float bulk sampling, Niton hand-held XRF mapping, and ground magnetic, gravity, and resistivity surveys have been carried out in the EPL 6691 since 2016.

The EPL 6691 has an extent of 68,966 ha, however, the intended exploration and mining activities will be concentrated on the Twyfelskupje Carbonatite Complex. located about 80 km southwest of Aus in Karas region. In order to comply with the statutory requirements of the Environmental Management Act of 2007, the proponent appointed Green Gain Consultants cc to undertake the required EIA study and apply for the ECC for the ongoing exploration activities and proposed mining activities on EPL 6691. The exploration and mining activities will be conducted inline with the Minerals (Prospecting and Mining) Act 33 of 1992.

1.2 Terms of Reference

The Terms of Reference (ToR) are aligned with the requirements of the Environmental Management Act 7 of 2007 and its 2012 Regulations. The consultant is therefore required to.

- i. Identify, investigate and evaluate all potential impacts of the exploration and mining activities on the physical environment, social, cultural and economic environment.
- ii. Review relevant and applicable legislations
- iii. Consult relevant stakeholders and potential Interested and Affected Parties (I&APs)
- iv. Prepare an Environmental Assessemnt report.
- v. Compile an Environmental Management Plan.
- vi. Submit the Environmental Scoping Report and Environmental Management Plan (EMP) to MEFT as per EMA Regulations of 2012.

1.3 Environmental Assessment Practitioner (EAP)

Green Gain Consultants cc has designated a team of consultant who are qualified EAP in terms of Section VII of the EIA Regulations of February 2012.

Lead EAP	Mr. Joseph Kondja Amushila
Qualifications	<ul style="list-style-type: none"> • Master of Science in Environmental Management (University of the Free State, South Africa) • Bachelor Honours Degree in Agriculture (Polytechnic of Namibia) • Bachelor's Degree in Agriculture (Polytechnic of Namibia) • National Diploma in Agriculture (University of Namibia)
Experience	Up to ten years' experience in Environmental consulting industry, most of which includes Strategic Environmental Assessment (SEA), Environmental Impact Assessment, Environmental Management Plans (EMPs) and Specialist studies.
Other team members	<p>Mr. Benny Shiimi Geologist Qualification: B. Sc. Environmental Geology</p> <p>Mr. Titus Shuuya Ecologist Qualification: B.S c. Environmental Science, M.S.c. Natural Resource Management (NUST)</p> <p>Ms. Justina Nghihangwa Environmental Health Specialist Qualifications: B. Honours Environmental Health, Mr. Sc. Health Science (NUST)</p>

2. METHODOLOGY

The study was conducted in a multidisciplinary approach as outlined in the EIA Regulations (Government Notice No. 30 of 2012). The methods used in the collection of information and assessment are explained below.

2.1 Field inspection and baseline data collection

The consultant conducted a field inspection at the proposed exploration and mining site. During the field inspection, the consultant conducted a walk-through-survey across the site to record various plants and animal species observed. Information from previous studies and surveys were reviewed.

The data collected during the site visit and from secondary sources can be summarized as follows:

- A list of all plant species observed at the site. This was verified with Quarter Degree Square (QDS) of vegetation from the National Botanical Research Institute (NBRI).
- Description and composition of the diverse habitats and plant communities observed on site.
- A list of all mammals, reptiles and amphibians directly or indirectly observed at the site.
- Maps of sensitive areas identified in the field and delineated on satellite imagery of the site.
- GPS coordinates of significant point-location biodiversity features.
- Photographs of various habitats, environments and biodiversity features present.

2.2 Specialist study

Given the sensitivity of the area and the types of vegetation, an Ecological specialist study was conducted as part of the EIA. The findings of this study are incorporated in this EIA. Information on the ecological setting of the area was collected from sources such as Tree Atlas of Namibia and Vegetation Survey of Namibia and the NBRI. The list of plants species of the area was derived from the NBRI data portal using a QDS method. The WIND QDS of the area are 2615DD. The conservation status of the species in the list was extracted from the database of the Ministry of Agriculture, Water and Land Reform (MAWLR) and the Red Data Book Namibian Plants. Information on fauna were obtained from direct observation and counter checked with important sources such as the Birds in Namibia, IUCN Red list of Threatened species of Namibia, and other relevant reports.

2.3 Legal and policy review

Relevant legislations were reviewed, and their applicability are outlined in Section 5 of this document.

2.4 Public and stakeholder consultation

The study was subjected to a public participation process (PPP) as defined in the Environmental Management Act 7 of 2007 and EIA Regulations of February 2012. The process that was followed is summarized below.

2.4.1 Consultations of stakeholders

The project was formally introduced to key stakeholders such as Government Ministries, Regional and Local Government, Traditional Authorities, and NGOs/CBOs. The aim of these consultations was to ensure that all relevant stakeholders are aware of the development and to obtain consent and input.

2.4.2 Consultations of I&APs

Potential IAPs were invited to register through newspaper advertisements that were published in two (2) local newspapers: New Era (12 & 16 November 2021), and Confidante (12 & 19 November 2021). Several public notices were placed at public places e.g., government offices, MEFT office, Service station in Aus. Relevant authorities were informed through notification letters sent to them.



Figure 1: Public Notices

**PUBLIC PARTICIPATION NOTICE
ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE
ONGOING EXPLORATION AND PROPOSED SMALL-SCALE
MINING ACTIVITIES ON EPL 6691, LÜDERITZ DISTRICT,
KHARAS REGION**

Notice is hereby given to all Interested and Affected Parties (I&APs), that an application for an Environmental Clearance Certificate will be submitted to the Competent Authority and the Ministry of Environment, Forestry and Tourism (MEFT) for the following activities.

Project title: Ongoing exploration and small-scale mining activities on EPL 6691.

Project location: Twyfelskupje, Lüderitz District, Kharas region

Proponent: Bony Exploration (Pty) Ltd.

Description: The proponent intends to continue with exploration activities and commence with the small-scale mining activities of base and rare metals, dimension stones, industrial minerals, precious metals, precious stones, and semi-precious stones. In terms of the Environmental Management Act 07 of 2007, the intended activities cannot be undertaken without an EIA study being carried out.

I&APs are hereby invited to register, request the Background Information Document (BID), attend the public meeting, and submit comments/inputs to eia@greengain.com.na The last day to submit inputs is 03 December 2021.

The public and stakeholder meeting is scheduled as follows

Venue: Banhof Conference Center, Aus.
Date: Friday, 19 November 2021
Time: 10:30

Green Gain Consultants For more Information
Cell: +264 811422927 or +26481 3380114
[http:// www.greengain.com.na](http://www.greengain.com.na)

See appendix B for Proof of consultations

2.4.3 Public meeting

A public meeting was held on Friday, 19 November 2021 at Bahnhof Conference Centre, Aus at 10:30. During the meeting, participants were introduced to the project and informed on the purpose of the study and the purpose of the consultation and their rights towards the study.

2.4.4 Joint site visit

In addition to the initial site visit and public meeting, the consultant, proponent and MEFT officials from the Lüderitz office who are responsible for the Sperrgebiet National Park had a joint site meeting on the 11 February 2022. The aim of the joint site meeting was for the consultant to show the MEFT officials the exact project site and provide detailed information on the intended activities.



Figure 2: officials during a site visit

2.4.5 Summary of issues raised from the PPP

Issues raised from the PPP were considered in the EIA and also incorporated in this EIA report. The summary of issues raised is outlined in the issue response report included as part of Appendix B.

3. DESCRIPTION OF THE PROPOSED ACTIVITIES

3.1 Locality

The Exploration Prospecting License (EPL) 6691 measures about 68,966 ha in extent and is situated approximately 60 km southwest of Aus settlement which lies 110 km east of the port of Lüderitz.

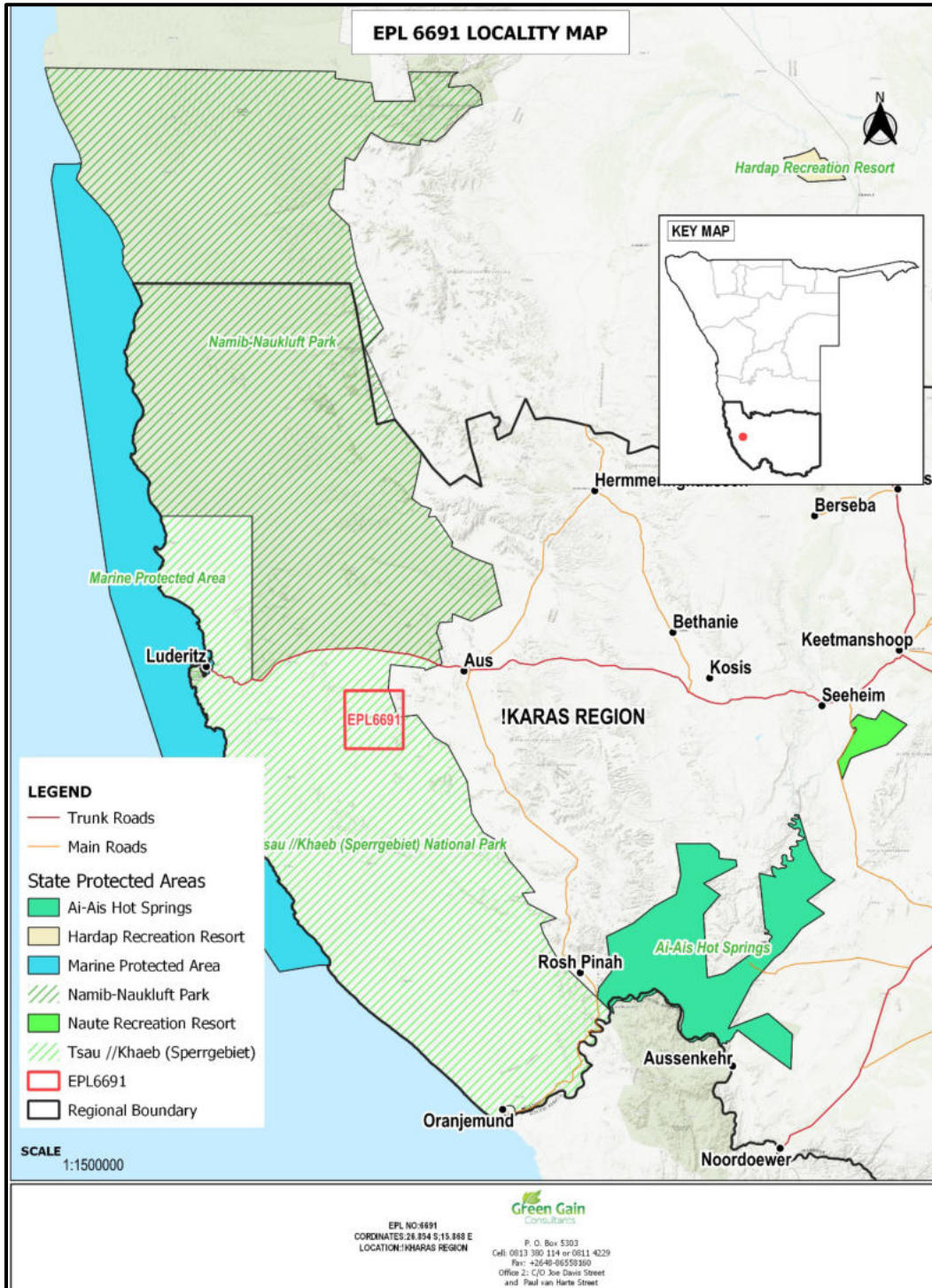


Figure 3: Location of EPL 6691

Although EPL 6691 has an extent of 68,966 ha, the proposed exploration and mining activities will be concentrated on an area measuring about 3x3km around the Twyfelskupje Carbonatite Complex (Figure), located on the following coordinates 26°51'52.00" S; 15°46'17.07" E. The mining site (Twyfelskupje Mountain Complex) is located about 80 km south-east of Aus and is accessible via the existing track roads linked to the B4 Aus-Lüderitz Road. The access track road is also used by MEFT -Sperrgebiet National Park and NamPower.

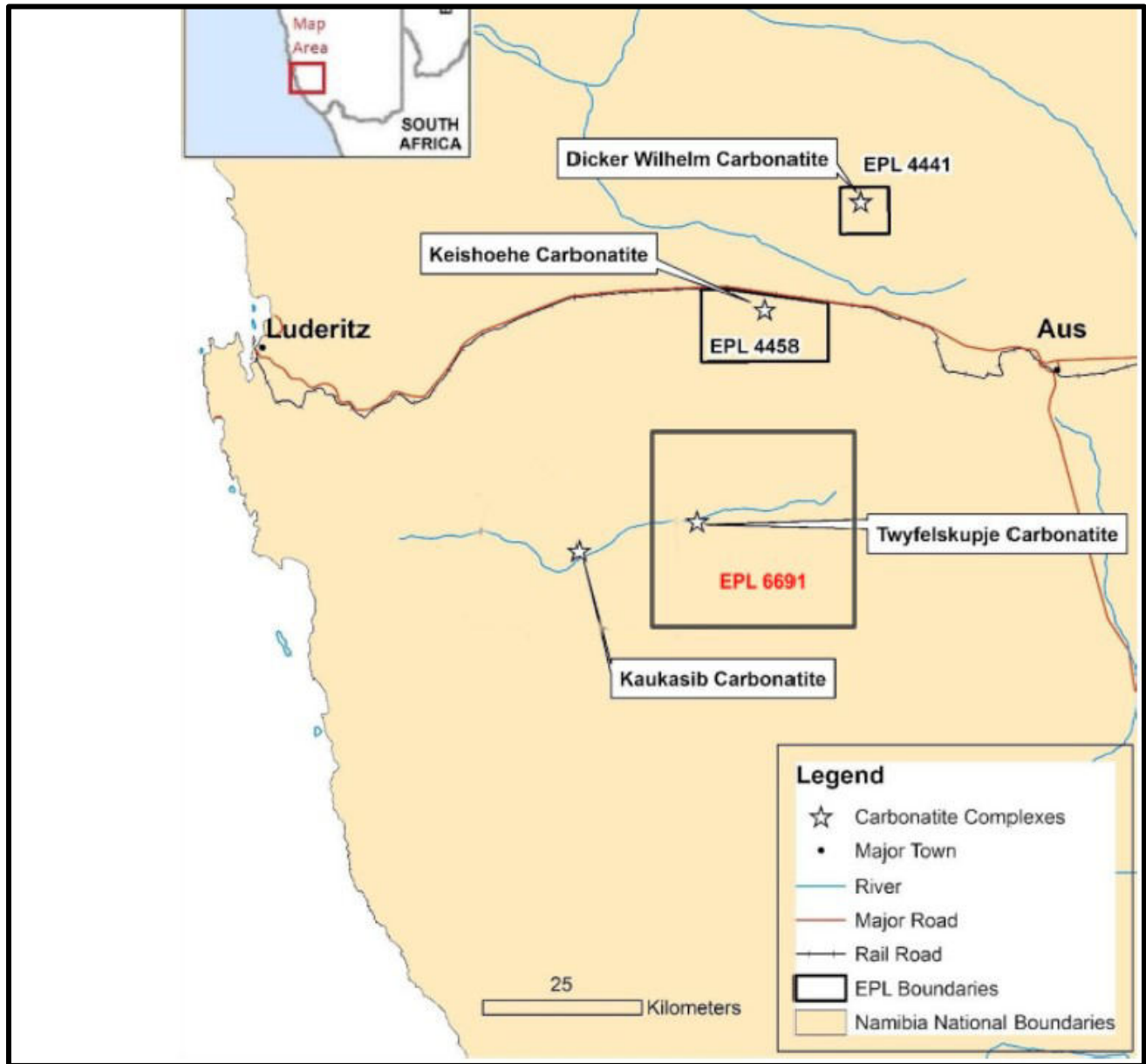


Figure 4: Geographical setting of the area

3.2 Exploration activities

Exploration activities undertaken to date, include geological mapping, rock chip sampling, channel sampling, float bulk sampling, Niton hand-held XRF mapping, and ground magnetic, gravity, and resistivity surveys.

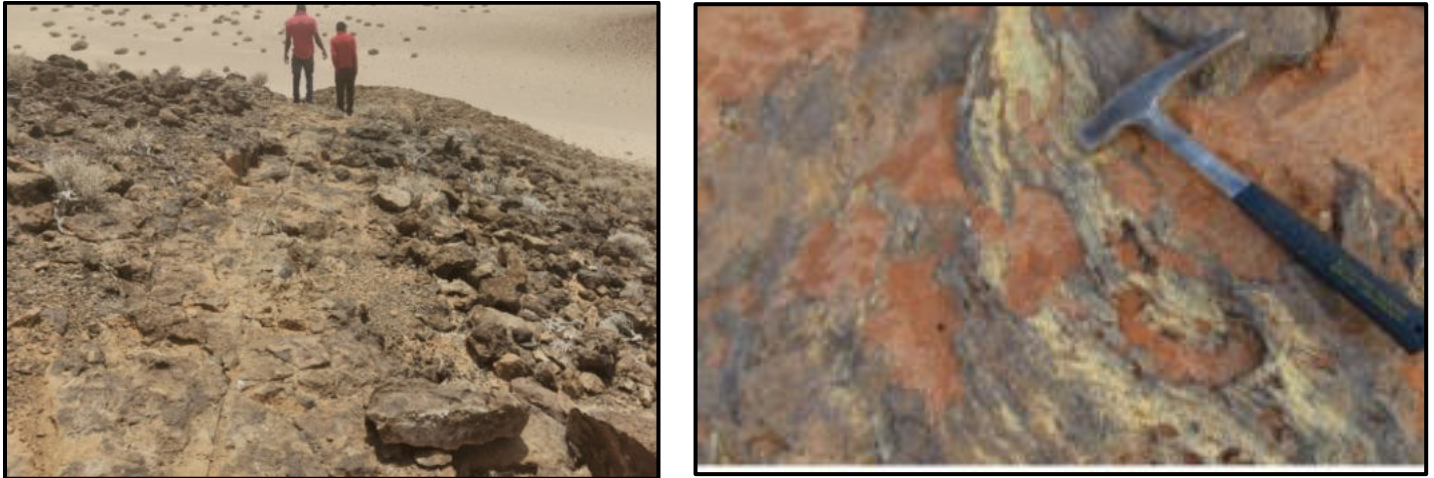


Figure 5: Previous exploration activities

The intention is to continue with the exploration activities in the form of drilling and bulk sampling leading to the development of open-pit mining operation activities. Drilling will be done to test the depth and continuity of mineralization at specific sites suited to that structural component being tested. Resource drilling will be undertaken on a 100m grid for pfs status, and locally on a 50m grid for dfs status. Samples of half core will be collected at 1m intervals within the mineralized zones. Samples will be tested with the handheld XRF gun and then by whole rock geochemical analyses of the individual earth elements. The total number of geochemical samples required to reach dfs status is likely to exceed 10,000.

Other exploration methods will include geophysical surveys such as ground magnetic, gravity, resistivity, and radiometric surveys, bulk sampling, trenching, and drilling.

3.3 Proposed mining activities

3.3.1 Types of minerals

EPL 6691 is registered for the following commodities *base and rare metals, dimension stones, industrial minerals, precious metals, precious stones, and semi-precious stones.*

3.3.2 Mine plan and layout

Figure 4 below depict the proposed mine plan and layout-down areas based on similar sized outcropping enriched carbonatites worldwide. The minimum total area required will cover an extent of about 9 km² (3x3km) or 900 ha which will be sufficient for a 30year open pit mine (excluding open pit areas).

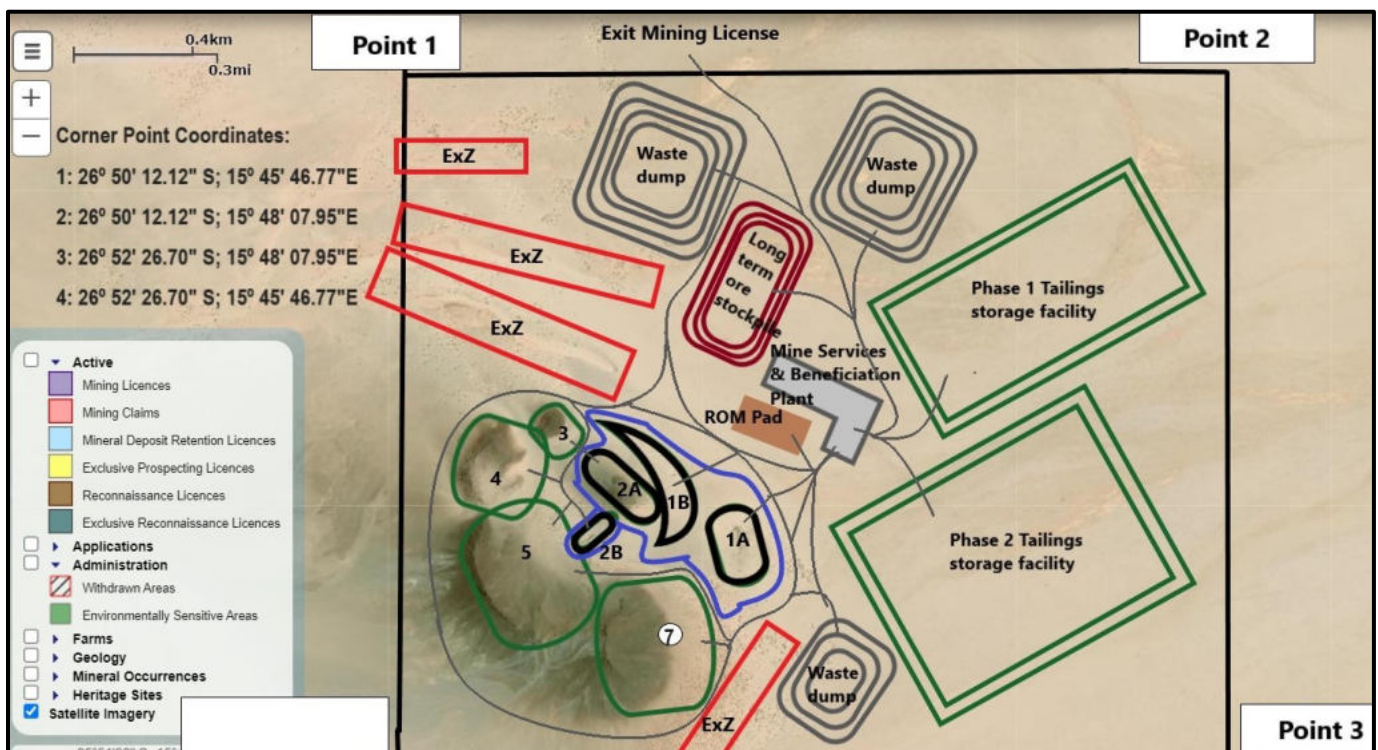


Figure 6: Proposed Mine Plan and layout

The proposed mining area has the following features

- The area does not contain any significant sized dry riverbeds
- The area has a flatter, and more subdued relief than other areas
- The gravity survey undertaken by Greg Symons indicates an extension of the Phase 1 high-grade 1A pit to the Northeast (NE)
- The disused electricity line from Lüderitz to the SW runs through the area NE of the ore deposit.
- The Phase 1 high-grade open pits, and the Phase 3 high-grade pushback (shown in blue on the attached mine site layout), are all best accessed from the NE.

3.3.3 Project infrastructure

The following facilities will be established onsite for the exploration and mining process

- Mine pit/s x 3
- Stockpile and temporary storage facility
- Tailing facility
- Mine camp (temporary accommodation)
- Beneficiation plant
- Waste dump (temporary usage)
- Site office and maintenance workshop

3.3.4 Mine plant and Equipment

The following mine plant and equipment will be required for the exploration and mining process

- Excavator (chain-wheel or bucket)
- Dump truck
- Jaw-crusher
- Hydraulic driller

3.3.5 Methods of mining

The method to be used in mining include mainly drilling and blasting to test the composition of the individual structural components, leading to the final establishment of the open pit boundaries, and start-up benches for ore extraction.

a) *Drilling and trenching*

The intended mining activities will include diamond drilling and trenching to test the depth and continuity of the individual structural components of the carbonatite complex followed by geophysical techniques to test potential extensions of the ore body and removal of overburden (sand and calcite) where necessary.

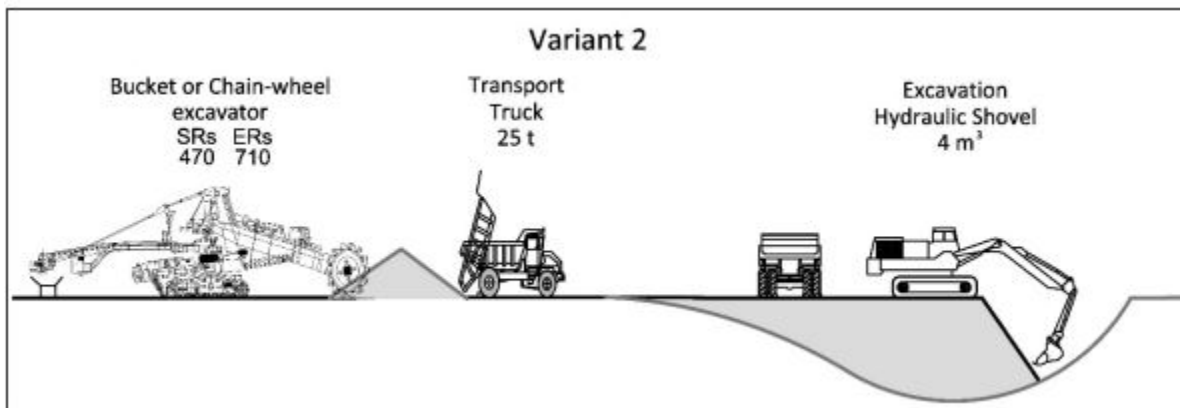


Figure 7: Typical example of trenching method

b) *Blasting in mining*

Blasting will be conducted by a registered blasting company or individual. The blasting technique normally follows six main steps as depicted in Figure 6 below.

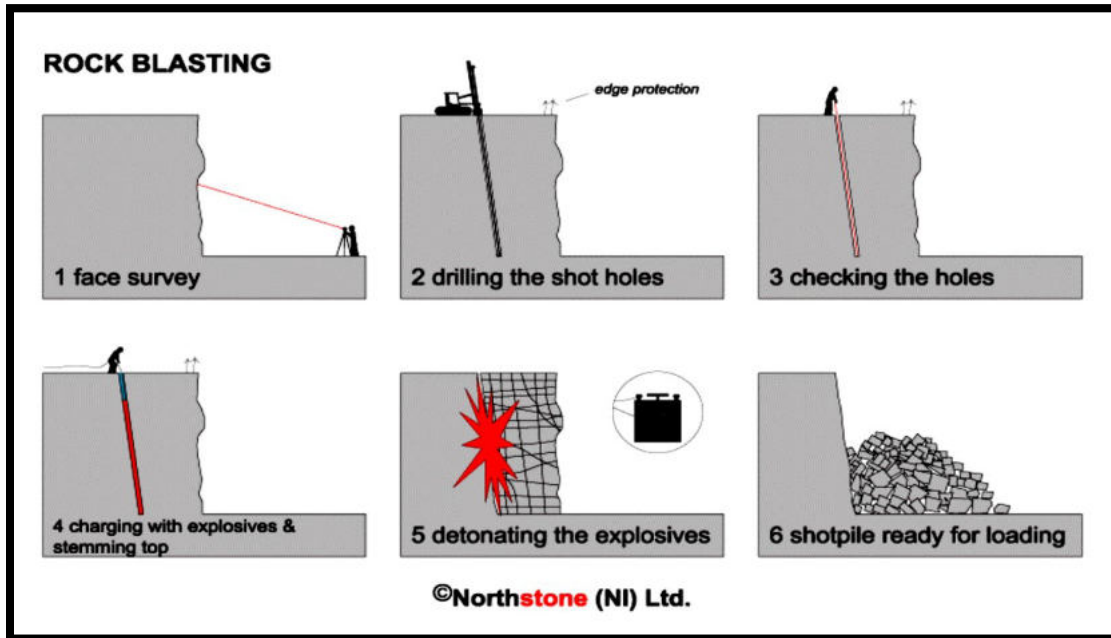


Figure 8: Typical example of the blasting process

- *Blasting process*

Step 1: The first step is a three-dimensional survey of the mining area to allow the explosives engineer to design the blast and to plot where the shot holes should be drilled so that the blast can be carried out safely and efficiently. The survey will also indicate the presence of bulges or hollows in the face and determine the number of explosives required.

Step 2: After the profiling survey, shot holes are drilled using an air or hydro operated driller at the marked spots corresponding to the hole positions on the blast design and at the angles and depths required (9 meter). The number of shot holes will depend on the size of the area to be blasted. This usually range from 10 to 30 shot holes per occasion.

Step 3: The area is then prepared for blasting and humans and animals are removed from the site. The placement of explosives is professionally planned to ensure that the required fragmentation of the rock is achieved with the minimum environmental impact. Detonator cord is placed in each hole and loaded with explosives within a few metres of the top.

Step 4, 5 & 6: After blasting, the area is inspected to check that all the shot holes have fired correctly.

- *Blasting explosives*

Table 1: Most common mining blasting explosive used in mining.

Explosive	Compositions	Classifications	Possible Risks
Emulsion Blasting in opencast mines	Oil emulsion	Hazardous substance, Class 5.1 oxidizing substances.	Oxidizing and toxic substances
Cartridge Suitable for underground mining applications, blasting in opencast mines, and civil blasting operations	Water and oil emulsion	Classified as hazardous substances and dangerous goods	Shock, Fire
Ammonium Nitrate-Fuel Oil (ANFO) Used in dry blast holes for surface and underground operations	Ammonium Nitrate and Fuel Oil	Hazardous substances	Emit hazardous gases (nitrogen oxides and carbon oxide)

3.4 Auxiliary infrastructures ‘

Other activities will also include the development of haul roads, plants, tailings, topsoil dumps, offices, and workshops. It is envisaged the final ore product will be sold as a light rare earth concentrate as well as a monazite concentrate. Access to the site from the main road will be via the existing minor gravel roads which are also used by NamPower and MEFT (TKSNP).

Water will be sourced from the company’s office yard in Aus. Water will be used mainly for domestic uses i.e., cooking, drinking and washing. Portable ablution facilities (toilet & shower) connected to a septic tank will be provided onsite. Power supply will be sourced from diesel generator or alternative solar panel. No permanent structures are expected to be established onsite during the first project phase. Only minor servicing of plant and equipment will be done onsite while main service and repair will be done at the company workshop in Aus.

3.5 Workforce and accommodation

About 15 employees will be recruited. Majority of the employees will be housed at company house in Aus and only few personnel (one shift) will be allowed to stay permanently onsite. Accommodation will be provided in the form of temporary structures i.e., caravans and tented camps.

3.6 Waste management and Rehabilitation

Mining activities produce two types of waste, namely: mining waste e.g., waste rocks and general waste e.g., litter etc. General waste will be collected and disposed of at the Aus disposal site. There will also be a radiation monitoring of waste and hydrogeological drilling to monitor the composition of groundwater and aquifer levels.

Progressive rehabilitation will include contouring of waste dumps to flatten and stabilize dumps and monitoring of dump oxidation processes. Other rehabilitation activities that will be undertaken concurrent with the exploration activities will include.

- Refilling and levelling of trenches
- Removal waste, scraps and contaminated soil from spills and leaks
- Flattening of abandoned roads
- Re-vegetation of the disturbed area with local adapting species under the supervision of the MEFT (NBRI and/or DWNP), where possible.
- Dust and Erosion control measures
- On completion of operations or if exploration and mining activities cease for certain reasons, all infrastructure, equipment, plant, temporary housing, and other items used during the mining period must be removed from the site.

3.7 Occupational health and safety

Employees in the mining activities are exposed to several occupational health hazards which could result into serious health risks such as injuries, diseases, or death. The exposure to these hazards could be aggravated by risk factors such as the lack of experience & limited knowledge, nature of work and non-compliance to health safety standards. The common hazards include physical, chemical, biological, radiological, agronomical, and behavioural hazards.

Table 2: Baseline Hazard Assessment of mining activities

Occupational Hazard	Hazard type	Potential Risks	Likelihood (1-4)
Dust	Ergonomic	Lung diseases, skin irritation and eye damage	4
Noise	Physical	Insomnia	4
Vibration	Ergonomic	Insomnia	4
Noxious gases	Chemical	Lung diseases, cancer, respiratory diseases etc.	3
Falling rocks	Physical	Injuries, death	4
Flying rocks	Physical	Injuries	1
Heights	Ergonomic	Falling, injuries, death	4
Toxic and hazardous substances	Radiological	Poisoning	4
Explosions	Physical	Fire, damage, injuries, death	4
Heavy loads	Ergonomic	Fatigue	2
Long distances	Physical	Physical fatigue	1
Long working hours	Ergonomic	Physical fatigue, insomnia	4
Poisonous plants	Biological	Poisoning	2
Predators	Biological	Injuries, death	1
Snake bites	Biological	Injuries, death	4
Harsh weather	Physical	Fatigue	4
Conflicts	Behavioural	Injuries	4

Likelihood scale: 1-unlikely/improbable, 2 –likely, 3 –most likely, 4 – definite/certainly

For detailed information of the above identified occupational health hazards, please refer to Section 4.2.6 of the EMP.

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

Below is the baseline of the affected environment which entails a description of various environmental receptors that are likely to be affected by the proposed exploration and mining activities. This includes both the socio-cultural-economic and biophysical aspects. The impacts on socio-cultural-economic aspects will affect a greater geographical area e.g., constituency, regional and national. Hence, the description of the socio-cultural-economic baseline provided for the study area corresponds to the extent of the community in which the activities are taking place. Alternatively, the baseline study area chosen for physical and ecological data collection is mainly the area which is in the direct zone of influence of the exploration and mining activities, its process facilities and supporting infrastructures.

4.1 Socio-economic environment

4.1.1 About the area

As indicated the previous chapters, EPL 6691 is located in the Sperrgebiet National Park which is a desert and it has been regarded as 'Forbidden Territory' of Diamond Area 1 (DA1), for nearly a century. It covers some 26 000 km² between the Orange River in the south and latitude 26°S in the north and extends 100 km inland from the coast (.

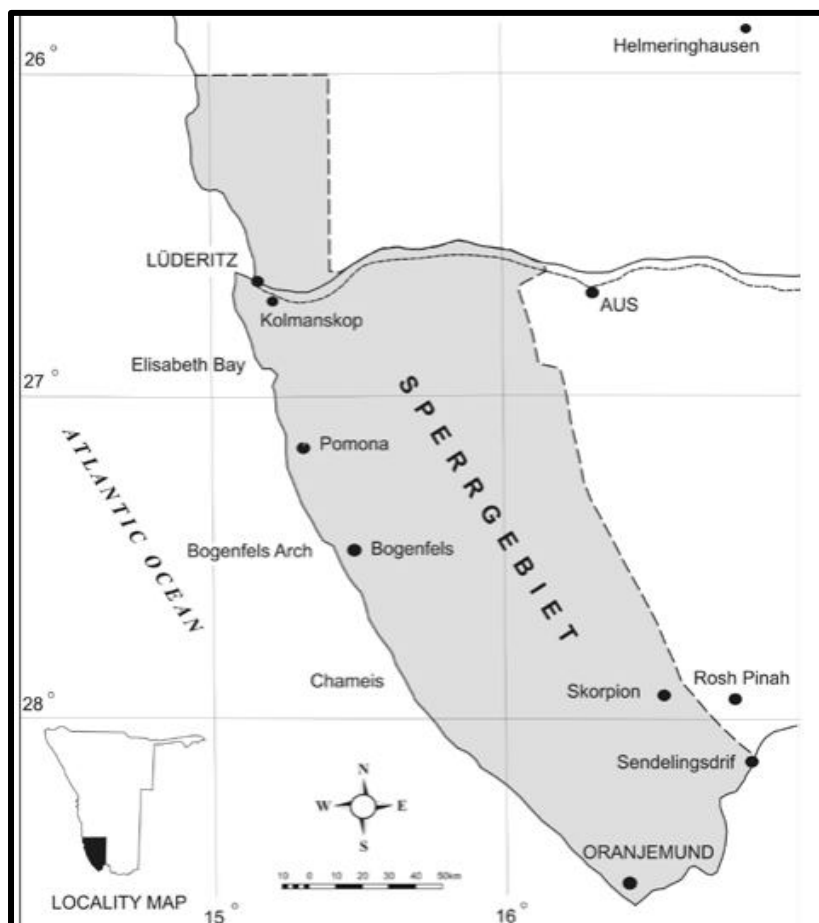


Figure 9: Locality of Sperrgebiet NP (Pallet, 1995)

4.1.2 Surrounding land use patterns

EPL 6691 also encroaches on the neighbouring farm Garub located on the northeast. During the first phase of public consultation, it was also confirmed that there are four operators operating within the proximity of the EPL. Moreover, there is a soon to be awarded tourism concession (Oxwagon Concession) in the proximity of the EPL. Land use impacts between these distinctive land uses will be assessed in detail during the EIA study.

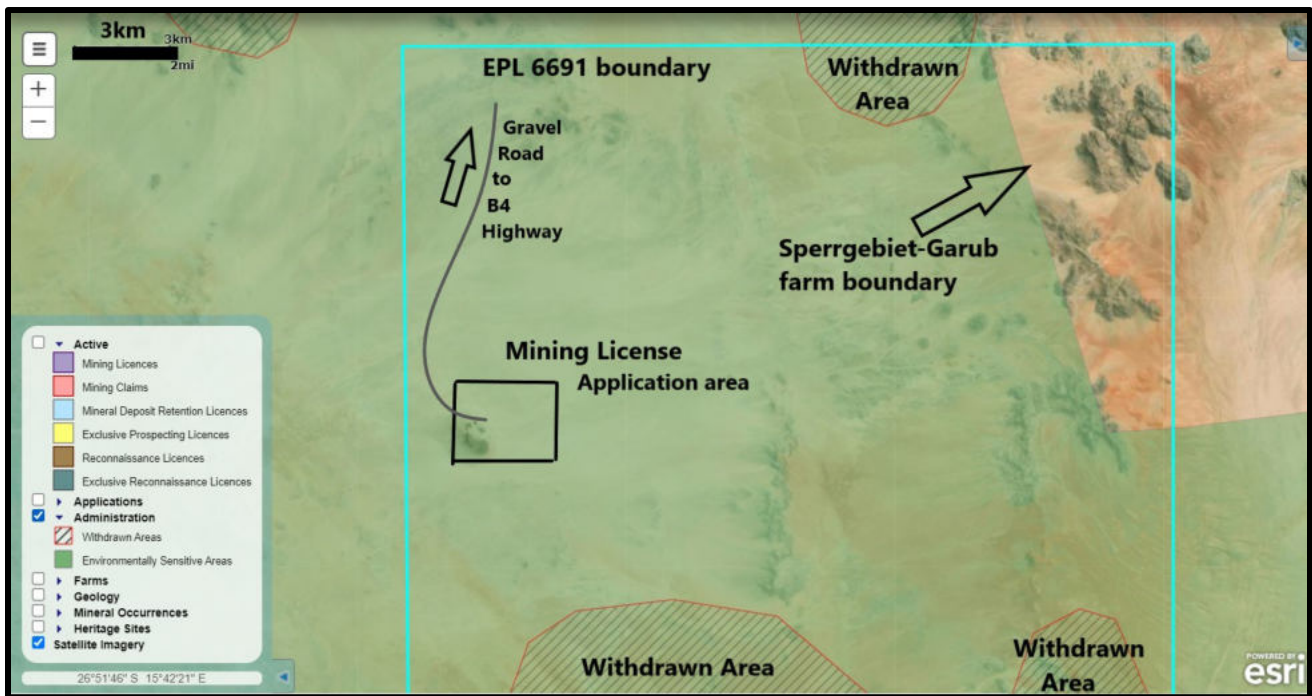


Figure 10: Surrounding land uses

4.1.3 Archaeology and Palaeontology

According to Pallet, (1995)., People have lived in the Sperrgebiet for at least 300 000 years, and possibly longer. To support these claims, there is some cultural artefact evidence, particularly at the Affenrücken and Chameis areas to suggest that human occupation continued more or less in the same area during the Middle Stone Age (from 20 000 years ago to 150 000 years ago), due to the presence of freshwater springs.

During the Late Stone Age (from 20 000 years ago to 500 years ago), people were following a hunter-gatherer culture both at the coast and inland, where occupation sites tended to be associated with springs and waterholes. Artefacts from this period have been found at the Orange River mouth, Lüderitz and the Koichab River area (MEFT, 2013).

4.2 Biophysical environment

4.2.1 Climate and meteorology

❖ Climate

The Sperrgebiet lies in the transition zone between the winter and summer rainfall regimes of southern Africa: the northern areas fall mostly within the summer rainfall zone and the southern parts generally receive rainfall in the winter months. There is also a transition as one moves from the slightly moister eastern parts to the more arid coastal zone. The Sperrgebiet receives less than 100 mm of rainfall per annum, which is very variable from year to year and area to area, e.g. the mountain ranges and inselbergs tend to attract slightly more precipitation than the surrounding plains due to the orographic effect (MEFT, 2013).

Most of the precipitation in the Sperrgebiet is in the form of rain and fog, but snow does occasionally occur on the mountains around Aus. As warm air from the interior of the country meets the cold Benguela current offshore the Namibian coast, condensation causes fog to occur. Fog occurs on average for 100 days per year at Oranjemund, decreasing slightly towards Lüderitz. The fog bank tends to persist offshore and rolls inland during the evening, occasionally reaching up to 50 km inland. The mountain ranges and inselbergs tend to attract more fog and it persists for longer over the higher ground because of the delayed dissipation of the inversion layer at altitude. As the winds pick up during the day, the inversion layer decays and the temperature differential between land and sea decreases, which causes the fog to dissipate as the day progresses (MEFT, 2013).

❖ Wind

The most prevailing winds are southerly to south-westerly winds which persist throughout the year, occasionally giving way to very strong north-easterly 'Berg' winds during the winter months. Calm conditions are rare, especially near the coast. Pomona has the distinction of having the highest wind velocities in southern Africa, with constant daily winds in summer ranging in velocity from 30 to 80 kph (8-22 m/s). Given that the erosion threshold for sand mobilisation is 4.4 m/s, it is clear that sandstorms are a frequent occurrence (MEFT, 2013).

❖ Temperature and evaporation

Generally, the cold Atlantic currents modify the temperatures of the desert. In summer it can get very hot in the area, with temperatures exceeding 40°C. Paradoxically, some of the warmest days in the desert can occur in winter when the hot Berg winds are blowing. Irrespective of the daytime temperatures, it is always cool at night due to strong outgoing radiation under clear skies. Frost has been experienced at Aus during winter (MEFT, 2013).

4.2.2 Topography and landscapes

The Sperrgebiet has a wide variety of landscapes, ranging from inselbergs and low mountain ranges to gravel plains, red semi-stabilised dunes, pale-coloured mobile dunes and ephemeral watercourses. The area of interest (Twyfelskupje Carbonatite Complex) is spatially associated with the Dicker Wilhelm, Keishoehe, and Kaukasib carbonatites within the Lüderitz structural corridor, which is inferred to be a zone of crustal weakness (Pickford and Senut, 2015).

According to Marlow, (2016), The Twyfelskupje, Keishoehe, Kaukasib, and Dicker Wilhelm carbonatites are considered to have intruded the Namaqua Metamorphic upper crustal basement during a period of rifting and crustal extension. The Twyfelskupje Carbonatite Complex forms a circular group of hills with a diameter of about 1km. There are seven outcropping areas of the complex (designated TK1 to TK7 in Figure 4 below). The outer cone sheets at Twyfelskupje form prominent topographic features and stand about 120m above the surrounding plain.

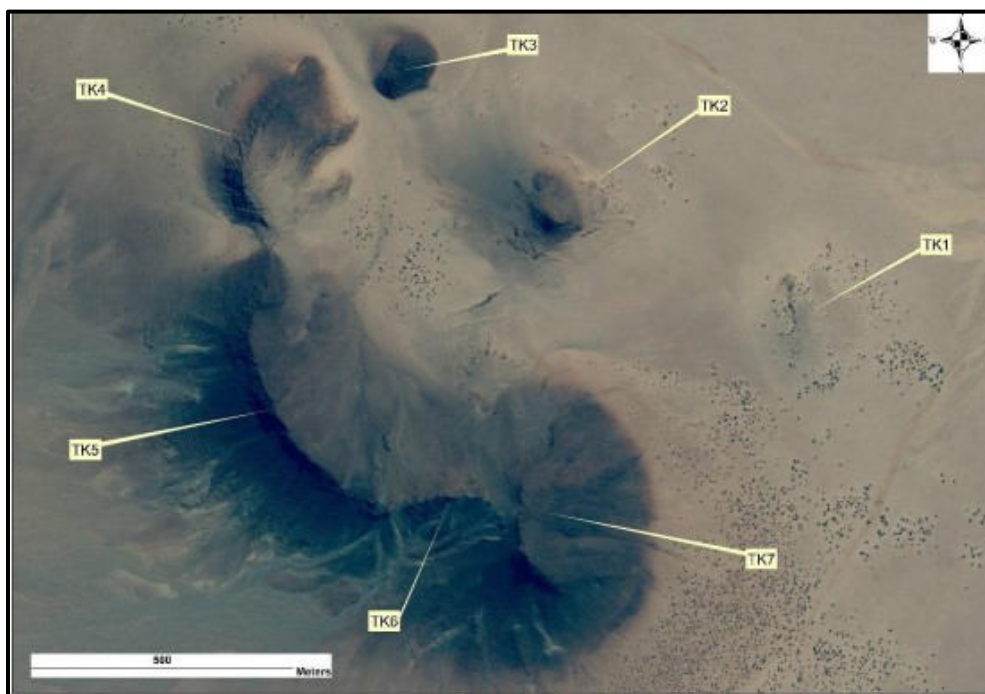


Figure 11: Topographic overview of the mining area (A. Marlow, 20221)

4.2.3 Habitats and local flora

The //Tsau Khaeb (Sperrgebiet) National Park is a combination of Succulent Karoo, Namib Desert, and Savannah biomes, with a variety of vegetation types such as Succulent Steppe, Southern Desert, Riverine Woodland. The area of interest (Twyfelskupje Mountain complex) is characterized by the Northern gravel and sand plain grassland and Agub-letterkupper inselberg succulent shrubland. The most prominent habitats are mainly the sandy gravel plains, mountain ridges & inselberg and slopes of drainage lines.

The local occurring vegetation observed during the initial site screening include succulent dwarf shrubs & bushes and herbaceous grass species such as *Euphorbia gummifera*, *Pteronia pomonae*, *zygophyllum*, *Ectadium latifolium*, *Salsola dwarf*, *Aloidendron dichotomum*.



Figure 12: Dominant plant species

A full list of plants that occurs on the affected area is provided in the ecological specialist study (Annexure C).

4.2.4 Local fauna

In terms of fauna, the //Tsau Khaeb (Sperrgebiet) National Park has more biodiversity than anywhere else in Namibia. The faunas that are known to occur in the area will include mammals, reptiles, amphibians, and terrestrial bird species. The notable local occurring fauna are displayed in the table below.

Table 3: Locally occurring fauna.

Category	Types	Category	Types
Wildlife	Elephant, Black Rhino, Leopard, Cheetah, Mountain Zebra, Kudu, Oryx, Ostrich, Springbok, Steenbok, Jackal, Klipspringer.	Mammals	Bats
Reptiles	Snakes, Geckos, Lizards Chameleons, Tortoise	Birds	Yellow Eagle, Owls, Swift birds
Amphibians	<i>Pyxicephalus adspersus</i> (near threatened but is widely spread across Namibia)	Others	Squirrels, Rats & Mice, Rodents, Insects and Scorpions etc.

4.2.5 Ecological Specialist study:

Given the fact that the proposed activities are taking place within a pristine environment where conservation is a priority, an independent specialist study (ecological study) focusing on the biological diversity and ecological setting of the area was carried out as part of the study and the report is attached hereto as Annexure C.

4.2.6 Water resources management

❖ Hydro-geological setting

The integrated water resources management (IWRM) in Namibia is carried out at the lowest management level, known as the basin level. To broaden the management process, the country is divided into twelve hydrogeological regions based mainly on geological structure and groundwater flow. According to Figure 10 below, the mining area falls under the Tsondab-Koichab River Basin.

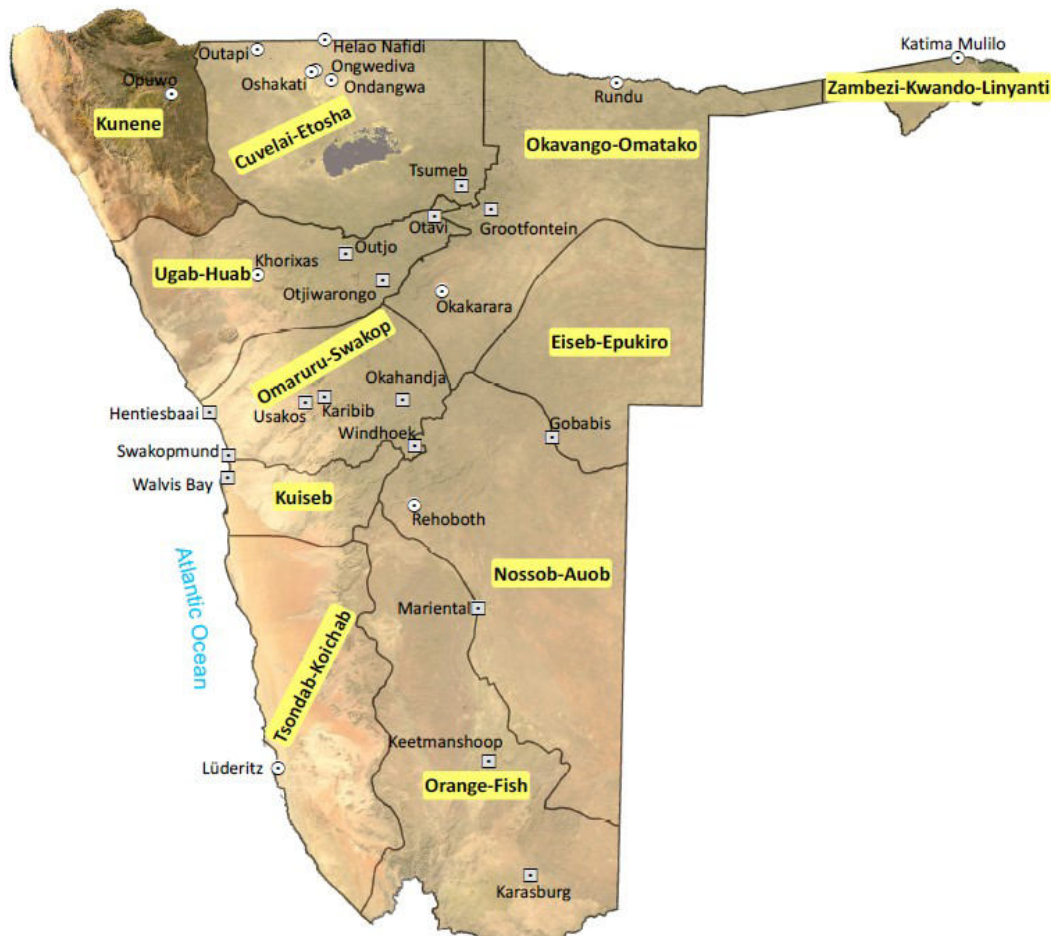


Figure 13: Hydro-geological map of Namibia (Source: IWRM, 2010)

The basin is bordered by the Atlantic Ocean on west, with the Kuiseb and Orange Fish River basins on its northern and eastern/ southern borders respectively. The basin is characterized by two major westward flowing ephemeral rivers namely the Tsondab and Tsauchab, originating in the Naukluft Mountains that feed into large pans. Other smaller rivers in the basin include the Tsisar and Koichab, the later contains a large alluvial aquifer (groundwater associated with a river) that supplies Luderitz (IWRM, 20210).

❖ Source and quality of water

The only readily available fresh surface water in the Sperrgebiet is from the Orange River. There are a few known fountains in the Sperrgebiet (at Chameis, Obib, Kaukausib, Daberas, Aurus, Buntfeldschuh and Grillenthal) which play an extremely valuable role in the survival of wildlife, and in the past for primitive cultures. Most of the fountains have rich deposits of archaeological and historical artefacts e.g., at Obib and Chameis Bay. The Kaukausib fountain and Obib fountain are utilised by gemsbok and baboons respectively. During drought periods, animals tend to congregate around these water sources, but due to the lack of grazing in the surrounding areas, there is a high concentration of mortalities around the fountains, e.g., Kaukausib

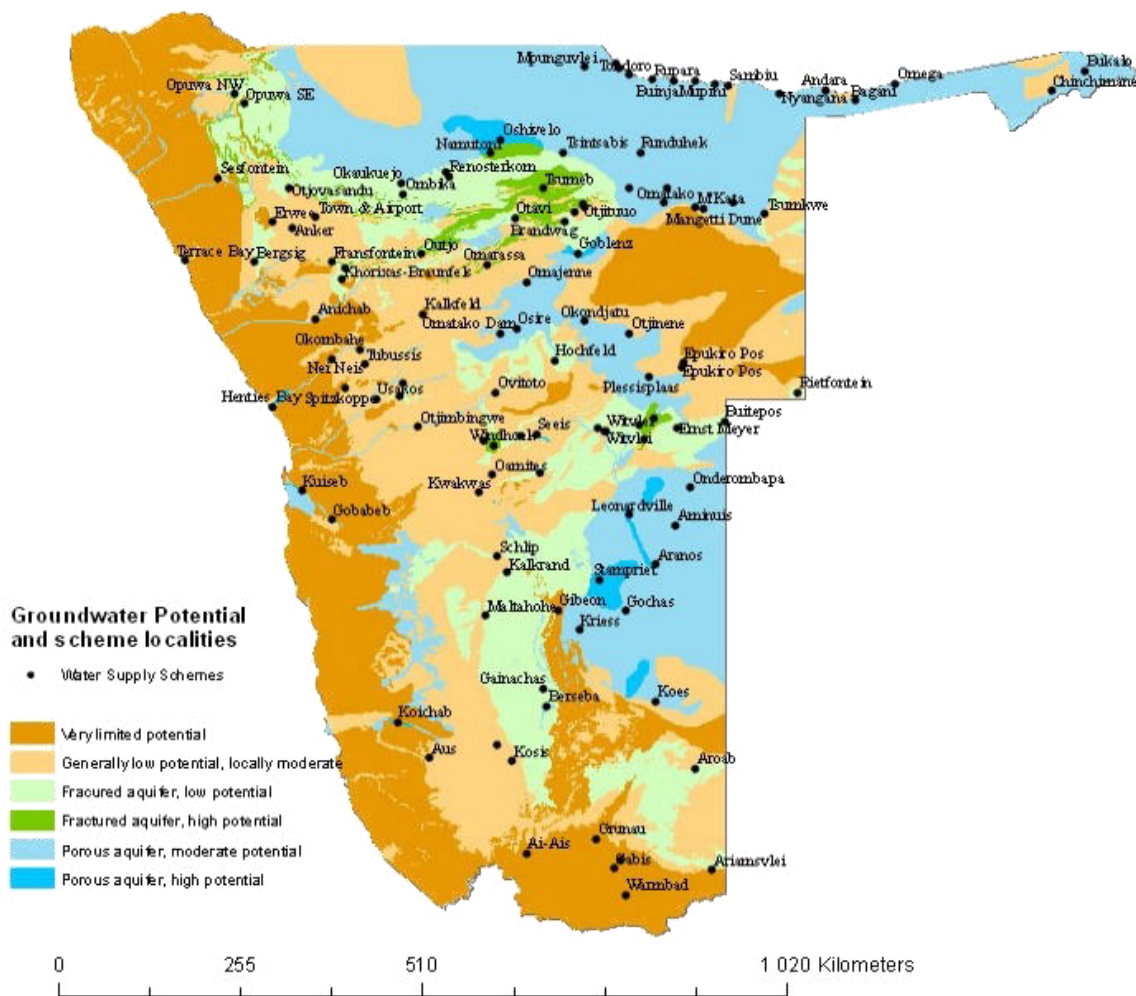


Figure 14: Hydrogeological map of Namibia (MAWLR)

4.2.7 Soil

The local occurring soils of the mining area are mostly eutric regosols and lithic leptosols which are generally thin and poorly developed. These soils have limited potential for agricultural production.

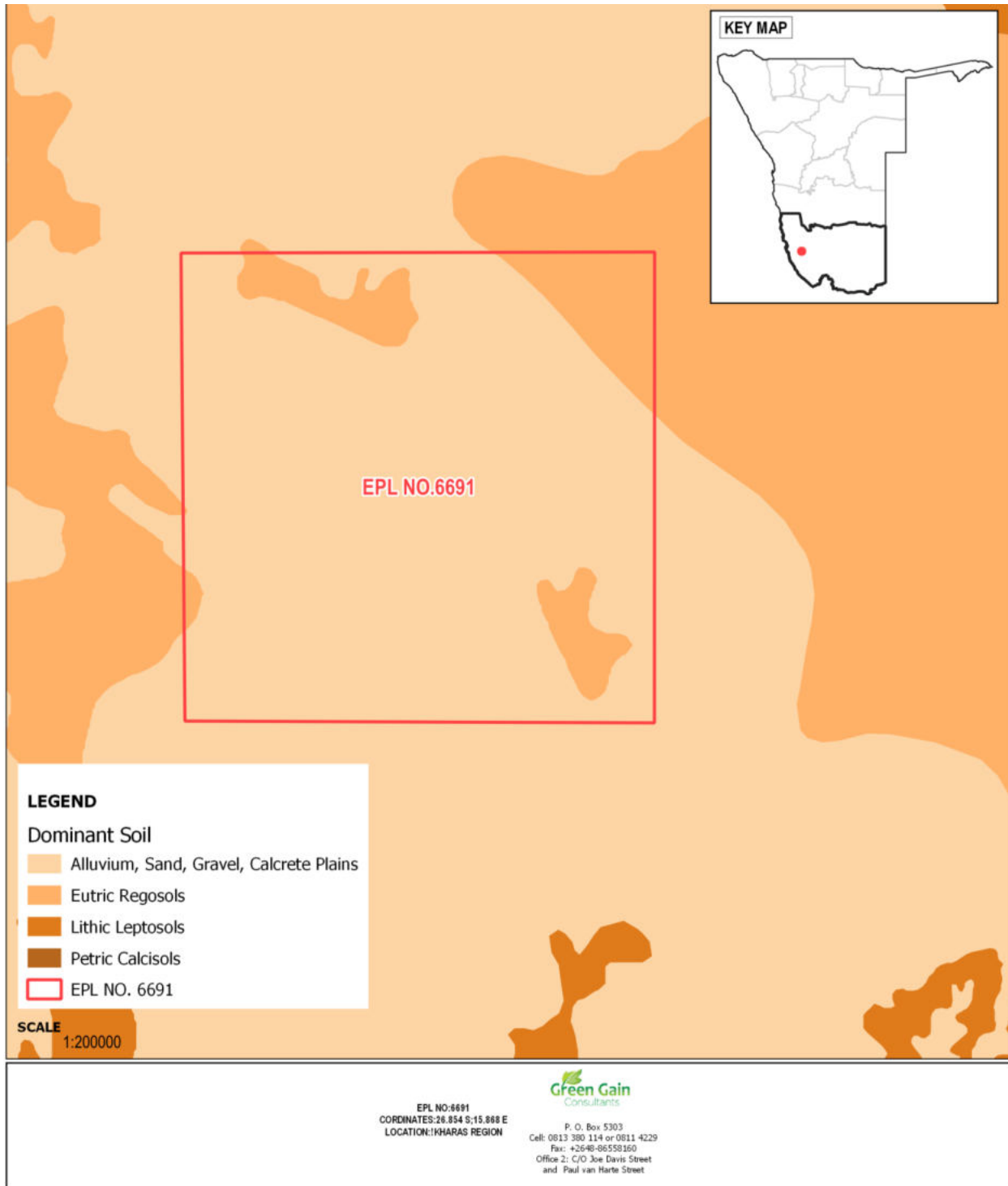


Figure 15: Soil map of the area

4.2.8 Geology

The geological record of the Sperrgebiet extends back some 1 500 million years (Ma), even predating the formation of the supercontinent of Gondwanaland. The current arid period dates from 10 to 7 Ma, giving rise to the claim that the Namib is the oldest desert in the World. The geology of the Sperrgebiet is extremely complex and is a result of sedimentary and volcanic activity over the course of millions of years. The resulting rocks have been metamorphosed during successive stages of structural overments in the Earth's crust. The formation of extensive mineral deposits has accompanied these geological processes. Long periods of erosion by wind and water have eventually given rise to the landscape of the Sperrgebiet today.

According to the geological mapping conducted by Dr. Alan Marlow, the Twyfelskupje Carbonatite complex consists of a dyke stockwork core surrounded by a peripheral cone sheet system. The carbonatites vary in color from grey to various shades of light brown and dark brown, as well as yellow. Furthermore, the carbonatites display highly variable textures including spotted, porphyritic, mottled, brecciated, sheared, slumped and weakly to strongly or finely to coarsely banded.

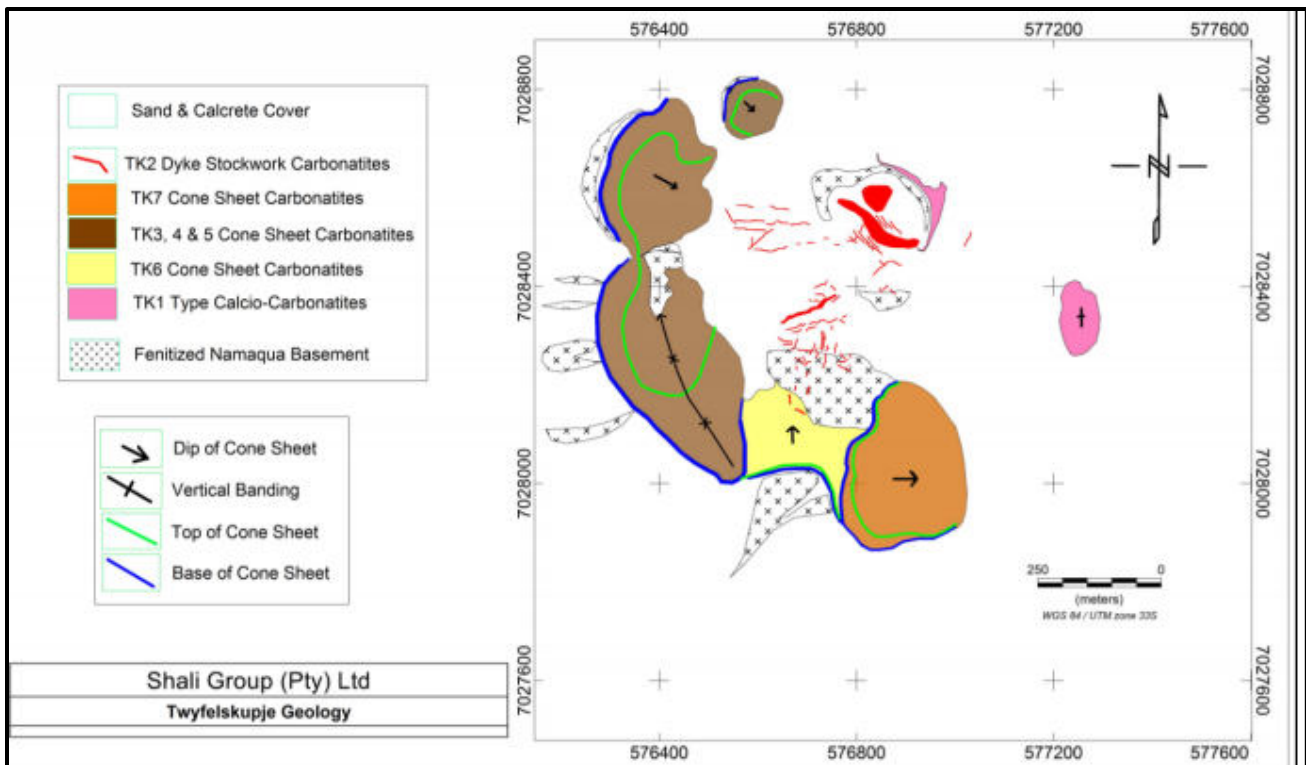


Figure 16: Geological make-up of the mining area (Source: A. Marlow, 2021)

5. LEGISLATIVE FRAMEWORK

5.1 Environmental management requirements

The Environmental Management Act No.7 of 2007 and the Environmental Assessment Policy for Sustainable Development and Environmental Conservation (1995) set the guiding policy/legal framework for environmental management in Namibia. The proposed activities trigger activities listed under the EMA Regulations of 2012, thus cannot be undertaken without an EIA being conducted and an ECC being obtained. The proposed exploration and mining activities on EPL 6691 will triggered the following listed activities.

- **Section 2: Waste management, treatment, handling and disposal.**
 - 2.1 The construction of facilities for waste site treatment or waste and disposal of waste
 - 2.2 Any activity entailing a scheduled process referred to in the atmospheric pollution prevention Ordinance of 1976.
 - 2.3 The import, processing, use and recycling, temporary storage, transportation, or export of waste.

- **Section 3: Mining and quarrying activities**
 - 3.1 The construction of facilities for any process or activities which requires a license, right or other form of authorization, and the renewal of a license, right or other form of authorization, in terms of the Minerals (Prospecting and Mining act), 1992.

 - 3.2 Other forms of mining or extraction of any natural resources whether regulated by law or not.
 - 3.3 Resource extraction, manipulation, conservation, and related activities.

 - 3.5 The extraction of peat.

- **Water resource developments**
 - 8.1 The abstraction of ground or surface water for industrial or commercial purposes.

- **Hazardous substance treatment, handling, and storage**
 - 9.1 The manufacturing, storage, handling, or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974.

 - 9.4 The storage and handling of dangerous goods, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic meters at any one location.

5.2 Mineral rights in Namibia

The Minerals (Prospecting and Mining) Act 33 of 1992 provides the overarching legal control of rights related to reconnaissance, prospecting, mining sale/disposal in Namibia, the following mining rights are applicable (Source: MME, 2010).

- **Non-Exclusive Prospecting Licence (NEPL):** This is a gateway licence to pegging mining claims but does not permit the holder exclusive rights for any specific mineral group e.g., semi-precious stones or area of mining.
- **Exclusive Prospective Licence (EPL) (Section 67 -76)** An EPL is meant for detailed investigations such as geological mapping, ground geophysics, geochemical sampling, trenching, drilling, bulk sampling, trial mining, etc. It is the most common type of mineral license issued by the Ministry of Mines and Energy. In fact, more than 70% of the workload which the Mining Commissioner's office undertakes due to licensing related activities emanate from EPLs and EPL applications.
- **Mining Claim (MC):** gives rights to prospect and mine. It must be registered within 21 days from the date on which such claim is pegged. Procedures for the application of MCs are detailed on Section 16-45 of the Minerals (Prospecting and Mining) Act 33 of 1992.
- **Mining License (ML) (Section 90-101)** After a successful exploration program, an EPL holder may want to start mining activities. In this case, an EPL Holder may to apply for a mining license. Depending on the deposit size and the scale of production, a mining license may be issued for a period not longer than twenty-five (25) years. The annual fee depends on the projected annual turnover.
- **Reconnaissance Licence (RL) Section 58-66** A reconnaissance license is used to conduct regional investigations such as airborne geophysical surveys and analysis of satellite images. Usually, it covers a large area e.g. 1 million Ha. A RL issued for six (6) months after which, the holder of a RL should ideally be in a position to apply for an Exclusive Prospecting Licence within the area previously covered by the RL. The application fee for a RL depends on the size of the area (N\$500/quarter of a degree square).
- **Mineral Deposit Retention License (MDRL) (Section 77 -89)** After conducting exploration under an EPL, the EPL holder may find a deposit but there could be certain circumstances that prevent such EPL holder from taking the project to mining. These circumstances include: the commodity price, lack of infrastructure or poor extraction technologies at the time.

5.3 Applicable national legislations

One of the most important components of an environmental assessment process is the review of applicable and relevant legislations. Below is a review of relevant legislations and applicable provisions in respect of the proposed exploration and mining activities.

Table 4: Applicable National Legislation

LEGISLATION	PROVISIONS APPLICABLE TO SSMs ACTIVITIES	IMPLEMENTING AGENCY
Namibian Constitution	The legislative and regulatory foundation for protection and management of the environment and its natural resources is governed by the Namibian Constitution. Article 95(i) of the constitution clearly emphasizes the promotion of the welfare of the people, whereby <i>the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future.</i>	GRN of Namibia
Environmental Management Act of 07 of 2007	The purpose of this Act is to promote the sustainable management of the environment and the use of natural resources by establishing principles for decision-making on matters affecting the environment; to provide for a process of assessment and control of projects which may have significant effects on the environment; and to provide for incidental matters. The Act also provides procedures for adequate public participation during the environmental assessment process for the interested and affected parties to voice and register their opinions and concern about the proposed project.	Ministry of Environment, Forestry and Tourism
National Forestry Act of 2001	Provide for the establishment of a Forestry Council and the appointment of certain officials; to consolidate the laws relating to the management and use of forests and forest produce; to provide for the protection of the environment and the control and management of forest fires; to repeal the Preservation of Bees and Honey Proclamation, 1923 (Proclamation No.1 of 1923), Preservation of Trees and Forests Ordinance, 1952 (Ordinance No. 37 of 1952) and the Forest Act, 1968 (Act No. 72 of 1968) and to deal with incidental matters Deforestation of natural forests has important implications for soil erosion, biodiversity loss and global warming. <i>This Forest Act 12 of 2001 requires that tree species and any vegetation within 100m from a watercourse may not be</i>	Ministry of Environment, Forestry and Tourism

	<p><i>removed without a permit (S22 (1)).</i></p> <p>The Act also prohibits the removal of and transport of various protected plant species. The Act further requires any project activity that will result in clearance of certain forests to obtain a forest permit beforehand.</p>	
Public Health and Environmental Act of 2015	<p>Section 119 of this Act prohibits the existence of a nuisance on any land owned or occupied. The term nuisance is important for the purpose of this EIA, as it is specified, where relevant in Section 122 as follows:</p> <ul style="list-style-type: none"> a) any dwelling or premises which is or are of such construction as to be injurious or dangerous to health or which is or are liable to favour the spread of any infectious disease. b) any dung pit, slop tank, ash pit or manure heap so foul or in such a state or so constructed as to be offensive or to be injurious or dangerous to health. c) any area of land kept or permitted to remain in such a state as to be offensive, or liable to cause any infectious, communicable, or preventable disease or injury or danger to health; or d) Any other condition whatever which is offensive, injurious, or dangerous to health. <p>Furthermore, in terms of Section 8 of the Public Health Proclamation 16 of 1936, where a Regional authority is of the opinion that a nuisance is seriously offensive or a serious menace to health, it may serve a notice on the owner or occupant of the nuisance to immediately remove the nuisance. Failure to abide by this provision is an offence. Of relevance is the location of the mine, and the fact that mining activities will overlap with the activities of the community currently on the land.</p>	Ministry of Health and Social Services
Minerals (Prospecting and Mining) Act 33 of 1992	<p>To provide for the reconnaissance, prospecting, and mining for, and disposal of, and the exercise of control over, minerals in Namibia; and to provide for matters incidental thereto.</p> <p><i>Part 1: Rights in relation to the minerals</i></p> <p>Subject to any right conferred under any provision of this Act, any right in relation to the reconnaissance or prospecting for, and the mining and sale or</p>	Ministry of Mines and Energy

disposal of, and the exercise of control over, any mineral or group of minerals vests, notwithstanding any right of ownership of any person in relation to any land in, on or under which any such mineral or group of minerals is found, in the State.

Also deals with prohibition on carrying on certain operations without licence, and transfer of certain licences or grant, cession, or assignment of interests in such licences, and joinder of persons as joint holders of such licences or interests.

Part VI: Rights of holders of non-exclusive prospecting licences.

(a) to carry on prospecting operations on any land for any mineral or group of minerals.

(b) to remove any mineral or group of minerals other than a controlled mineral or sample of such mineral or group of minerals, for any purpose other than she or disposal, from any place where it was found or incidentally won in the course of prospecting operations referred to in paragraph (a) to any place within Namibia.

(c) with the permission of the Commissioner previously obtained generally or in every case in writing and subject to such conditions as may be determined by the Commissioner or subject to be conditions of an exemption granted under section 137 –

Section 109 (1): Minerals Ancillary Rights. The holder of NEPL or MC may obtain rights.

a). to enter upon land to carry on operations authorized by such licence or mining claim on such land.

(b) to erect or construct accessory works on any land for purposes of such operations.

(c) to obtain a supply of water or any other substance in connection with such operations.

(d) to dispose of water or any other substance obtained during such operations.

	(e) To do anything else in order to exercise any right conferred upon him or her by such licence or mining claim.	
Pollution Control and Waste Management Bill of 1999	<p>This Bill serves to regulate and prevent the discharge of pollutants to air and water as well as providing for general waste management. The bill provide framework for a multitude administration on pollution control and waste management in the country. Each authority identified by the bill shall play its respective roles.</p> <p><u>In addition, the National Solid Waste Management Strategy</u></p> <p>The Ministry of Environment and Tourism (MET) has recognised the urgent need to improve solid waste management in Namibia. This National Solid Waste Management Strategy is important to ensure that the future directions, regulations, funding and action plans to improve solid waste management are properly co-ordinated and consistent with national policy, and to facilitate co-operation between stakeholders.</p>	Ministry of Environment, Forestry and Tourism
Atmospheric Pollution Prevention Ordinance No. 11 of 1976	<p>This Ordinance generally provides for the prevention of the pollution of the atmosphere and for matters incidental thereto. The Ordinance deals with administrative appointments and their functions; the control of noxious or offensive gases; atmospheric pollution by smoke, dust control, motor vehicle emissions; and general provisions.</p> <p>Part IV of this ordinance deals with dust control. The Ordinance is clear in requiring that any person carrying out an industrial process which is liable to cause a nuisance to persons residing in the vicinity or to cause dust pollution to the atmosphere, shall take the prescribed steps or, where no steps have been prescribed, to adopt the best practicable means for preventing such dust from becoming dispersed and causing a nuisance.</p> <p>Of applicability to the mining activities, is dust generated by vehicles or equipment as well as dust generated during mining. The risk of dust generation is high at the envisaged site. This deals with air pollution as it affects occupational health and safety, and no consideration is given to the natural environment.</p>	Ministry of Environment, Forestry and Tourism
Soil conservation Act 76 of 1969	The objectives of the Soil conservation Act 76, 1969 are to make provision for the combating and prevention of soil erosion, and for the conservation, protection and improvement of the soil, the vegetation and the sources and	Ministry of Agriculture, Water and Land Reform

	<p>resources of the water supplies.</p> <p>Part II, deals with soil conservation works and it further states that in section 4(1) The Minister may by means of a direction order the owner of land to construct the soil conservation works referred to in such direction either on land belonging to such owner or on land belonging to another person, in such manner and within such period as may be mentioned in such direction, if the Minister is of the opinion that the construction of such soil conservation works is necessary in order to achieve any object of this Act in respect of the land belonging to such owner.</p> <p>Of relevance is the fact that the area has very little disturbances. The proponent should ensure that when new areas will be mined, all the topsoil should be stored separately to ensure the seedbeds are conserved and can be used when rehabilitation of the area is conducted after mining has been completed.</p>	
Hazardous Substance Ordinance 14 of 1974	<p>This Ordinance provides for the control of toxic substance and thus also relevant for pollution control. It covers for the manufacturing, sale, use, disposal, dumping, importing, and exporting of hazardous waste.</p> <p>Of relevance to the proponent are the use of Blasting Abrasives and any other substance or mixture of substances classified under Group I Group II or Group III of hazardous substances.</p> <p>The sale of Group I, and use, operation, application, and installation of Group III hazardous substances are subjected to the provisions of subsection (2).</p>	Ministry of Environment, Forestry and Tourism
Water Resources Management Act 24 of 2004	<p>The Water Resources Management Act (Act 24 of 2004) governs the quality of both fresh- and seawater used for industrial purposes. Restrictions imposed on users are as follows: Any water used for industrial purposes must be purified to standards prescribed by the Minister. Purified or treated effluent must be returned to the source from which it was originally drawn. This may, however, be changed subject to ministerial intervention.</p> <p>Part 9-10 deals with the Water Supply and Licensing of Water Abstraction. The Ministry of Agriculture, Water and Land Reform has the overall responsibility to regulate, control, manage and regulate water resources and to supply water to rural areas through its Directorate of Water Supply and Sanitation Coordination (DWSSC). The Namibia Water Cooperation (NamWater) is responsible for bulk</p>	Ministry of Agriculture, Water and Land Reform

	<p>water supply from primary water sources (dams, aquifers, rivers etc.) to communities whereas private consumers (commercial farmers, mines, tourism operators etc.) have private boreholes for water abstraction.</p> <p>Abstraction of water for domestic use. Section 38 (1) Subject to subsection (3), a person who abstracts water from a water resource for own domestic use is exempted from the requirement for a licence to abstract and use water.</p> <p>Part 13 (70) of the WRA states that no person shall discharge or cause to discharge any substance industrial effluent or any other liquid or substance other than soil water or wastewater or unpolluted water for the purpose of testing the function of the drainage installation or any part thereof during or upon completion construction.</p> <p>Any occupier of a premise from which industrial effluent is discharge into a public sewer, shall: provide overflow detection devices, pre-treatment where necessary to comply with regulations and ensure that no prohibited discharges enter public sewer systems.</p> <p>Since connection to public sewer is not an option in this case, The proponent, shall before occupation make provision for a conservancy tank or a septic tank and absorption field on site. Sanitary systems must be constructed and located in such a way as to prevent a causation of any nuisance or unhygienic or offensive conditions.</p> <p>Sewage or other prohibited discharges should not enter storm water drains or roads. The occupier of any premises shall provide for facilities necessary to prevent any discharge, leakage or escape of such liquids onto any street or any premises or into any storm water drains or watercourse. No person shall cause or permit any storm water to enter any drainage installation on any premises. Inspections may be carried out at any time by the Department for Water Affairs (or a nominee). The Secretary has the power to suspend or restrict operations which may be causing water pollution and to impose certain conditions on the offender.</p>	
<p>Petroleum Products and Energy Act 13 of 1990</p>	<p>Regulations made under the Petroleum Products and Energy Act 13 of 1990 states that: A license or certificate is required for purposes of storing or</p>	<p>Ministry of Mines and Energy</p>

	<p>keeping fuel in a quantity of 200 liters or less in any container kept at a place within a local Authority area or fuel in a quantity of 600 liters or less in any container kept at a place outside a local authority area.</p> <p>These regulations apply, in the case of an above-ground tank, to a storage tank with a capacity of 2,200litres or more and in the case of all below-ground tank, to a capacity with a capacity of 4,560 liters or more. Every license-holder or certificate holder shall about any replacement or installation of a storage tank, or a remaining storage tank, which this regulation applies, and which is in the possession of such license-holder or certificate holder, annually not later than 28 February, duly complete Form PP/10 as set out in Annexure B and shall submit such form together with the information requested therein by the Ministry of Mines and Energy.</p>	
National Heritage Act 27 of 2004	<p>The National Heritage Act 27 of 2004 provide provisions for the protection and conservation of places and objects of national heritage significance, and to register places and objects under that framework. The proponent must ensure that should any archaeological objects defined in the Act be found while mining operations are ongoing, it will be communicated to the National Heritage Act.</p> <p>Cultural heritage is defined as “<i>monuments, [as] architectural works (...), cave dwellings and combinations of features, (...) [but also] sites, as works of man or the combined works of nature and man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view.</i>” Natural heritage is “<i>natural features (...), geological and physiographical (...) [and] natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation and natural beauty.</i>”</p> <p>Heritage sites, whether included in UNESCO list (World Heritage Site, WHS), are composed of cultural and natural elements of aesthetic and scientific value.</p> <p>Natural and cultural capital are of great scientific, aesthetic and tourism value. Multiple groups of users compete for these assets and resources. They have different interests at stake, and this leads to conflicts over use of resources.</p>	National Heritage Council (NHC)

<p>Labour Act 11 of 2007</p>	<p>To establish a comprehensive labour law for all employers and employees; to entrench fundamental labour rights and protections. Regulate basic terms and conditions of employment; ensure the health, safety, and welfare of employees; to protect employees from unfair labour practices; to regulate the registration of trade unions and employers' organisations; to regulate collective labour relations; to provide or the systematic prevention and resolution of labour disputes.</p> <p>Some of the notable Sections under this Act are.</p> <p>Health and Safety Procedures Section 17 (1) The employer shall prepare any health and safety procedure referred to in sub regulation (1) in consultation with the work-place safety committee concerned.</p> <p>Section 21. (1) Any person who intends to commence any mining operation shall give 30 days' notice of such intention to the Minister.</p> <p>Section 22. (1) In the event of an accident or dangerous occurrence in or in connection with a workplace, including a mine, or if an employee dies, or suffers a serious injury because of such an accident or dangerous occurrence, the employer shall notify and report such accident to the Chief Inspector of Labour of the area.</p> <p>Notification of Occupational Diseases, Section 23. If a medical practitioner finds that any person is suffering from any occupational disease listed in Annexure A.2(1), or of any other disease that he or she believes was caused by that person's current or past employment, he or she shall immediately and in the form of Form OD. 1, report this fact to the Chief Medical Officer of Occupational Health and Safety.</p> <p>It shall be an unfair dismissal, or unfair disciplinary action, in terms of section 45 by an employer if such employer terminates the services of, or takes disciplinary action against, such employee, if such employee has contracted an occupational disease listed in Annexure A.2 (1), or any other disease, because of his or her past or present employment with such employer.</p>	<p>Ministry of Labour and Employment Creation</p>
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	<p>Section 210, states that an employer shall ensure that an employee wears or uses, to the satisfaction of an inspector, suitable and adequate personal protective equipment. All employment issues should be handled in accordance with relevant Sections of the Labour Act.</p>	
Human Wildlife Conflicts Policy	<p>The policy defines Human Wildlife Conflicts as Human “conflicts between wild animals and humans. This ranges from the destruction of crops and water installations to loss of livestock, homes and in some cases loss of human lives. Human Wildlife Conflict occurs throughout Namibia on communal as well as freehold land and involves a variety of species. The main problems occur on the land where the most elephants and predators are found outside protected areas and where people are least able economically to bear the costs of damage and losses.</p> <p>The Policy objectives is to manage human wildlife conflict in a way that recognizes the rights and development needs of local communities, recognizes the need to promote biodiversity conservation, promotes self-reliance and ensures that decision-making is quick, efficient, and based on the best available information.</p> <p>The Revised National Policy on Human Wildlife Conflict Management is based on several fundamental principles as stated under Section 5.1 to 5.13.</p>	Ministry of Environment Forestry and Tourism
Nature Conservation Act 5 of 1996	<p>The Act provides amendments to various Sections of the Nature Conservation Ordinance of 1975. One such amendments was the requirements to be complied with for the recognition of conservancy committees and the declaration of conservancies, and any restrictions and conditions to which a conservancy committee shall be subject.</p> <p>The Act provides for and promote the maintenance of ecosystems, essential ecological processes, and Namibia biodiversity and to promote the mutually beneficial co-existence of humans with wildlife as well as to give effect to Namibia’s international obligations to legal instruments such as the Convention on Biological Diversity.</p> <p>The Act also recognizes that biodiversity must be maintained, and where necessary, rehabilitated and that essential ecological processes and life support systems must be maintained.</p>	Ministry of Environment Forestry and Tourism
Arms and Ammunition Act 7 of 1996.	<p>To provide for control over the possession of arms and ammunition; to regulate the dealing in, importation, exportation, and manufacture of, arms and ammunition; and to provide for incidental matters.</p> <p><u>The relevant provisions under this Act are as follows.</u></p>	Ministry of Safety and Security

	<p>According to this Act an “ammunition” means any cartridge or percussion cap intended for use in the discharge of an arm.</p> <p>CHAPTER 5: Manufacture of Arms and Ammunition</p> <p>Prohibition of unauthorized manufacture of ammunition</p> <p>26. (1) Subject to subsection (2), no person shall manufacture ammunition or any explosive component of ammunition except -</p> <p>(a) in an explosives factory licensed under the Explosives Act, 1956 (Act 26 of 1956); and</p> <p>(b) under the authority of and in accordance with a permit issued under section 27.</p> <p>(2) Subsection (1) shall not apply to the loading or reloading of cartridges by the holder of a licence to possess an arm, for use in such arm.</p>	
<p>Explosives Act 1956 Act 26 of 1956</p>	<p>Provides for authorization of certain group of explosives, manufacture, storage, use and licensing of explosives.</p> <p><u>Authorized explosives in Namibia</u> <i>gunpowder, nitro-glycerine, dynamite, guncotton, blasting powders, fulminate of mercury or of other metals, coloured fires, and every other substance, whether like those herein mentioned or not, which is used or manufactured with a view to produce a practical effect by explosion or a pyrotechnic effect.</i></p> <p>Most of the products listed here are old fashioned and have been replaced with modern generation products such as emulsions, watergels and cartridge products.</p> <p><u>Prohibition of storage or possession of unauthorized explosives save in accordance with section three.</u> Section (1) states that No person shall keep, store or be in possession of any unauthorized explosive unless it has been manufactured as provided by subsection (1) of section three and is kept, stored or possessed in such manner and in such quantities as have been approved in writing by an inspector.</p> <p><u>Prohibition of storage of authorized explosives except in licensed premises</u> No person shall keep, store or be in possession of, any authorized explosive in or on any premises unless authorized thereto by a permit issued by an inspector and the explosive be kept in quantities not exceeding 500 kilograms in weight and be stored in an isolated place approved by an inspector and under conditions prescribed in writing by an inspector.</p>	<p>Ministry of Safety and Security</p>

	<p><u>Licence necessary to deal in explosives.</u></p> <p>(1) No person, other than the manufacturer, shall sell or deal in any explosive unless he is in possession of a licence granted under the regulations, which shall be in addition to any other licence which may be required in terms of any other law.</p>	
<p>Controlled Wildlife Products and Trade Act 9 of 2008</p>	<p>Aim: To provide for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; and to provide for incidental matters. Of relevance to the proposed activities are.</p> <p>Section 4: Possession of and dealing with controlled wildlife products.</p> <p>(1) Any person who -</p> <p>(a) possesses any controlled wildlife product the possession of which is unlawful in terms of Schedule 1.</p> <p>(b) deals in any controlled wildlife product if the dealing therein is unlawful in terms of Schedule 1.</p> <p>(c) manufactures anything from a controlled wildlife product if such manufacture is unlawful in terms of Schedule 1., commits an offence unless he or she has been issued with a permit contemplated in subsection (3) authorising the act in question and unless he or she complies with the conditions specified in the permit.</p> <p>SCHEDULE 1: CONTROLLED WILDLIFE PRODUCTS (Section 1).</p> <p>Subject to paragraph 2 and 3 no person may possess, manufacture any object from, deal in, import into, or export from Namibia any tusk, horn, head, ear, trunk, skin, tail or foot or any part thereof, of any elephant or rhinoceros, or any part of any species or other specimen mentioned in Appendix I unless the action in question is authorised by a permit.</p>	<p>MEFT Directorate of Scientific Services (DSS)</p>
<p>Management Plan //Tsau Khaieb (Sperrgebiet) National Park</p>	<ul style="list-style-type: none"> -Management of natural resources -Regional conservation, park neighbourhood, and resident relations -Establish land use zonation -Tourism Development Areas (TDA) 	<p>MEFT Directorate of Wildlife and National Parks (DWNP)</p>

5.4 Legislation of international significance

a) Convention on wetlands and biological diversity

The Convention on Wetlands of International Importance, especially as Waterfowl Habitat of 1971 (Ramsar) aims primarily to prevent the loss of wetlands, to promote the wise use of these, and to give special protection to listed wetlands. The Convention stresses a habitat-type approach rather than a species-specific approach.

The primary goal of the Convention on Biological Diversity of 1992 is the conservation of biodiversity. The causes of threats to biodiversity should be anticipated and prevented, and the precautionary principle should be applied. Parties to the convention are obliged to:

- Establish a network of protected areas.
- Create buffer areas adjacent to these protected areas using environmentally sound and sustainable development practices; and
- Rehabilitate degraded habitats and populations of species.

b) Convention on Combat Desertification (CBD)

The convention recognized that the conservation of biological diversity is “a common concern of humankind” and is an integral part of the development process. The agreement covers all ecosystems, species, and genetic resources. It links traditional conservation efforts to the economic goal of using biological resources sustainably. It sets principles for the fair and equitable sharing of the benefits arising from the use of genetic resources, notably those destined for commercial use.

The objectives of the CBD are:

- The conservation of biological diversity,
- The sustainable use of its components and
- The fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, considering all rights over those resources and to technologies, and by appropriate funding.

Conservation of species and ecosystem to combat the increasing rate of loss of biological diversity is one of Namibia’s challenges due to a heavy reliance on natural resources and ecosystem goods and services. In the interest of the welfare of the people, the state has adopted policies aimed at maintaining ecosystems, ecological processes, and biodiversity for the benefit of present and future generations. Direct impact on biodiversity is minimal but a precautionary approach is necessary to ensure those disturbances are avoided.

6. ASSESSMENT OF ENVIRONMENTAL IMPACTS

6.1 Rating of environmental impacts

A summary of the potential impacts associated with the proposed exploration and mining activities are presented in this chapter, as well as the suggested mitigation measures required to ensure impacts are managed effectively. Within the accepted broad definition of the term “environment” that applies to Environmental Impact Assessments, it is required to assess potential impacts of both socio-economic and biophysical aspects.

Table 5: Assessment criteria

CRITERIA	DESCRIPTION			
EXTENT	National (4) The whole country	Regional (3) Karas region and neighbouring regions	Local (2) Within a radius of 2 km of the mining site	Site (1) Within the mining site
DURATION	Permanent (4) Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient	Long-term (3) The impact will continue/last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter.	Medium-term (2) The impact will last for the period of the operation phase, where after it will be entirely negated	Short-term (1) The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the operation phase
INTENSITY	Very High (4) Natural, cultural, and social functions and processes are altered to extent that they permanently cease	High (3) Natural, cultural, and social functions and processes are altered to extent that they temporarily cease	Moderate (2) Affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way	Low (1) Impact affects the environment in such a way that natural, cultural, and social functions and processes are not affected
PROBABILITY	Definite (4) Impact will certainly occur	Highly Probable (3) Most likely that the impact will occur	Possible (2) The impact may occur	Improbable (1) Likelihood of the impact materialising is very low
SIGNIFICANCE	Is determined through a synthesis of impact characteristics. Significance is also an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.			

Table 6: Impacts significance rating

Low impact	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction, or operating procedure.
Moderate impact	Mitigation is possible with additional design and construction inputs.
High impact	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
Very high impact	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a “very high impact” is likely to be a fatal flaw.
Type	Denotes the perceived effect of the impact on the affected area.
Positive (+)	Beneficial impact
Negative (-)	Deleterious or adverse impact.
Neutral (/)	Impact is neither beneficial nor adverse
It is important to note that the status of an impact is assigned based on the status quo should the project not proceed. Therefore, not all negative impacts are equally significant.	
<p>Significance Rating Scale</p> <p>Points 1-4 Insignificant/low impact</p> <p>Points 5-8 Significant /Moderate</p> <p>Points 9-12 Very significant/High impact</p> <p>Points 13-16 Highly significant /Very high impact</p>	

6.2 Anticipated biophysical impacts.

Below are possible negative impacts of the proposed exploration and mining activities on the biophysical environment. The significance of each impact has been rated before and after mitigations measures. The implementation of mitigations is expected to reduce the significance of impacts by means of at least two (2) scales.

➤ Vegetation losses and destruction

Exploration and mining activities pose serious negative impacts to the local flora through vegetation clearance, trampling, dust generation, soil disturbance and veld fire. This is a main concern given the succulent diversity, endemism, and threatened plant species of the area.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	2	2	2	7	5

Mitigation measures

- Areas with abundance of species of concerns should be considered as No-go zones and must be avoided at all costs.
- Conduct a search rescue mission within the proposed mine footprint area. This should be done in collaboration with the NBRI prior to the commencement of any activity
- Implement the Search and Rescuer Plan (SRP) as outlined in the Ecological study
- Disturbances should be limited to the mine footprint area.
- Existing track roads should be used as far as possible. Creation of new access roads (if need be) should be done in consultation with MEFT-TKSNP Lüderitz office
- Fireplaces should be secured and must be under control
- Ensure progressive rehabilitation of the disturbed area

➤ Disturbance to the local fauna

Potential impacts to the local fauna will be as a result of habitat fragmentation, trapping of small animals, risk of falling in the un-rehabilitated excavations as well as nuisance from excessive dust, noise and vibration. Other impact could be in the form of human-wildlife conflicts (HWC) that could result from poaching or hunting.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	1	1	2	5	3

Mitigation measures

Poaching of both small and large wildlife is prohibited and is a punishable act. Rehabilitation of the disturbed areas should be encouraged as far as possible. Adhere to the minimum driving speed of 40km/hr within the park. The possession of and dealing with controlled wildlife products is prohibited under the Controlled Wildlife Products and Trade Act 9 of 2008. All human-wildlife conflicts should be reported to MEFT and should be handled in accordance with the HWC policy.

➤ **Destruction of topography and landscapes**

The area is consisting of different landscapes and varying topographies. These landscapes serve as source of attractions and landmarks in the area. Mining activities have potential to cause surface disturbances of the natural landscapes, reduce the aesthetic view thus, degrading the sense of the place.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	3	1	2	7	5

Mitigation measures

Important local viewpoints and landscape features should be identified and spared from mining activities as far as possible. Blasting should be carried out by experienced and registered blasting companies only.

➤ **Ecological degradation**

Ecological settings refer to the processes and interconnectedness which support a variety of life and functioning of the natural ecosystem. Ecological settings are vital for sustaining life of trees, wild animals, livestock, and people. Habitats affected by the exploration and mining activities are open gravel plains, inselberg and rocky ridges. The exploration and mining activities are likely to cause fragmentations of the natural habitats, disturb soil profile, pollute the environment, and disrupt ecological processes and the entire ecosystem functioning.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	2	2	2	2	8	6

Mitigation measures

Disturbances should be limited to the mine footprint and areas with abundance of species of concerns should be considered as no-go areas. Ensure progressive rehabilitation of the disturbed areas and a search and rescue of species of concerns that are directly affected by the mining activities.

➤ **Soil erosion and contamination**

Soil disturbances occurs through the removal of topsoil and overburden during the mining process. De-vegetation of the area due to mining will increase soil erosion by wind or water and increase suspended sediment loads in nearby streams and rivers. Other impacts on soil are the possible contamination from spillage, leakages, and direct discharge of pollutant in the soil.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	2	2	2	7	5

Mitigation measures

The topsoil should be properly and securely stockpiled and not be mixed with overburdens and should be backfilled after mining. Avoid trampling of highly vegetated areas by making use of existing routes instead of creating new ones. Soil conservation measures such as berms, gabions should be used on-site to help reduce erosion and any erosion incidence should be contained as soon as possible.

Vehicles and Equipment with oil leaks should be properly maintained. Spillage or leakage should be contained, and contaminated soil should be carefully removed and disposed of at the nearest dumpsite.

➤ **Disturbance to local geology**

As such, mining activities are likely to cause unintended disturbances to the local geology and geomorphology.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	2	2	2	7	5

Mitigation measures

- ✓ The exploration activities should be conducted inline the geological report
- ✓ A comprehensive Mining Plan should be developed and submitted to MME for approval prior to the mining operations
- ✓ Blasting should be carried out by experienced and registered companies

➤ **Increased water demand**

Due to the limited availability of freshwater in the area, the proposed activities will put immense pressure on the available water resources. The situation is likely to become untenable in case of a full-scale mining operation.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	1	1	2	5	3

Mitigation measures

- ✓ Water should also be used sparingly and when necessary recycled for other least essential activities such as dust suppression.
- ✓ Drill of borehole(s) in the area is subjected to an Abstraction Permit from the Directorate of Water Supply and Sanitation Coordination (DWSSC).
- ✓ Contamination of water sources both surface and groundwater should be avoided at all costs. Mining areas and camping sites should be provided with ventilated improved (VIP) latrines or portable toilets connected to a septic tank.
- ✓ Permits to install septic tanks should be obtained from the Ministry of Agriculture and Land Reform (Directorate of Sanitation). Spillage or leakage should be contained, and contaminated soil should be carefully removed and disposed of.

➤ **Contamination of surface and groundwater sources**

The impacts of excavations may influence the direct loss of stream reserve habitat, cause disturbances of species attached to streambed deposits, reduce light penetration, reduce primary production, and reduce groundwater recharge opportunities. Potential pollution of groundwater can also occur through acid mine drainage, poor sanitation, contamination of soil and uncontrolled discharge of mining waste and other pollutants in the ground.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	1	1		4	2

Mitigation measures

Care must be taken when selecting and locating the waste handling facilities. Avoid locating waste facilities in riverbeds or slope areas or area with heavy drainage. All mining areas must be rehabilitated upon mine closure and all discharge must be properly disposed as per the Minerals (Mining and Prospecting Act), of 1992 and the Environmental Management Act, of 2007.

➤ **Air pollution**

The major sources of air pollution are fugitive dust from excavations, loading, transportation, hauling of waste rocks, as well as wind erosion of open pits and silt heaps from the processing operation. Exposure to dust is a potential health risk because inhalation of fine dust particles can damage the lungs and lead to chronic obstructive pulmonary disease. Wind can disperse inhalable dust from the project site over settlements and farming areas that are nearby.

Another impact of dust deposition is on the environment. The most obvious effect will be observed on vegetation next to the roads or in the vicinity of the mining areas. Dust covers the surfaces of leaves, blocking stomata, reducing plant photosynthesis thus causing retard growth of local vegetation.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	2	1	2	6	4

Mitigations measures

The area is already prone to strong wind conditions which often carries the exposed dune sand of the local sand plains. However, the proponent should prevent further contribution to dust emission from the mining operations. The first step to control dust is to identify and monitor all dust emission sources. An inventory for all dust generation sources should be established and mitigation measure from each potential source should be proposed. Proper maintenance of equipment should also be ensured at contractual basis. Visual observations and dust monitoring should be used to identify additional problem areas and quantify dust emissions levels.

Another important part of air quality management is the collection of climate data on wind direction. This is because wind patterns determine the extent and direction of dust plumes. The prevailing wind directions in the area are southerly, south-westerly, and north-easterly. Controlling of dust emission is also a legal requirement in terms of certain legislations as outlined below.

Legal compliance aspects

The following compliance standards are applicable to dust emission:

- The Atmospheric Pollution Prevention Act (No 45 of 1965), which is still applicable in Namibia requires that *“any person carrying out an industrial process which is liable to cause a nuisance to persons residing in the vicinity or to cause dust pollution to the atmosphere, shall take the prescribed steps or, where no steps have been prescribed, to adopt the best practicable means for preventing such dust from becoming dispersed and causing a nuisance.”*
- The Namibian Labour Act’s Health & Safety Regulations set the following limits for personal exposure over 8 hours’ time-weighted average:
 - Total particulates of **10 mg/m³**.
- The Public Health and Environmental Act 1 of 2015, requires preventing the occurrence of a health nuisance, unhygienic condition, an offensive condition, or any condition which could be harmful or dangerous to the health of a person.

➤ **Land degradation**

Land degradation is one of the most significant impacts associated with any mining activities. Given the limited climatic conditions of the area and sensitivity of the local vegetation, destruction and disturbances to the local fauna can lead to lose of these rare succulent species, most of which are endemic to the area. This could lead to a situation of land degradation of the area.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
<i>Negative</i>	1	1	1	1	4	2

Mitigation measures

- Areas with abundance of species of concerns should be considered as No-go zones and must be avoided at all costs.
- Conduct a search rescue mission within the proposed mine footprint area. This should be done in collaboration with the NBRI prior to the commencement of any activity
- Implement the Search and Rescuer Plan (SRP) as outlined in the Ecological study
- Disturbances should be limited to the mine footprint area.
- Existing track roads should be used as far as possible. Creation of new access roads (if need be) should be done in consultation with MEFT-TKSNP Lüderitz office
- Fireplaces should be secured and must be under control
- Ensure progressive rehabilitation of the disturbed area

6.3 Anticipated socio-economic impacts.

The exploration and mining activities are also associated with several negative impacts to the socio-economic environment. Unlike the biophysical impacts, the socio-economic impacts are likely to affect greater geographic area e.g., constituency, regional and national.

➤ Public health and safety

Public health hazards associated with the exploration and mining activities are such as Blasting, Excavation and Nuisance.

Blasting

Blasting in mining operations produces critical health hazards such as noise, dust, noxious gases, vibration etc. Other public health and safety concerns of blasting is explosions, from premature or delayed detonation of blasting explosives, damage to properties and danger of flying or falling rocks from poor handling of explosions.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	2	1	2	6	4

Mitigation measures

The area is isolated and no settlement in the close proximity. The movement of people in the area is also limited.

- Only use explosives listed under the Explosives Act of 1956.
- Use abrasives that can be delivered with water (slurry) to reduce dust.
- Blasting should ONLY be carried out by a registered company/person.
- No major blasting should take place for sites within 1000 m from residential areas.
- Do not keep explosions more than 500kg onsite
- Explosions must be kept and transported by licenced persons only.
- Explosions must be kept at cool, dry, and well-ventilated magazines.
- Keep people and animal away from the blasting area.

Excavations

Uncovered excavations, pits and trenches from mining activities are safety hazards for animal and humans. People and animals are at risk of falling or being trapped into the un-rehabilitated pits and trenches.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	2	1	2	6	3

Mitigation measures

- Excavated areas must be backfilled and properly rehabilitated.
- If possible, avoid wildlife migration corridors.
- Sensitive areas should be avoided.

Nuisance

Nuisances are broadly defined as any condition which is offensive, injurious, or dangerous to health. This impact is subjective based on the public perceived views. It will also depend on the concerned person’s perception of what constitutes a nuisance. According to the National Labour Act 11 of 1992, a nuisance is described as noise, dust, vibration, and odour.

Mining activities that may contribute to nuisance include excavation, backfilling, blasting and the operation of heavy equipment.

Exposure to excessive noise levels can lead to:

- Prevention of sleep, insomnia, and fatigue.
- Decrease in speech reception, communication, distraction, and diminished concentration thus adversely affecting job performance efficiency.
- Chronic psychological disturbance including impaired hearing.
- Irreparable cardiovascular, respiratory, and neuralgic damages in certain extreme cases.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	1	1	1	4	2

Mitigation measures

- Large scale blasting should not be conducted at places closer to residential areas, otherwise residents should be informed prior to blasting.
- Noise level at semi-mechanized sites should not exceed 85db (Health and Safety Regulations No.156).
- Provide regular maintenance of all equipment/ machines to reduce noise generation.
- All affected community should be informed in advance.
- Activities should not be carried out during odd hours and should be limited to daylight.

➤ **Possibility of fire outbreaks**

One of the most critical issues is with regards to the use and storage of fuel for mining purposes. Fuel is regarded as a hazard and if not properly handled, could cause fire outbreaks and damage to properties, especially if stored in large quantity.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	1	1	1	4	2

Mitigation measures

Only fuel less than 200 L can be kept onsite in line with the Petroleum Products Regulations of 2000. Fuel should be kept on approved metal containers which are properly sealed. The refuelling of vehicles and machineries onsite should be done on a site with an impervious surface.

➤ **Visual appeal and aesthetics**

Exploration and mining activities generate excessive dust which causes visual intrusion in the area. Structures, temporary housing, and excavated pits may also be visible from the road and not necessarily visually attractive to tourists or visitors to the area.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	2	2	2	7	5

Mitigation measures

Minimise dust emission activities and ensures dust control measures. Temporary structures should be made of locally available materials and should be comparable to the local landscapes. If lighting is to be used onsite, it should be installed in such a manner that it does not cause annoyance to the local wildlife, residents, and visitors.

➤ **Waste generation**

Exploration and mining activities will generate a variety of waste matrix such as waste rocks, litter, scrap metals, and sewage waste. Improper handling of these waste matrix is likely to cause a range of environmental impacts e.g., contamination of fresh water sources, soil contamination, sedimentation of river streams, pollution of the surrounding environment etc.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	2	2	2	7	5

Mitigation measures

- ✓ Waste rocks and overburdens should not be placed in riverbeds or on areas with high grazing potential. Topsoil should be kept separate to be used as backfilling material
- ✓ General waste generated on site should be gathered, collected regularly and properly dumped at the nearest Municipal or approved disposal site (Aus or Lüderitz).
- ✓ Hazardous waste e.g., used oil, batteries generated should be collected and transported to specialized waste collectors or to Windhoek or Walvis Bay landfill site for proper dumping.
- ✓ Unwanted and old temporary structures not in use must be removed from the site and disposed of by the responsible person.
- ✓ The camping site must be equipped with Ventilation Improved (VIP) latrines or portable toilets connected to a septic tank. No spillage or discharge of sewage should be allowed in the environment and in case of accidents, corrective actions should be implemented to remedy such spillages.

➤ **Land use effects**

Some land use conflicts between the Proponent, MEFT, Tour operator, Concession operators could occur during operation phase if there is no adherence to the Parks Rules and if there is any inference with each other's operations.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	1	1	1	4	2

Mitigation measures

The proposed activities will take place on the area designated for tourism as per the TKSNP land use management plan. Activities have been taking place in this area and no land-use related conflicts have been experienced before. However, the proponent must

- ✓ Ensure adherence to the National Parks Rules and Regulations
- ✓ All human-wildlife conflicts (if occur) should be handled in terms of the Human-Wildlife Policy
- ✓ Maintain good communication with all parties involved through regular meetings

➤ **Impacts from temporal housing for employees.**

No permanent structures should be erected in the area. Temporary structures in the form of tents and other movable items that are comparable to the local landscapes are allowed. Employees residing at the mining site might be at risks of dangerous predators such leopards etc.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	2	2	2	7	5

Mitigation measures

Majority of the employees will be housed at the company house in Aus.

- ✓ Establishment of temporary housing should be done in consultation with the MEFT
- ✓ No settlement should be allowed in wildlife corridors.
- ✓ Movement of people during night hours should be limited within the park.
- ✓ Fireplaces should be at secure sites and the fire should be put out after use.

➤ **Influx of people to the area**

The exploration and mining activities is likely to attract an influx of people from different parts of the country in search for better opportunities. The influx of people could result into secondary impacts such as spread of HIV/AIDS, theft, poaching etc. Uncontrolled movement of people could also result in pressure on local available resources such as land, water, energy.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	1	1	1	4	2

Mitigation Measures

- ✓ Local people should be given first priority to minimise movement of people from other parts of the country
- ✓ The camp site and mining site should not be a place of abodes, hence only people who are actively involved in mining should be allowed to stay there.

➤ **Traffic related impacts**

The affected area is frequented by several people such as tourists, NamPower maintenance staff, government officials etc. Thus, whether the exploration and mining activities exists or not, traffic volumes on the roads are expected to increase and this is not an aspect that can be controlled by the proponent alone.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	2	1	2	6	4

Mitigation measures

There is already an access route which connects the site to the main trunk road (B4).

- ✓ All vehicles are required to make use of existing access routes and abide to the speed limit of 40km/hr within the park area.
- ✓ If there is a need for new access routes it should be done in consultation with the MEFT.

➤ **Occupational safety and health impacts**

Like in other mining activities, employees are exposed various occupational health during operations. The most common hazards associated with exploration and mining activities are listed under item 3.7 of this document. The exposure to these hazards can be aggravated by certain risks factors such as lack of the experience & limited knowledge, nature of work and non-compliance to health and safety standards.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	2	1	2	6	4

Mitigations measures

The first step in preventing occupational health safety risks is to identify the potential hazards. To eliminate potential hazards and reduce the likelihood of potential risks the following measures should be implemented.

- All explosives must be transported, stored, and used by an experienced person in accordance with relevant regulations.
- All employees should also register themselves with the Social Security Commission (SSC).
- All employees should be subjected to regular health check-ups at the nearest health centre.
- Employees should be equipped with proper PPE suitable for each job.
- Consider the use of available technologies to reduce the workload.
- Regular inspections by the relevant inspectors such as Labour, Mines and NAMPOL.
- Ensure adherence to hazard exposure limits as listed under the National Labour Act 11 of 2007 as follows.

Potential hazard	Legal exposure limits/daily
Dust	0.1 mg/m ³
Noise	85dB
Vibration	5 m/s ²
Working time	8hrs.

➤ **Impacts on archaeology, culture, and heritage.**

There are no materials or area of archaeological or cultural importance within the area earmarked for exploration and mining. However, a well-known ox-wagon route is located north of the site but at a safe distance from the area if interest.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	1	1	1	4	2

Mitigation measures

There are no archaeological sites within or in close proximity to the area of interest and the area earmarked for ox-wagon route will be identified by means of a concession to be operated under the auspicious of the MEFT. Hence,

- ✓ The proponent should ensure good communication with MEFT and the Concession operator
- ✓ Should there be sites or materials of archaeological importance uncovered during mining, such incidences should be reported to the National Heritage Council (NHC).

➤ **Impacts on local tourism.**

The proposed activities are taking place within the North Dune Tourism Designated Area (TDA). Hence, the operation could interfere with the tourism activities or destructions caused by the mining operations could reduce tourism potential of the area.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	2	2	2	1	7	5

Mitigations

The proposed activities will be limited within the proposed footprint of about 9km². The proponent must ensure progressive rehabilitation of the disturbed area, ensure proper and regular waste management as outlined in the EMP and ensure proper decommissioning when the exploration of mining activities deemed unproductive or when the operation cease.

➤ **Gender roles implications.**

The exploration and mining activities are likely to contribute to the increase in female headed households because such infield activities are carried out mostly by men. Thus, most men leave their villages and homesteads for temporary settlements at mining sites.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	1	1	1	1	4	2

Mitigation measures

Females can equally benefit from these activities such as in office, administration or in similar roles as men where possible.

6.4 Potential positive impacts

Apart from the identified negative impacts, the proposed exploration and mining activities also provides an array of socio-economic benefits. However, certain enhancement measures should be implemented to fully realize these benefits.

6.4.1 Socio-economic benefits

✓ Employment opportunities

The exploration activities will create employment opportunities for about 15 employees while more opportunities are expected during the actual mining process. Both activities will also generate indirect job opportunities.

✓ Secondary opportunities

Exploration and mining activities will also create indirect employment and business opportunities in areas such as logistic, supplies, consulting etc.

✓ Livelihood

The proposed activities will generate source of livelihood and economic wellbeing to many families through employment opportunities (both direct and indirect) and income generation.

✓ Foreign Exchange and GDP Contribution

The envisaged mining operations have potential to contribute to the mainstream economy through Gross Domestic Product (GDP) and earn foreign exchange through international markets. However, majority of Namibia's mineral resources are sold as raw products and only get processed abroad, the finished products are often not marketed as Namibian products.

6.4.2 Enhancement measures

The proponent should explore possibilities of mineral beneficiation and value addition within the country and discourage export of unprocessed minerals. This will create more opportunities and increase the sector's contribution to the country's GDP.

6.5 Summary of identified negative impacts.

Below is a summary of identified potentials impacts and their significance after mitigation measures.

Table 7: Significance of impacts

Potential Impacts on Environmental Receptors	Significance of impacts (After mitigations)
A. Impacts on Biophysical environment	
Vegetation losses and destruction	Moderate
Disturbance to Fauna	Moderate
Disturbance to topography and landscapes	Moderate
Ecological degradation and habitat fragmentation	Moderate
Soil erosion and contamination	Moderate
Disturbance to local Geology	Moderate
Increase water demand	Low
Contamination to surface and groundwater sources	Low
Air pollution	High
Land Degradation	Moderate
B. Impacts on Socio-economic Environment	
Public health and safety	Moderate
Possibility of fire outbreaks	Low
Visual impacts	Moderate
Land use effects	Moderate
Waste Management	Moderate
Impacts of temporary infrastructures	Moderate
Influx of People	Low
Traffic impacts	Low
Occupational Health Impacts	Moderate
Impacts on Archaeological, Culture and Heritage	Low
Impacts on local tourism	Low
Impacts on Gender roles	Insignificant

7. CONCLUSIONS, CONDITIONS AND RECOMMENDATIONS

7.1 Conclusion

The objective of this EIA study was to establish the baseline of the affected environment, solicit inputs from stakeholders and Interested and Affected Parties in order to define the range of the environmental impact assessments and determine any gap of information that require further studies. It is believed that this objective has been achieved and adequately documented in this report. All possible environment aspects associated with the ongoing exploration and proposed mining activities have been adequately assessed and necessary control measures have been formulated to meet statutory requirements. The following conclusions can be drawn from this EIA study.

- Authorized exploration activities have already taken place at the study area, with minimum disturbances to the environment. Thus, similar exploration activities can be allowed with the same expectations if similar due diligence is observed and EMP is fully implemented.
- The intended mining activities can be undertaken, and potential impacts thereof can be manageable by implementing the EMP.
- The proponent has for years been adhering to the Sperrgebiet Rules and Regulations, thus there is presently a good relationship between MEFT and the proponent.

7.2 Conditions of Approval

The following conditions should have bearings to the Proponent

- Given the sensitivity of the area, a Search and Rescue Management Plan operation should be conducted before any further exploration activities or commencement of mining activities. This should be carried out as per the Search and Rescue Plan as provided in the Ecological specialist study.
- Entry Permits should be obtained for every vehicle to be used onsite prior to entry
- Training should be provided to all employees (both old and new) and such proof be provided to the MEFT-Sperrgebiet National Park.
- Adherence to the Sperrgebiet National Park Rules and Regulations should be ensured at all times.
- No boreholes should be drilled at the area or anywhere within the park without prior approval from MEFT

7.3 Recommendations

To the proponent

- ✓ Acquire all necessary legal documents i.e., permits, required for the exploration and mining and conduct its activities in line with the Prospecting and Mining Act
- ✓ Comply with all other legislations as listed in Section of this report
- ✓ Comply with the Rules and Regulations of the Sperrgebiet National Park
- ✓ Ensure the implementation of the EMP during the life span of the proposed project/activities
- ✓ Notify the competent authority and regulatory authority of any changes or amendments to the initial proposed exploration and mining methods to be used and affect changes on the EMP
- ✓ Appoint an Environmental Control Officer to ensure the implementation of the EMP, conduct monitoring and provide biannual environmental reports to the regulatory authority.
- ✓ Appoint a Botanist/Horticulturist to implement the Search and Rescue management Plan
- ✓ Ensure effective communication with competent authority and/or regulatory authority to ensure a good working relationship at all times.

To the competent authority (MME) and regulatory Authority (MEFT)

- ✓ Approve the findings of the EIA study, ecological study and mitigation measures contained in the EMP.
- ✓ Conduct regular meetings or other form of communication with proponent to ensure a good working relationship at all times.
- ✓ Authorize the issuance of the ECC with conditions as listed on Section 7.2 to Bonya Exploration (Pty) Ltd for the ongoing exploration and proposed mining activities on EPL 6691, Luderitz district, Karas region.
- ✓ When deemed necessary, attach any other condition/s to ensure environmental compliance and for the proposed project to meet statutory requirements.

8. REFERENCES

- Alan Marlow, Geotechnical report on the Twyfelskupje carbonatite complex, southern Namibia prepared for the EPL 6691 renewal application august 2021.
- Government Gazette. No.5367 Promulgation of Water Resource Management Act, 2013 (Act No. 11 of 2013 of Parliament), 2013, Windhoek, Republic of Namibia.
- Integrated Water Resource Management Booklet, 2010. By IWRM Committee
- Jacobson, J. Pallet, 1997. An ephemeral perspective of fluvial ecosystems: Viewing ephemeral rivers in the context of current lotic Ecology
- Mendelsohn, J., Jarvis, A., Roberts, C., & Robertson, T. 2002. Atlas of Namibia. New Africa Books (Pty) Ltd: Cape Town.
- Ministry of Environment and Tourism, 2011. Dealing with Climate Change, A community information toolkit on adaptation.
- Ministry of Health and Social Services. Namibia Health Account 2012/13 Retrieved from, [http://: www.mhss.gov.na](http://www.mhss.gov.na)
- Ministry of Mines and Energy, 2010., Licences, rights and permits application guidelines and assessment procedures.
- National Statistic Agency NSA), 2011. Population and Housing Census
- Pickford, M. and Senut, B. 2000. Geology and Palaeobiology of the Namib Desert, Southwestern Africa. Mem. Geol. Surv. Namibia, 18, 150 pp.
- Schneider and Walmsley, 2004., The Sperrgebiet Land Use Plan – An example of integrated Management of Natural Resources
- Ward, J. 1995. Geology and Geomorphology. In: J. Pallett (Ed.) The Sperrgebiet – Namibia's least known wilderness, 27-32. NAMDEB, Windhoek.
- Ministry of Environment and Tourism, 2013., Directorate of Regional Services and Parks Management, Management Plan of the //Tsau Khaieb (Sperrgebiet) National Park.

9. APPENDICES

- 9.1 Appendix A: Background Information Document (BID)**
- 9.2 Appendix B: Proof of Consultations**
- 9.3 Appendix C: Ecological impact study**
- 9.4 Appendix D: MEFT-Sperrgebiet NP Consent letter**
- 9.5 Appendix E: Curriculum Vitae of the EAP**
- 9.6 Appendix F: Environmental Management Plan (EMP)**

**ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE ONGOING
EXPLORATION AND PROPOSED MINING ACTIVITIES ON EPL 6691,
LÜDERITZ DISTRICT, KARAS REGION**



**APPENDIX C: ECOLOGICAL SPECIALIST
STUDY**

March 2022

Declaration by the Author

The author of this report do hereby declare that, this study has been conducted to assess the possible impacts of the proposed exploration and mining activities on the area of interest within the EPL 6691, Lüderitz district, Karas region to the local biodiversity. The study was conducted independently from the main study (EIA). There are no circumstances that compromise the objectivity of the specialist performing such work. All opinions expressed in this report are my own. I have also made references to different resources I have used which, I have recognized in the reference list here attached to this report.



Joseph Kondja Amushila

Horticulturist and Environmentalist

March 2022

About the author

Mr. Joseph K. Amushila is natural resource specialist with over ten years in the field of natural resources management. He holds a M. c. Environmental Management (specialized in Water, Pollution and Mining Rehabilitation) from the University of the Free State, SA. He also holds bachelor's degree and bachelor's honors in Agriculture from Namibia's University of Science and Technology (formally the Polytechnic of Namibia). He has worked as a Horticulturist for more than ten 910) years and gained experience in plant physiology, propagation, maintenance under different environment. He has conducted a number of vegetation study and has conducted well over 100 EIA studies on Namibia. One of the notably relevant studies is "Re-introducing indigenous climax grasses in the degraded rangelands of Namibia, published with the NUST (Polytechnic of Namibia in 2010).

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List of Acronyms

CBD	Convention on Biological Diversity
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographic Information System
MAWLR	Ministry of Agriculture Water and Land Reform
MEA	Multilateral Environmental Agreements
MEFT	Ministry of Environment, Forestry and Tourism
NACOBTA	Namibia Community-based Tourism Association
NBRI	Namibia Botanical Research Institute
NBSAP	National Biodiversity Strategy and Action Plan
QDS	Quarter Degree Square
IRLUP:	Integrated Regional Land Use Plan
SEA:	Strategic Environmental Assessment
DoF:	Directorate of Environmental Affairs

1. INTRODUCTION AND BACKGROUND

1.1 Purpose

As it indicated in the EIA study, the proponent intends to continue with the exploration activities and commence with mining activities on the area of interest as depicted in the EIA report. The ongoing exploration and proposed mining activities will impact different environmental receptors during development, operation, and decommissioning phase. One of the most important receptors to be affected is the biological diversity.

The Sperrgebiet National Park is a desert environment and is renowned for its succulent diversity, endemism, and threatened plant species. The area has also been regarded as 'Forbidden Territory' of Diamond Area 1 (DA1), for nearly a century. Given the ecological sensitivity of the Sperrgebiet area, it was found necessary to conduct an ecological specialist study of the proposed activities.

The ecology can be defined as the interrelationships of organisms with their environment and each other. The main purpose of this ecological impact study was to establish the ecological baseline of the affected environment and how it is affected by the proposed activities in order to come up with measures to avoid, mitigate or lessened the adversity of the impacts. The scope of this study entails; field surveys to identifying the local occurring flora and fauna, identifying sensitive habitats, protected species, red data species, threatened species etc. within the affected area also referred to as the area of interest.

The study also took cognizance of relevant policies and Acts which govern the activities and potential impacts to the environment associated with the proposed activities.

1.2 Terms of References

The following terms of reference form the basis for this report:

- Describe the biodiversity and ecology at the site, develop a draft sensitivity map based and assess the potential impacts of the proposed development.
- Conduct vegetation and plant species surveys noting conservation significance and status (*i.e. Red list, Protected, Indigenous species etc.*)
- Identify and map vegetation habitats in the study area, paying careful attention to conservation constraints, threatened species that exist or may exist in the project area.
- Produce a vegetation sensitivity map of the project area which will be used to inform the layout of project infrastructure.
- A description of the occurrence and distribution of fauna (*i.e. amphibians, reptiles and small-, medium- and large mammals*) in the study area, which may be influenced by the proposed facility.
- Identify any occurrence of species of special conservation status such as; *rare, endemic, threatened and endangered species*
- An assessment of the potential impacts (positive, negative or cumulative if relevant) on fauna during the construction and operation of the proposed development.
- The identification of specific mitigating measures, for enhancing benefits and avoiding or mitigating negative impacts and risks, which should be implemented during planning, establishment, and operation of the proposed projects.

2. LEGISLATIVE REVIEW AND PERMIT REQUIREMENTS

A summary of some relevant portions of the Acts which govern the activities and potential impacts to the environment associated with the development are listed below. Provided that standard mitigation and impact avoidance measures are implemented, not all the activities listed in the Acts below would actually be triggered. The following legal instruments were found to be relevant to the protection of biodiversity in Namibia.

a). National Forestry Act, No. 12 (2001)

National Forests Act provides for the protection of forests as well as specific tree species, quoting directly from the Act: “no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated”.

Section 22. (1) stated that “Unless otherwise authorized by this Act, or by a license issued under subsection (3), no person shall on any land which is not part of a surveyed erven of a local authority area as defined in section 1 of the Local Authorities Act, 1992 (Act No. 23 of 1992) cut, destroy, or remove -

(a) vegetation which is on a sand dune or drifting sand or on a gully unless the cutting, destruction or removal is done for the purpose of stabilizing the sand or gully; or

(b) any living tree, bush or shrub growing within 100 metres of a river, stream, or watercourse.

b). National Water Resource Management Act, 2004

This act provides provision for the control, conservation and use of water for domestic, agricultural, urban and industrial purposes. In addition, the Act clearly gives provision that pertain with license or permit that required abstracting and using water as well as for discharge of effluent. The effluent of human waste under this framework is the main focus; hence mobile toilets are earmarked to be used to avoid any seepage into existing water course, infiltration into soil and etc.

c). Legislation related to the conservation of ecosystem

Conservation of species and ecosystem to combat the increasing rate of loss of biological diversity is one of Namibia's challenges due to a heavy reliance on natural resources and ecosystem goods and services.

In the interest of welfare of the people, the state has adopted policies aimed at maintaining ecosystems, ecological processes, and biodiversity for the benefit of present and future generations. The National Biodiversity Strategy and Action Plan (NBSAP) can assist the Proponent in environmental management issues. Direct impact on biodiversity is minimal but a precautionary approach is necessary to ensure those disturbances are avoided.

d). Legislation related to Soil Conservation

The objectives of the Soil conservation Act 76, 1969 are to make provision for the combating and prevention of soil erosion, and for the conservation, protection and improvement of the soil, the vegetation and the sources and resources of the water supplies.

Part II, deals with soil conservation works and it further states that in section 4(1) The Minister may by means of a direction order the owner of land to construct the soil conservation works referred to in such direction either on land belonging to such owner or on land belonging to another person, in such manner and within such period as may be mentioned in such direction, if the Minister is of the opinion that the construction of such soil conservation works is necessary

in order to achieve any object of this Act in respect of the land belonging to such owner.

e). Convention on Wetlands and Biological Diversity

The Convention on Wetlands of International Importance, especially as Waterfowl Habitat, 1971 (Ramsar) aims primarily to prevent the loss of wetlands, to promote the wise use of these, and to give special protection to listed wetlands. The Convention stresses a habitat-type approach rather than a species-specific approach. The National wetland Policy strives to complement existing policy instruments regarding sustainable development and sound natural resource management in Namibia. Its implementation will provide a platform for the conservation and wise use of wetlands, thus promoting inter-generational equity regarding wetland resource utilization. Furthermore, it facilitates the Nation's efforts to meet its commitments as a signatory to the International Convention on Wetlands (Ramsar) and other Multinational Environmental Agreements (MEA's).

The primary goal of the Convention on Biological Diversity, 1992, is the conservation of biodiversity. The causes of threats to biodiversity should be anticipated and prevented, and the precautionary principle should be applied.

Parties to the convention are obliged to:

- Establish a network of protected areas;
- Create buffer areas adjacent to these protected areas using environmentally sound and sustainable development practices; and
- Rehabilitate degraded habitats and populations of species.

f). Convention on Combat Desertification (CBD)

The convention recognized that the conservation of biological diversity is “a common concern of humankind” and is an integral part of the development process. The agreement covers all ecosystems, species, and genetic resources. It links traditional conservation efforts to the economic goal of using biological resources sustainably. It sets principles for the fair and equitable sharing of the benefits arising from the use of genetic resources, notably those destined for commercial use.

3. METHODOLOGY & APPROACH

This ecology and biodiversity impact study is based on a field survey and desk-top assessment of available biodiversity and ecological information. A wide range of spatial data sets were interrogated, and relevant information was extracted for the study site. A basic ecological sensitivity analysis was performed to identify areas of special interest or concern. The various approaches used, and aspects taken into account are detailed below.

3.1 Field surveys

Field surveys on the affected area took place between November 2021 and February 2022 which culminated to the compilation of this report.

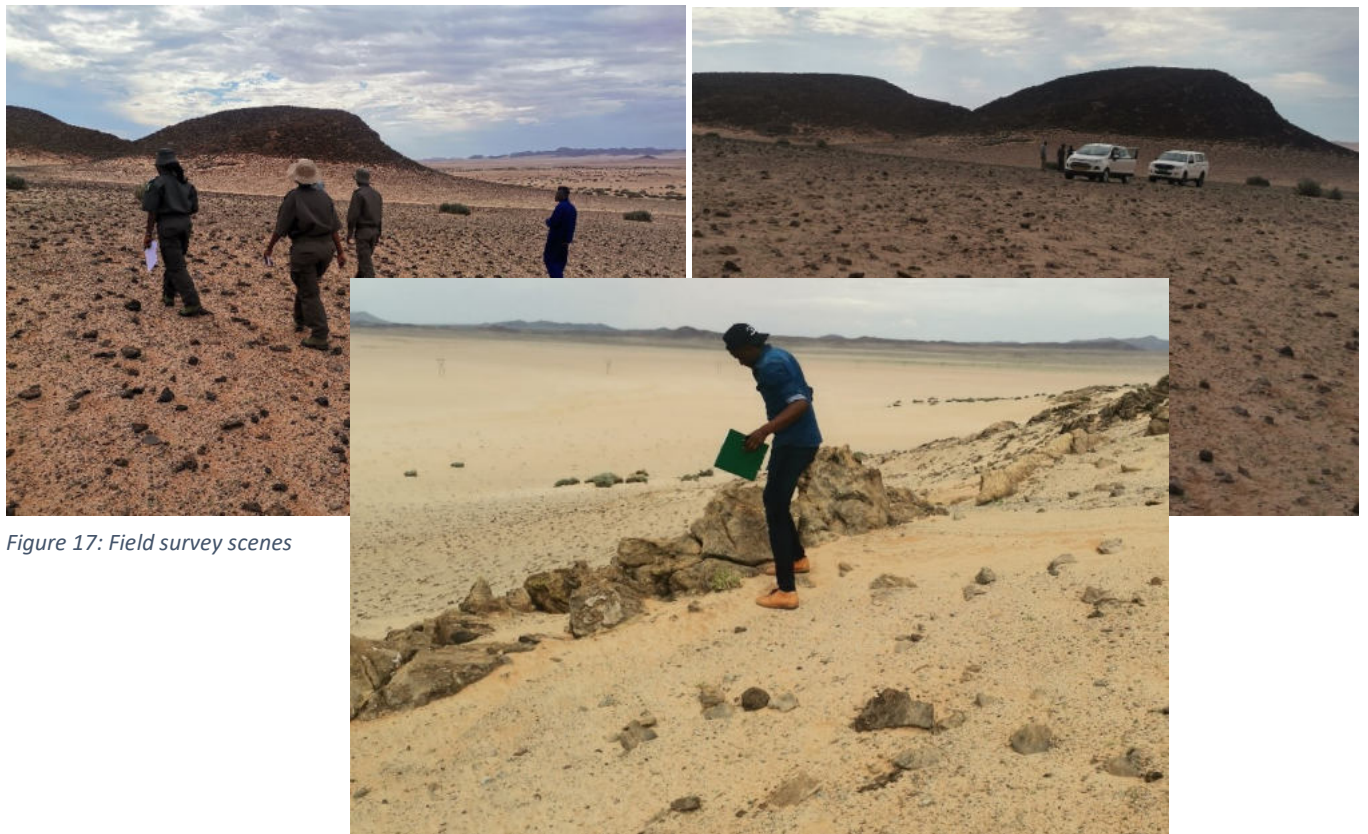


Figure 17: Field survey scenes

During the field surveys, different biodiversity features, habitats and landscape units present at the site were identified. The consultant also conducted walk-through-surveys across the sites record different plant and animal species observed.

3.2 Desktop studies

Desktop research on reptiles and amphibians which are known to occur at the site or within habitats that harbour or be important for such species was done. The presence of sensitive habitats such as wetlands and unique edaphic environments were noted in the field (where present). Photographs of any sensitive habitats and environments present were taken for documentation and illustration purposes in this report.

The data collected during the site visit can be summarized as follows:

- A list of all plant species observed at the site
- Description and composition of the different habitats and plant communities observed on site.
- A list of all mammals, reptiles and amphibians directly or indirectly observed at the site
- Maps of sensitive areas identified in the field and delineated on satellite imagery of the site
- GPS coordinates of significant point-location biodiversity features
- Photographs of the different habitats, environments and biodiversity features present.

3.3 GIS and Sensitivity Mapping

Following the site visit, different satellite imagery maps of the site were also produced using a GIS and Google earth systems. An ecological sensitivity map of the site was generated by integrating the information collected on-site with the available ecological and biodiversity information available in the literature and various spatial databases as described above. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

Low – Areas with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. This category is reserved specifically for areas where the natural vegetation has already been transformed by existing land uses or by other natural or anthropogenic forces in the area i.e., erosion. Most types of the activities can proceed within these areas with little ecological impact.

Medium- Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. Exploration or mining within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.

High – Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity, or important ecological role of the area. Exploration or mining activities within these areas is highly undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.

High – Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas and should be avoided at all costs.

3.4 Data Sourcing and Review

Vegetation descriptions and conservation status of the vegetation types which occur in the study area are based on the physical observation (site visits) at the site and are supported by information from various sources. The study benefited a great deal from the following sources.

- Description of the local ecosystem of the area (Succulent Karoo) was obtained from the following studies: (i). Ecosystem Profile, “*The succulent karoo hotspot Namibia and South Africa*” (ii) Patterns and plant diversity and endemism in Namibia, Craven and Vorster, 2006, Plant species richness, endemism and genetic resources in Namibia, Kolberg et al 1998.
- The species list of plants that can occur in the area was derived from the WIND Quarter Degree Square (QDS) for 2615DD, National Botanical Institute (NBRI) data portal).
- Other sources on vegetation were also obtained from the **Tree Atlas of Namibia and Vegetation Survey of Namibia** the projects of the NBRI.
- The conservation status of each species in the list was extracted from the database of the **Red Data Book Namibian Plants**.
- Information on fauna were obtained from direct observation and counter checked with important sources such as the **Birds in Namibia, IUCN Red list of Threatened species of Namibia**, and the Sperrgebiet Land Use Plan.

Other important sources

- Integrated Land Use Plan for Karas region
- SEA for Karas IRLUP

The research also benefited from different studies as provided in the reference list.

3.5 Key Assumptions & Limitations

The key assumption for this study is that the existing datasets which were used to assess site sensitivity are correct and reliable. Although no long-term studies have taken place, the interpretation of the data collected in the field can still be considered comprehensive. This is especial so because the survey was undertaken both during the dry season and during the rainy season (growing), hence majority of the local occurring species were captured. Furthermore, these lists were augmented with species likely to occur at the site based on distribution records from the spatial database of the NBRI and various reliable literatures.

Against this background, the following key assumptions can be made with regards to the ecological settings of the area.

- The area is renowned for its succulent diversity, endemism, and threatened plant species.
- Over 60 species are said to occur in and around the area of interest which are endemic to this area of which 28 species are protected, while some are near threatened or endangered.
- The rocky landscapes are the most affected

4. PROJECT ECOLOGICAL FOOTPRINT

4.1 Proposed project layout

The proposed exploration and mining activities will be concentrated on an area measuring about 9 km² (3kmx3km) around the Twyfelskupje Complex.

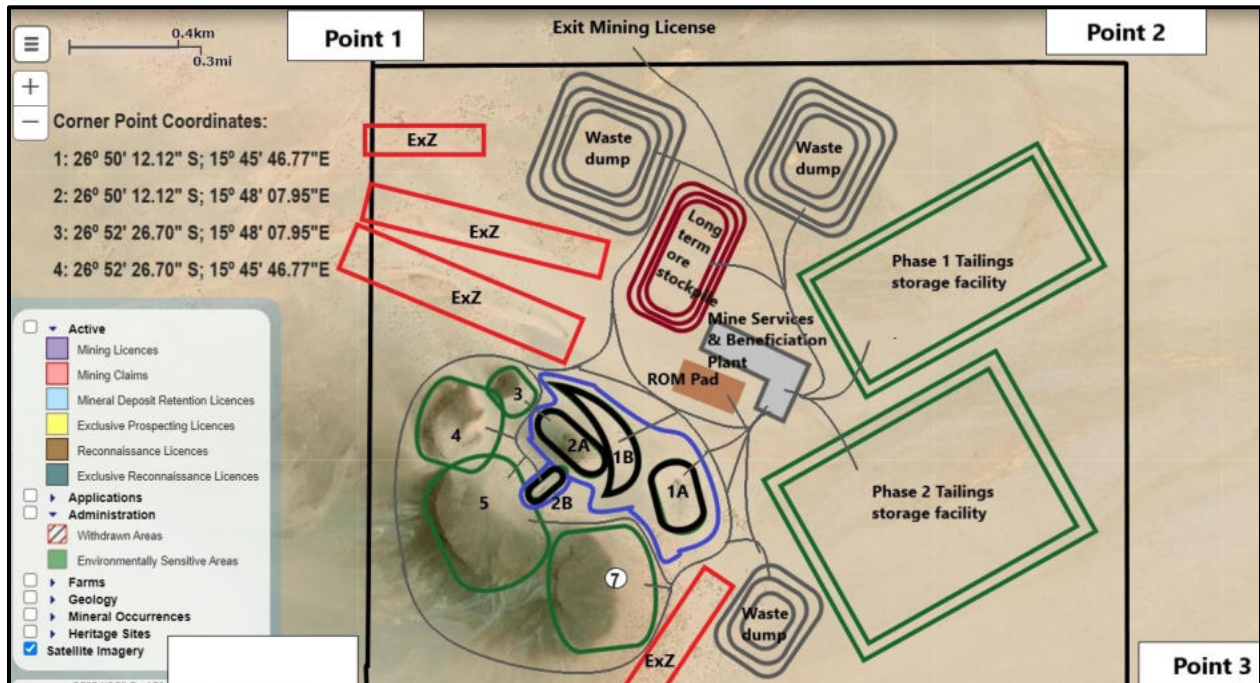


Figure 18: Provisional mine layout

The mining site (Twyfelskupje Mountain Complex) is located about 80 km southeast of Aus and is accessible via the existing track roads linked to the B4 Aus-Lüderitz Road. The access track road is also used by MEFT and NamPower.

4.2 Project infrastructure

In order to carry out the exploration and mining operations, the following facilities will be established onsite.

- Mine pit/s
- Stockpile and temporary storage facility
- Tailing facility
- Mine camp
- Beneficiation plant
- Waste dump (temporary usage)
- Site office and maintenance workshops

4.3 The intended exploration and mining activities

- **Ongoing exploration activities**

The intention is to continue with the exploration activities in the form of drilling and bulk sampling leading to the development of open-pit mining operation activities. Diamond drilling will be done to test the depth and continuity of mineralization at specific sites suited to that structural component being tested. Drilling will be undertaken on a 100m grid for pfs status, and locally on a 50m grid for dfs status. Samples of half core will be collected at 1m intervals within the mineralized zones. Samples will be tested with the handheld XRF gun and then by whole rock geochemical analyses of the individual are earth elements by ALS. The total number of geochemical samples required to reach dfs status is likely to exceed 10,000.

Other exploration methods will include geophysical surveys such as ground magnetic, gravity, resistivity, and radiometric surveys, bulk sampling, and trenching.

- **Intended mining activities**

The method to be used in mining include mainly diamond drilling, trenching, and blasting to test the composition of the individual structural components, leading to the final establishment of the open pit boundaries, and start-up benches for ore extraction.

A detail description of the ongoing exploration and intended mining activities has been provided in the EIA report.

5. BASELINE ASSESSMENT

Below is a baseline assessment of various ecological and biodiversity parameters which are likely to be affected or have bearing on the proposed activities.

5.1 Climatic conditions

According to MEFT, 2013, The //Tsau Kaeb (Sperrgebiet) NP receives less than 100 mm of rainfall per annum, which is very variable from year to year and area to area, e.g., the mountain ranges and inselbergs tend to attract slightly more precipitation than the surrounding plains due to the orographic effect.

Although the fog provides a valuable source of moisture for maintaining fauna and flora, rainfall is essential for plant germination. In poor rainfall years, the plants do not respond; the seeds of annual grasses do not germinate, geophytes (bulbs) do not grow, and the perennial plants fail to flower. Hence, the fauna and flora of the Sperrgebiet have developed special adaptive systems to use the fog as a source of moisture, in place of rain.

The most prevailing winds are southerly to south-westerly winds which persist throughout the year, occasionally giving way to very strong north-easterly 'Berg' winds during the winter months with a velocity ranging from 30 to 80 kph (8-22 m/s).

5.2 Ecological settings

- **Topography and landscapes**

The Sperrgebiet has a wide variety of landscapes, ranging from inselbergs and low mountain ranges to gravel plains, red semi-stabilised dunes, pale-coloured mobile dunes and ephemeral watercourses (Pickford and Senut, 2015).

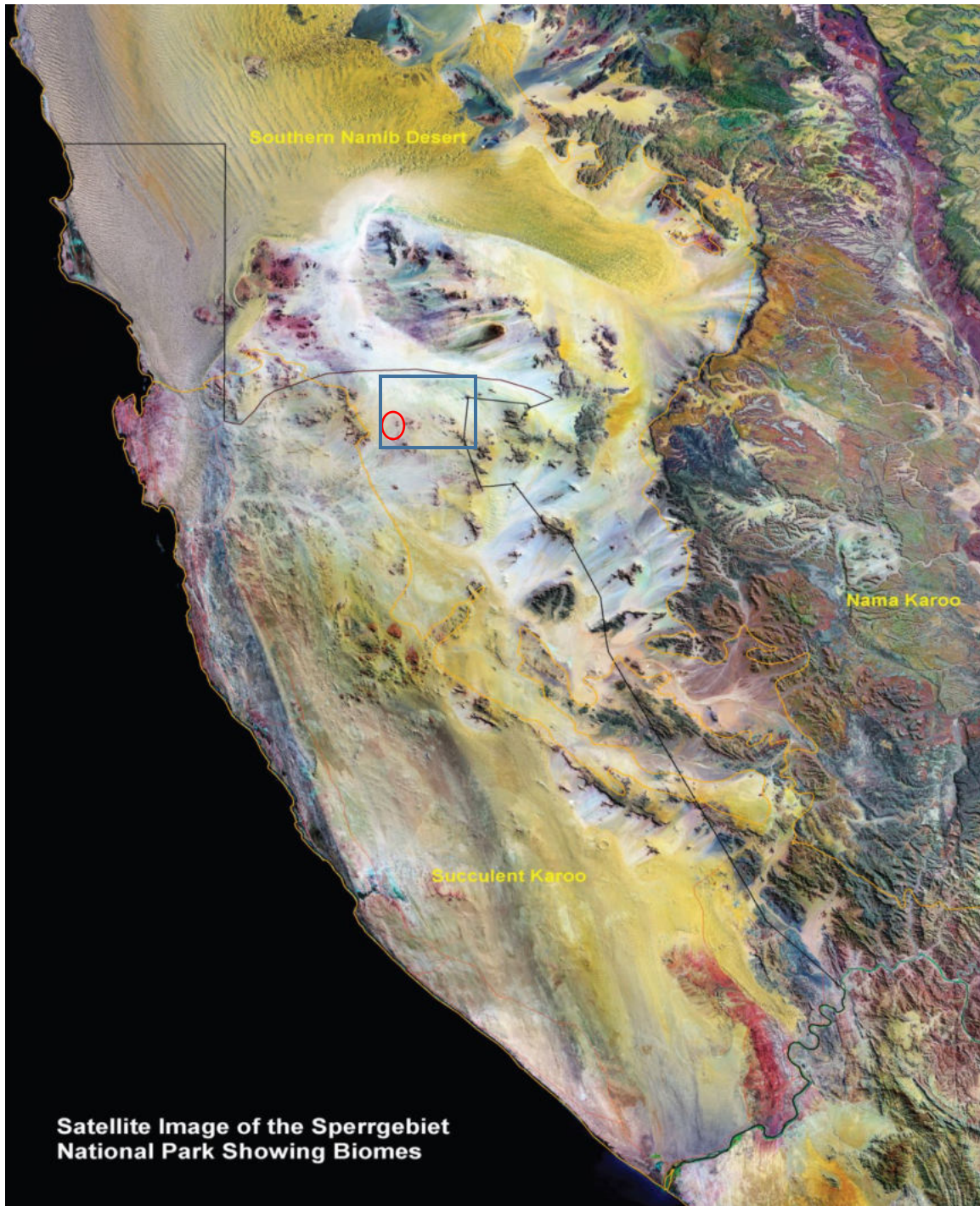


Figure 19: Topographic map of the //Tsau Kaeb (Sperrgebiet) NP (MEFT, 2013)

According to A. Marlow, 2016, the Twyfelskupje Carbonatite Complex forms a circular group of hills with a diameter of about 1km. There are seven outcropping areas of the complex (designated TK1 to TK7 in Figure 4 below). The outer cone sheets at Twyfelskupje form prominent topographic features and stand about 120m above the surrounding plain.

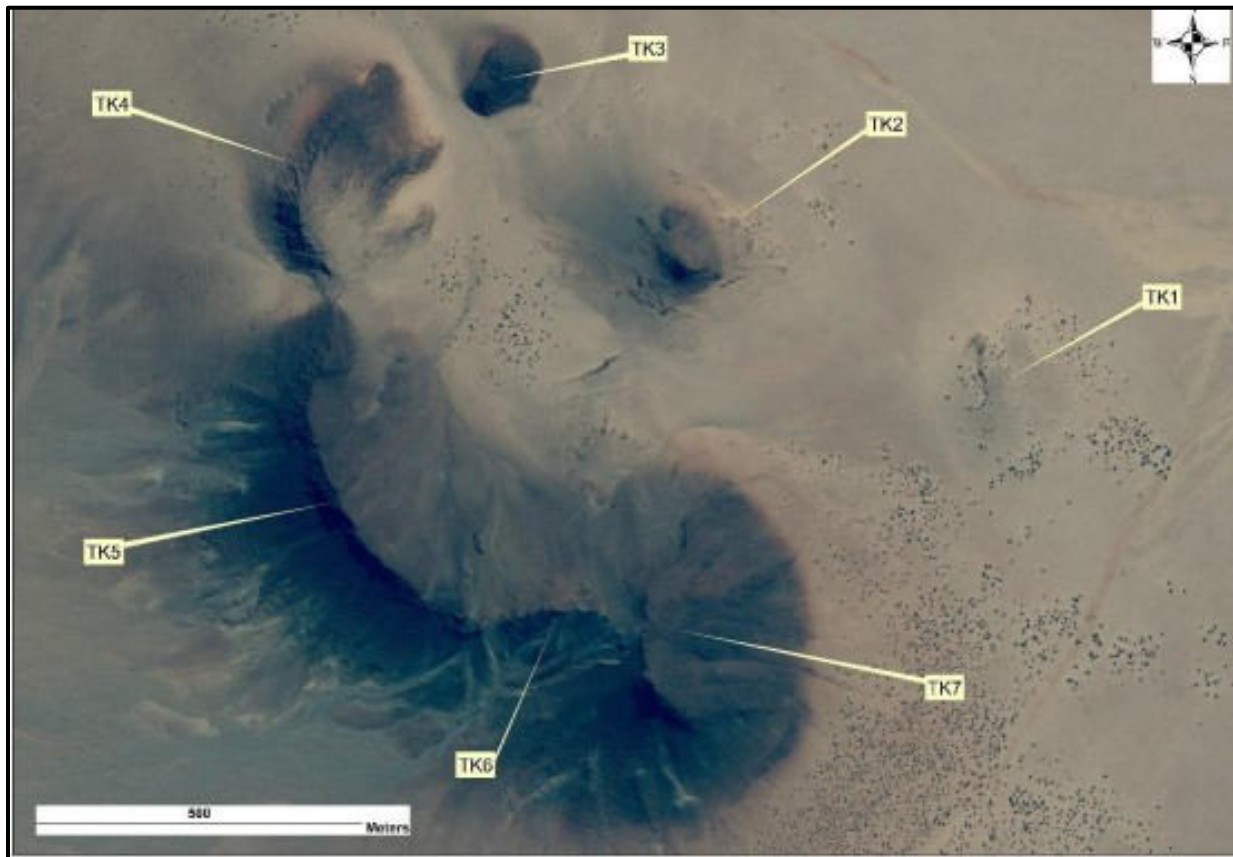


Figure 20: Overview of Twyfelskupje complex

The area of interest is characterized by the sand plain grassland and (Twyfelskupje Mountain complex), Agub-letterkupper inselberg succulent shrubland and dry riverbeds in the close vicinity.



Figure 21: Sand gravel plain (during the rainy season)



Figure 22: Rocky areas

- **Vegetation type**

The //Tsau Khaeb (Sperrgebiet) National Park is a combination of Succulent Karoo, Namib Desert, and Savannah biomes, with a variety of vegetation types such as Succulent Steppe, Southern Desert, Riverine Woodland. According to (Burke, 2006)., the park comprises of 16 forms of different landform units and 56 different vegetation types. The area of interest consists of the northern gravel and sand plains grassland and rocky outcrop.

The local occurring vegetation observed during the field surveys are listed on Table1 and Figure 6 below.

Table 8: Some of the plant species observed and known to occur in the area

Species name
<i>Euphorbia gummifera</i>
<i>Pteronia pomonae</i>
<i>zygophyllum</i>
<i>Ectadium latifolium</i>
<i>Salsola dwarf</i>
<i>Antimima aurasensis</i>
<i>Crassula aurusbergensis</i>
<i>Eriocephalus klinghardtensis</i>
<i>Brownanthus namibensis</i>
<i>Euphorbia verruculosa</i>
<i>Frankenia pomonensis</i>
<i>Aloidendron dichotomum</i>

Source: WIND QDS, 2615DD, 2021)

Most of the local occurring plants are succulent dwarf shrubs & bushes and herbaceous grass species and are known to be endemic to the area. A comprehensive list of the local occurring flora as obtained from WIND QDS 2615DD are listed on Appendix A

Plants observed onsite

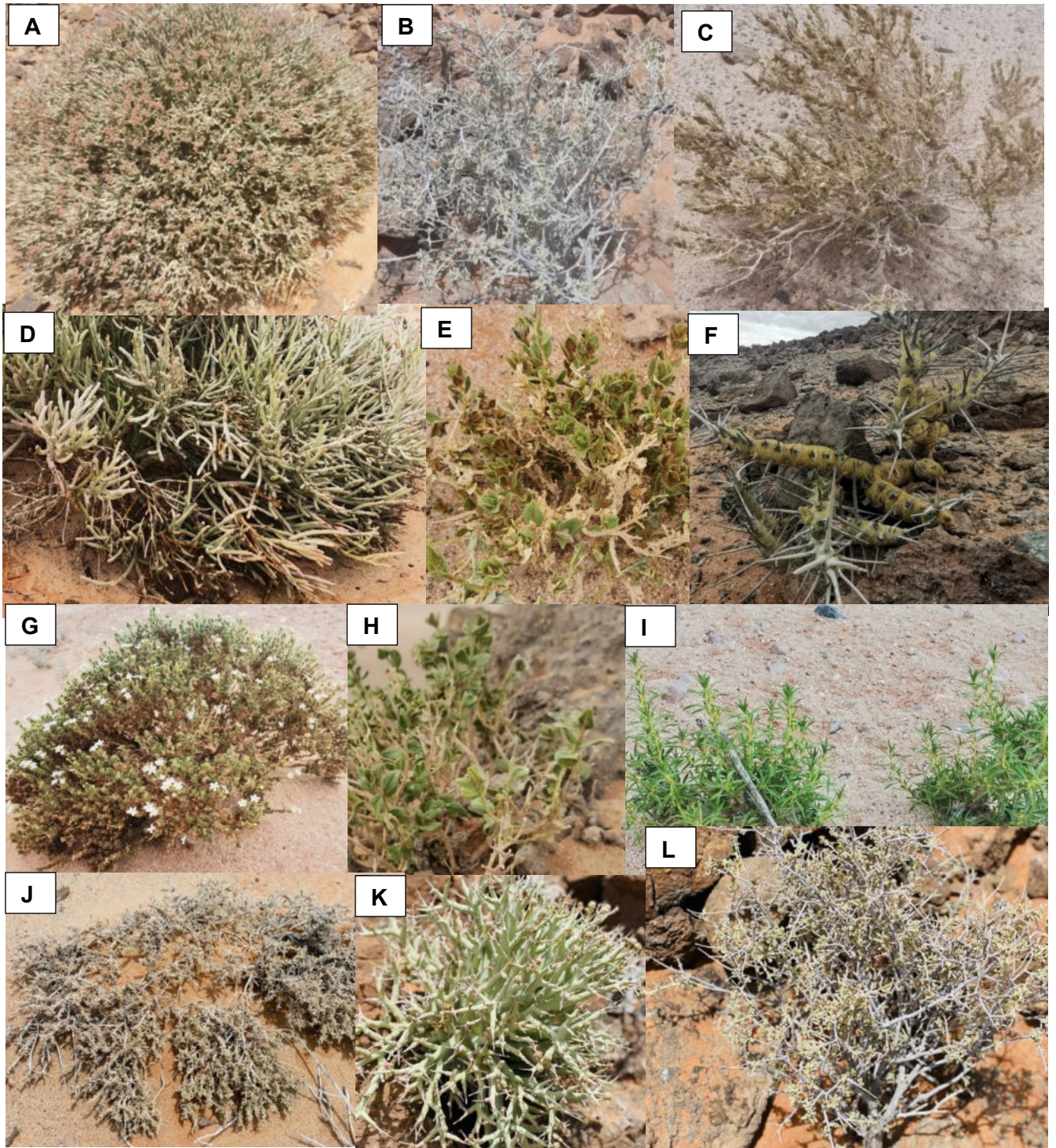


Figure 23: Locally occurring plants (Photo Credit: J.K. Amushila, 2022)

Species A, D, F & K are most dominant in the area, while B, E & H, L also occur in the slopes of the rock ridges but in less abundance, while C, E, G, I & J occur mostly on sand grave plains and mostly dominant in the dry riverbeds.

- **Local Fauna**

According to the Succulent Karoo Ecosystem Programme, 2008, in terms of fauna, the //Tsau Khaeb (Sperrgebiet) National Park has more biodiversity than anywhere else in Namibia. The faunas that are known to occur in the area will include mammals, reptiles, amphibians, and terrestrial bird species.



A comprehensive list of the fauna that are known to occur in the area is listed on Appendix B.

- **Land uses management**

In terms of the TKSNP zonation map, the EPL 6691 and in particular, the area of interest is located on the National Park zone and in the North Dune Tourism Development Area (TDA). Under this zone, control tourism and mechanised access is allowed.

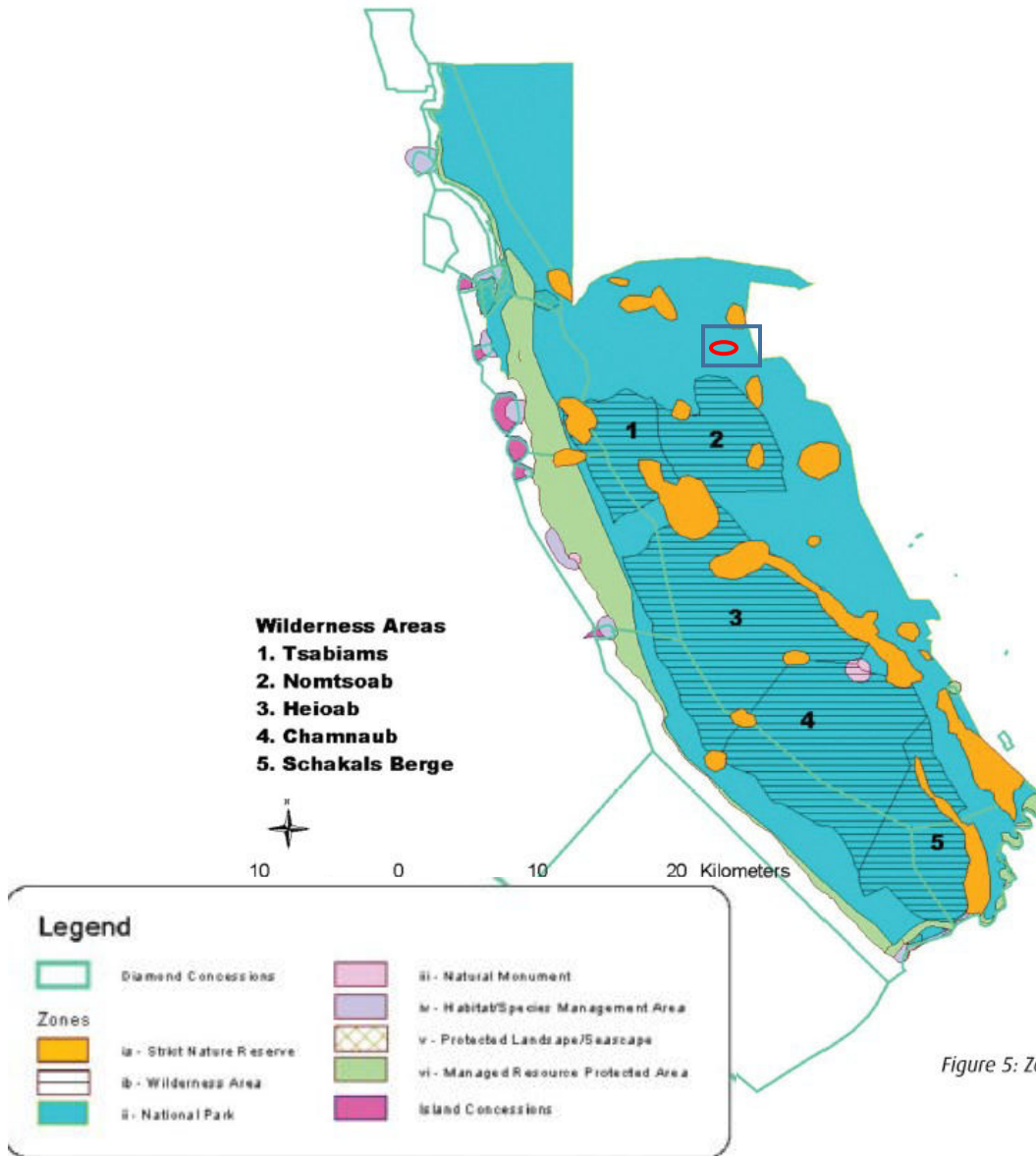


Figure 5: Zonation map of the Tsau // Khaeb (Sperrgebiet) National Park

Figure 24: SNP Zonation Map (MEFT, 2013)

6. ASSESSMENT OF RISK AND POTENTIAL IMPACTS

6.1 Anticipated ecological impacts

Potential ecological impacts resulting from the proposed activities would stem from a variety of different activities and risk factors associated with the proposed activities during development/establishment, operation, and decommissioning phase. The proposed activities can potentially cause impacts to the following ecological parameters.

- Flora
- Fauna
- Habitats
- Landscapes
- Soil
- Surface water and drainage
- Groundwater
- Air quality

Disturbance to local flora

Exploration and mining activities pose serious negative impacts to the local flora through vegetation clearance, trampling, dust generation, soil disturbance and veld fire.

Mitigation

- Only vegetation that are directly affected by the development must be cleared. Areas with abundance of protected flora should be considered as No-go zones and must be avoided at all costs.
- Reduce the excessive dust generation, vegetation trampling
- Fire should be at secured places and must be under control
- Excavations should be backfilled with the original topsoil as far as possible.
- Implement the Search and Rescuer Plan (SRP) as outlined in the EMP

Disturbance to local fauna

Potential impacts to the local fauna will be through fragmentation of habitats, risk of falling in the un-rehabilitated excavations, excessive dust, noise and vibration, disturbance of grazing areas and reduction of the availability of fodder. Human-wildlife conflicts could also occur because of poaching, hunting, or trapping of animals.

Mitigations

- Poaching of both small and large wildlife is prohibited and is a punishable act.
- Rehabilitation of the disturbed areas should be encouraged as far as possible.
- Only use existing and designated access roads and a minimum driving speed of 40km/hr should be adhered to within the park.
- The possession of and dealing with controlled wildlife products is prohibited under the Controlled Wildlife Products and Trade Act 9 of 2008.
- Ensure progressive rehabilitation of the disturbed areas

Pollution of surface water and drainage

Pollution of surface water systems could occur as a result of improper waste disposal, spillage or leaks that may contaminate the soil or enter straight into the surf run-offs during rainy season.

Mitigation

- ✓ The area does not contain any significant sized dry riverbeds
- ✓ Vehicles with leaks should be provided with drip trays
- ✓ In case of spillages or leaks of grease, oil, fuel, the contaminated soil must be removed and disposed to the nearest dumpsite (Aus or Lüderitz)
- ✓ Disposing of waste or wastewater in the environment is prohibited under the Water Resource Management Act
- ✓ Maintenance workshops should be provided with impervious surfaces

Disturbance to the ecosystem functioning

The exploration and mining activities are likely to cause fragmentations of natural habitats, disturb soil profile, pollute the environment, and disrupt ecological processes and the entire ecosystem functioning.

Mitigation

This impact can be mitigated by preventing or reducing the occurrence of impacts to the flora, fauna, water, soil etc as mentioned above.

Ecosystem Resilience

Intact ecosystems are better able to recover from perturbations and resist invasion by alien plants. However, disturbed areas can easily be dominated by invasive plants which could result to land degradation.

Mitigation

- Reduce disturbances to the local fauna
- Ensure to rescue of species of concerns as per the SRMP
- Ensure progressive rehabilitation of the disturbed areas

Impact to the soil

Soil is one of the most important natural resources which support a community of diverse organisms. Hence disturbance to the soil will culminate to the destruction of the local ecosystem.

Mitigations

- The topsoil must be properly removed and kept separate from waste rocks for possible use as backfill materials and rehabilitation
- Avoid exposing soil to erosion caused by wind or by water
- In case of spillages or leaks of grease, oil, fuel, the contaminated soil must be removed and disposed to the nearest dumpsite (Aus or Lüderitz)
- Ablution facilities must be connected to Ventilated Improved Toilets or connected to septic tank
- Contain all wastewater and do not discharge in the open environment

Landscape and visual/aesthetic impacts

Visual impacts associated with the construction of the pipeline will occur because of the uncollected waste stockpile, unpacked construction materials, open trenches, and other facilities which makes the view of the site unappealing.

Mitigations

- Rehabilitate the area by backfilling all trenches after mining
- Remove all unwanted structures from the area
- Ensure regular waste disposal
- Prevent pollution by covering all windblown waste
- Temporary structures should be

5. CONCLUSION AND RECOMMENDATIONS

It is apparent from this study that the proposed exploration and mining activities are taking place within a sensitive area consisting of species of both flora and fauna that of ecological concerns. Hence, it is recommended that the proponent ensures the followings.

- Appoint a Botanist/Horticulturist to implement the SRMP hereto attached as Annexure C
- Necessary permits should be obtained from DoF prior to the movement of any species of concerns
- The Search and Rescue mission should be implemented in collaboration with the MEFT-DoF.
- Progressive rehabilitation of the disturbed areas should be ensured through the mine life span
- The ECO to be appointed by the proponent should liaise with MEFT, DoF and provide a method statement for the SRM, Mine Plan depicting the footprint and laydown areas, prior to the commencement of any activity.

6. ANNEXURES

Annexure A: List of plant species

Annexure B: List of fauna species

Annexure C: Search and Rescue Management Plan

Annexure D: CV-Horticulturist

Appendix A: List of flora of the area

SPECIES	ENDEMISM	PROTECTED	IUCN1	IUCN2
<i>Abutilon dinteri</i> Ulbr.	Near Endemic			
<i>Acanthopsis adamanticola</i> H.M.Steyn	Endemic			
<i>Acrotome fleckii</i> (Gürke) Launert	Endemic			
<i>Aloe karasbergensis</i> Pillans subsp. <i>karasbergensis</i>	Endemic			
<i>Aloe microstigma</i> Salm-Dyck subsp. <i>microstigma</i>		Protected		
<i>Aloe variegata</i> L.		Protected		
<i>Anacampteros karasmontana</i> Dinter ex Poelln.		Protected		
<i>Anticharis namibensis</i> B.Nord.	Endemic			
<i>Antiphiona pinnatisecta</i> (S.Moore) Merxm.	Endemic			
<i>Aridaria noctiflora</i> (L.) Schwantes subsp. <i>noctiflora</i>		Protected		
<i>Asparagus juniperoides</i> Engl.	Near Endemic			
<i>Avonia albissima</i> (Marloth) G.D.Rowley	Near Endemic	Protected		
<i>Barleria lanceolata</i> (Schinz) Oberm.	Endemic			
<i>Berkheya schinzii</i> O.Hoffm.	Endemic			
<i>Blepharis furcata</i> (L.f.) Pers.	Near Endemic			
<i>Blepharis spinifex</i> Merxm.	Endemic			
<i>Bulbine namaensis</i> Schinz	Near Endemic			
<i>Calicorema squarrosa</i> (Schinz) Schinz	Near Endemic			
<i>Ceraria fruticulosa</i> H.Pearson & Stephens	Near Endemic			
<i>Cheiridopsis caroli-schmidtii</i> (Dinter & A.Berger) N.E.Br.	Endemic	Protected		
<i>Citrullus ecirrhosus</i> Cogn.	Near Endemic			
<i>Citrullus rehmi</i> De Winter	Endemic			
<i>Commiphora capensis</i> (Sond.) Engl.	Near Endemic			
<i>Commiphora namaensis</i> Schinz	Near Endemic			
<i>Crassothonna sparsiflora</i> (S.Moore) B.Nord.	Near Endemic			
<i>Crassula ausensis</i> Hutchison subsp. <i>ausensis</i>	Endemic	Protected		
<i>Crassula muscosa</i> L. var. <i>muscosa</i>		Protected		

Crassula subaphylla (Eckl. & Zeyh.) Harv. var. subaphylla		Protected		
Crassula thunbergiana Schult. subsp. minutiflora (Schönland & Baker f.) Toelken		Protected		
Crotalaria giessii M.M.le Roux & B-E.Van Wyk	Endemic			
Crotalaria meyeriana Steud.	Near Endemic			
Dracophilus dealbatus (N.E.Br.) Walgate	Near Endemic			
Dracophilus delaetianus (Dinter) Dinter & Schwantes	Endemic			
Drosanthemum pauper (Dinter) Dinter & Schwantes	Endemic			
Eberlanzia clausa (Dinter) Schwantes	Endemic	Protected		Near Threatened
Eberlanzia sedoides (Dinter & A.Berger) Schwantes	Near Endemic	Protected		Near Threatened
Ebracteola derenbergiana (Dinter) Dinter & Schwantes	Near Endemic	Protected		
Ellisochloa rangei (Pilg.) P.M. Peterson & N.P. Barker	Endemic			
Eragrostis kingesii De Winter	Near Endemic			
Eriocephalus dinteri S.Moore	Endemic			
Eriocephalus giessii M.A.N.Müll.	Endemic			
Eriocephalus scariosus DC.	Near Endemic			
Euphorbia chersina N.E.Br.	Near Endemic			
Euphorbia cibdela N.E.Br.	Near Endemic			
Euphorbia gregaria Marloth	Near Endemic			
Euphorbia juttae Dinter	Endemic			
Euphorbia lignosa Marloth	Near Endemic			
Euphorbia mauritanica L. var. foetens A.C.White, R.A.Dyer & B.Sloane	Endemic			
Euphorbia namibensis Marloth	Endemic			
Forsskaolea hereroensis Schinz	Near Endemic			
Gazania jurineifolia DC. subsp. scabra (DC.) Roessler	Near Endemic			
Gladiolus orchidiflorus Andrews				Near Threatened
Gonialoe variegata (L.) Boatwr. & J.C.Manning		Protected		
Helichrysum gariepinum DC.	Near Endemic			

Heliophila obibensis Marais	Endemic			
Heliophila trifurca Burch. ex DC.	Near Endemic			
Hereroa hesperantha (Dinter & A.Berger) Dinter & Schwantes	Near Endemic	Protected		
Hereroa puttkameriana (Dinter & A.Berger) Dinter & Schwantes	Near Endemic	Protected		
Hermannia minutiflora Engl.	Near Endemic			
Hoodia alstonii (N.E.Br.) Plowes		Protected		
Hoodia gordonii (Masson) Sweet ex Decne.		Protected		Near Threatened
Huernia hallii E. & B.M.Lamb	Endemic	Protected		
Jamesbrittenia bicolor (Dinter) Hilliard	Endemic			
Jamesbrittenia primuliflora (Thell.) Hilliard	Endemic			
Jamesbrittenia sessilifolia (Diels) Hilliard	Endemic			
Juttadinteria attenuata Walgate	Near Endemic	Protected		
Juttadinteria ausensis (L.Bolus) Schwantes	Endemic	Protected		Endangered
Lachenalia giessii W.F.Barker	Endemic			
Lachenalia pearsonii (P.E.Glover) W.F.Barker	Endemic			
Larryleachia picta (N.E.Br.) Plowes		Protected		
Leipoldtia weingangiana (Dinter) Dinter & Schwantes subsp. <i>weingangiana</i>	Near Endemic			
Lessertia acanthorhachis (Dinter) Dinter	Endemic			Near Threatened
Lithops karasmontana (Dinter & Schwantes) N.E.Br. subsp. <i>bella</i> (N.E.Br.) D.T.Cole	Endemic	Protected		
Lotononis pachycarpa Dinter ex B.-E.van Wyk	Endemic			
Lotononis strigillosa (Merxm. & A.Schreib.) A.Schreib.	Near Endemic			
Maerua gilgii Schinz	Near Endemic			
Manulea dubia (Skan) Overkott ex Roessler	Endemic			
Manulea namibensis (Roessler) Hilliard	Endemic			
Microloma calycinum E.Mey.	Near Endemic			
Monechma desertorum (Engl.) C.B.Clarke	Endemic			
Monechma leucoderme (Schinz) C.B.Clarke	Near Endemic			

Monsonia deserticola Dinter ex R.Knuth	Endemic			
Monsonia drudeana Schinz	Endemic			
Monsonia umbellata Harv.	Near Endemic			
Moraea graniticola Goldblatt	Endemic			
Myxopappus acutilobus (DC.) Källersjö	Near Endemic			
Nemesia fleckii Thell.	Near Endemic			
Ornithogalum stapffii Schinz	Endemic			
Ornithogalum tubiforme (Oberm.) Oberm.	Endemic			
Ornithoglossum pulchrum Snijman, B.Nord. & Mannheimer	Endemic			
Othonna graveolens O.Hoffm.				Near Threatened
Oxalis ausensis R.Knuth	Endemic			
Oxalis luederitzii Schinz	Endemic			
Oxalis pseudo-cernua R.Knuth	Endemic			
Ozoroa concolor (C.Presl ex Sond.) De Winter	Near Endemic			
Pegolettia plumosa M.D.Hend.	Endemic			Near Threatened
Pentatrachia petrosa Klatt ex Range	Near Endemic			
Phyllobolus oculatus (N.E.Br.) Gerbault	Near Endemic			
Phyllopodium namaense (Thell.) Hilliard	Near Endemic			
Polygala mossii Exell	Near Endemic			
Psilocaulon salicornioides (Pax) Schwantes	Near Endemic			
Pteronia lucilioides DC.	Near Endemic			
Pteronia polygalifolia O.Hoffm.	Endemic			
Pteronia pomonae Merxm.	Endemic			
Pteronia quadrifaria Dinter	Endemic			
Pteronia rangei Muschl.	Endemic			
Ruschia divaricata L.Bolus		Protected		
Ruschia muricata L.Bolus		Protected		
Ruschia odontocalyx (Schltr. & Diels) Schwantes	Endemic	Protected		

Ruschia spinosa (L.) Dehn		Protected		
Salsola cauliflora Botsch.	Endemic			
Salvia garipensis E.Mey. ex Benth.	Near Endemic			
Selago lepida Hilliard	Endemic			
Selago nachtigalii Rolfe	Endemic			
Sesamum abbreviatum Merxm.	Endemic			
Sisyndite spartea E.Mey. ex Sond.	Near Endemic			
Sisyndite spartea E.Mey. ex Sond.	Near Endemic			
Solanum rigescentoides Hutch.	Endemic			
Stipagrostis geminifolia Nees	Near Endemic			
Stipagrostis lanipes (Mez) De Winter	Endemic			
Strumaria barbarae Oberm.	Near Endemic			
Suessenguthiella caespitosa Friedrich	Endemic			
Tetraena applanata (Van Zyl) Beier & Thulin	Endemic			Near Threatened
Tetraena clavata (Schltr. & Diels) Beier & Thulin	Near Endemic			
Tetraena longistipula (Schinz) Beier & Thulin	Endemic			Near Threatened
Titanopsis schwantesii (Dinter) Schwantes	Endemic	Protected		Near Threatened
Trachyandra bulbinifolia (Dinter) Oberm.	Near Endemic			
Trachyandra lanata (Dinter) Oberm.	Endemic			
Triptaris polycephala DC.	Near Endemic			
Ursinia frutescens Dinter	Near Endemic			
Wahlenbergia subumbellata Markgr.	Near Endemic			
Zygophyllum longicapsulare Schinz	Near Endemic			

Appendix B: List of Fauna of the area

Scientific name	English name/Local name	Conservation status/Use
1. reptiles		
<i>Pseudaspis cana</i>	Mole snake	<i>Not evaluated</i>
<i>Dipsina multimaculata</i>	Dwarf beaked snake	<i>Not evaluated</i>
<i>Psammophis notostictus</i>	Karoo sand sake	<i>Not evaluated</i>
<i>Naja nivea</i>	Cape cobra	<i>Not evaluated</i>
<i>Bitis caudalis</i>	Horned adder	<i>Not evaluated</i>
<i>Bitis cornuta</i>	Many-horned adder	<i>Not evaluated</i>
<i>Acontias lineatus</i>	Striped legless skink	<i>Least concern</i>
<i>Typhlosaurus meyeri</i>	Meyers blind legless skink	<i>Least concern</i>
<i>Scelotes capensis</i>	Western dwarf burrowing skink	<i>Least concern</i>
<i>Mabuya capensis</i>	Cape skink	<i>Not evaluated</i>
<i>Mabuya occidentalis</i>	Western three-striped skink	<i>Not evaluated</i>
<i>Mabuya sulcata</i>	Western rock skink	<i>Not evaluated</i>
<i>Mabuya variegata</i>	Variegated skink	<i>Not evaluated</i>
<i>Meroles suborbitalis</i>	Spotted desert lizard	<i>Least concern</i>
<i>Pedioplanis namaquensis</i>	Namaqua sand lizard	<i>Not evaluated</i>
<i>Cordylus subtaeniatus</i>	Dwarf plated lizard	<i>Least concern</i>
<i>Cordylus polyzonus</i>	Karoo Girdled lizards	<i>Least concern</i>
<i>Chamaeleo namaquensis</i>	Namaqua Chameleon	<i>Least concern</i>
<i>Pachydactylus turneri</i>	Turner's thick-toed gecko	<i>Not evaluated</i>
<i>Pachydactylus punctatus</i>	Speckled thick-toed gecko	<i>Not evaluated</i>
<i>Pachydactylus rugosus</i>	Rough thick-toed gecko	<i>Least concern</i>
<i>Palmatogecko rangei</i>	Web-footed gecko	<i>Least concern</i>
<i>Ptenopus garrulus</i>	Barking gecko	<i>Least concern</i>
2. Amphibians		
<i>Breviceps macrops</i>	Desert rain frog	<i>Near threatened</i>
<i>Vandijkophrynus gariensis</i>	Karoo toad	<i>Least concern</i>
<i>Phrynomantis annectens</i>	Marble rubber frog	<i>Not threatened</i>
<i>Xenopus sp</i>	Platannas frog	<i>Least concern</i>
<i>Xenopus laevis</i>	Common platanna	<i>Least concern</i>
<i>Tomopterna</i>	Sand frog	<i>Near Threatened</i>
<i>Tomopterna tandyi</i>	Tandy's sand frog	<i>Not threatened</i>
3. Birds		
<i>Chlidonias leucopterus</i>	White-winged tern	<i>Least concern</i>
<i>Chlidonias hybridus</i>	Whiskered tern	<i>Least concern</i>
<i>Pelecanus onocrotalus</i>	Eastern white pelican	<i>Least concern</i>
<i>Phalacrocoax capensis</i>	Cape cormorant	<i>Endangered</i>

<i>Phalacrocorax neglectus</i>	Black cormorant	<i>Endangered</i>
<i>Phalacrocorax coronatus</i>	Crowned cormorant	<i>Near Threatened</i>
<i>Phalacrocorax africanus</i>	Reed cormorant	<i>Least concern</i>
<i>Phalacrocorax carbo</i>	White-breasted cormorant	<i>Least concern</i>
<i>Ixobrychus sturmii</i>	Dwarf bittern	<i>Least concern</i>
<i>Nycticorax nycticorax</i>	Black-crowned night heron	<i>Least concern</i>
<i>Egretta garzetta</i>	Little egret	<i>Least concern</i>
<i>Ardea melanocephala</i>	Black headed heron	<i>Least concern</i>
<i>Tadorna cana</i>	South African shelduck	<i>Least concern</i>
<i>Anas smithii</i>	Cape shoveler	<i>Least concern</i>
<i>Tachybaptus ruficollis</i>	Dabchick	<i>Least concern</i>
<i>Fulica cristata</i>	Red-knobbed coot	<i>Least concern</i>
<i>Gallinula chloropus</i>	Moorhen	<i>Least concern</i>
<i>Charadrius hiaticula</i>	Chestnut-banded plover	<i>Least concern</i>
<i>Charadrius tricollaris</i>	Ringed plover	<i>Least concern</i>
<i>Philomachus pugnax</i>	Ruff	<i>Least concern</i>
<i>Charadrius marginatus</i>	White-fronted plover	<i>Least concern</i>
<i>Calidris minuta</i>	Little stint	<i>Least concern</i>
<i>Actitis hypoleucos</i>	Common sandpiper	<i>Least concern</i>
<i>Calidris ferruginea</i>	Curlew sandpaper	<i>Near threatened</i>
<i>Tringa glareola</i>	Wood sandpiper	<i>Least concern</i>
<i>Vanellus armatus</i>	Blacksmith plover	<i>Least concern</i>
<i>Recurvirostra avosetta</i>	Avocet	<i>Least concern</i>
<i>Cursorius rufus</i>	Burchell's courser	<i>Least concern</i>
<i>Rhinoptilus africanus</i>	Double-banded courser	<i>Least concern</i>
<i>Neotis ludwigii</i>	Ludwig's bustard	<i>Endangered</i>
<i>Ardeotis kori</i>	Kori bustard	<i>Near threatened</i>
<i>Struthio camelus</i>	Ostrich	<i>Least concern</i>
<i>Sagittarius serpentarius</i>	Secretary bird	<i>Endangered</i>
<i>Torgos tracheliotus</i>	Lapped-faced vulture	<i>Endangered</i>
<i>Hieraaetus pennatus</i>	Booted eagle	<i>Least concern</i>
<i>Polemaetus bellicosus</i>	Martial eagle	<i>Endangered</i>
<i>Buteo rufofuscus</i>	Jackal buzzard	<i>Least concern</i>
<i>Melierax canorus</i>	Pale chanting goshawk	<i>Least concern</i>
<i>Falco biarmicus</i>	Lammner Falcon	<i>Least concern</i>
<i>Falco peregrinus</i>	Peregrine falcon	<i>Least concern</i>
<i>Falco rupicoloides</i>	Greater kestrel	<i>Least concern</i>
<i>Pterocles burchelli</i>	Burchell's sandgrouse	<i>Least concern</i>
<i>Streptopelia senegalensis</i>	Laughing dove	<i>Least concern</i>
<i>Oena capensis</i>	Namaqua dove	<i>Least concern</i>
<i>Columba guinea</i>	Rock pigeon	<i>Least concern</i>
<i>Columba livia</i>	Rock dove	<i>Least concern</i>

<i>Tyto alba</i>	Barn owl	<i>Least concern</i>
<i>Bubo africanus</i>	Spotted eagle owl	<i>Least concern</i>
<i>Hirundo rustica</i>	European swallow	<i>Least concern</i>
<i>Hirundo dimidiata</i>	Pearl-breasted swallow	<i>Least concern</i>
<i>Riparia paludicola</i>	Plain martin	<i>Least concern</i>
<i>Hirundo fuligula</i>	Rock martin	<i>Least concern</i>
<i>Apus bradfieldi</i>	Bradfield's swift	<i>Least concern</i>
<i>Apus affinis</i>	Little swift	<i>Least concern</i>
<i>Tachymarptis melba</i>	Alpine swift	<i>Least concern</i>
<i>Colius colius</i>	White-backed mousebird	<i>Least concern</i>
<i>Tricholaema leucomelas</i>	Acacia pied barbet	<i>Least concern</i>
<i>Calandrella cinerea</i>	Red-capped lark	<i>Least concern</i>
<i>Chersomanes albofasciata</i>	Spike-heeled lark	<i>Least concern</i>
<i>Eremopterix verticalis</i>	Sparrow-lark	<i>Least concern</i>
<i>Anthus similis</i>	Long-billed pipit	<i>Least concern</i>
<i>Motacilla capensis</i>	Cape wagtail	<i>Least concern</i>
<i>Corvus capensis</i>	Black crow	<i>Least concern</i>
<i>Pycnonotus nigricans</i>	Red-eyed bulbul	<i>Least concern</i>
<i>Oenanthe monticola</i>	Mountain chat	<i>Least concern</i>
<i>Cercomela familiaris</i>	Familiar chat	<i>Least concern</i>
<i>Parisoma subcaeruleum</i>	Chestnut-vented titbabbler	<i>Least concern</i>
<i>Eremomela scotops</i>	Green-capped eremomela	<i>Least concern</i>
<i>Cisticola subruficapillus</i>	Grey-backe cisticola	<i>Least concern</i>
<i>Bradornis infuscatus</i>	Chat flycatcher	<i>Least concern</i>
<i>Lanius collaris</i>	Common fiscal	<i>Least concern</i>
<i>Telophorus zeylonus</i>	Bokmakierie	<i>Least concern</i>
<i>Creatophora cinerea</i>	Wattled starling	<i>Least concern</i>
<i>Onychognathus naboroup</i>	Pale-winged starling	<i>Least concern</i>
<i>Cinnyris fusca</i>	Dusky sunbird	<i>Least concern</i>
<i>Passer domesticus</i>	House sparrow	<i>Least concern</i>
<i>Passer melanurus</i>	Cape sparrow	<i>Least concern</i>
<i>Ploceus velatus</i>	Masked weaver	<i>No concern</i>
<i>Estrilda astrild</i>	Common waxbill	<i>No concern</i>
<i>Serinus flaviventris</i>	Yellow canary	<i>No concern</i>
<i>Serinus albogularus</i>	White-throated canary	<i>No concern</i>
<i>Emberiza impetuani</i>	Lark-like bunting	<i>No concern</i>
<i>Emberiza capensis</i>	Cape bunting	<i>Least concern</i>

Appendix C: Search and Rescue Management Plan

Introduction

This document provides a management plan for the rescue of threatened or protected plant species occurring within the area affected by the proposed exploration and mining activities in the EPL 6691, Lüderitz District, Karas region. The purpose of the document is to provide practical guidance on the search and rescue mission, identify legal requirements related to plant species removal, and also provide the responsibilities of the responsible persons.

Ecological considerations

The objective is to identify, remove and, where possible, rescue or relocate species of concern in line with the relevant legislations.

The ecosystem within the footprint of the development, with all its species diversity, genetic variation, and ecological interrelationships will be lost and the objective is to salvage something prior to the destruction. Plant rescue is considered to be the last resort to conserve individual plants when authorization for the proposed activities has been obtained and commencement is imminent. The following factors should be put in considered.

Some considerations are as follows:

- Plant rescue can usually only salvage a small proportion of the plants on site. This is due to two main factors, firstly, the fact that different species appear at different times and some species will almost certainly be dormant at the time that the Search and Rescue is undertaken, and secondly, there may be practical limitations in terms of how much plant material can be salvaged.
- Globally, it has been recognised that the selection of plants to rescue is based on criteria that may have little to do with conservation, for example, ease of access, horticultural value and probability of survival.
- Plants chosen for rescue may not thrive or even survive. It is highly unlikely that all rescued plants will survive. This is based on the fact that it is virtually impossible to predict without experimentation and research exactly what

artificial conditions will be required for the management of each species in order to ensure survival.

- Various agencies globally (e.g IUCN) and nationally (e.g. NBRI) have expressed concern regarding the concept of plant rescue. The concern is that the implementation of a plant Search and Rescue can weaken support for habitat conservation by fostering the perception that rescuing selected plants can compensate for the destruction of an entire habitat, or that landscape plantings can substitute for natural areas.
- Plant rescue can divert time, energy, resources and leadership from tasks that may be more effective in protecting natural habitats.
- Plants can be used for rehabilitation of affected areas, thereby restoring something resembling the natural vegetation.
- It can also make a long-term contribution to public education by providing native plants for public gardens and nature centers.

Responsibility

Rescue of sensitive plant species during the development/establishment phase of the project will be dependent on a number of project personnel as listed below.

i). Proponent (Bonya Exploration Pty Ltd)

- ❖ Ensure that the requirements set out in this Plan are adhered to and implemented.
- ❖ Allocate the responsibilities assigned to the Environmental Control Officer (ECO) to an independent suitably qualified individual prior to the start of construction activities on-site; and
- ❖ Provide all principal contractors working on the project with a copy of this management plan as part of tender contract documentation to allow the contractors to cost for its requirements within their respective construction contracts or alternatively, commission a suitable service provider to undertake the required Search and Rescue independent from any contract documentation with individual contractors.

ii). Botanist/Horticulturist

The proponent must appoint a Botanist or plant specialist to take responsibility of identifying species of concern, advice on the transplanting, relocation, caring/nurturing and aftercare of relocated plants.

iii). Environmental Control Officer (ECO)

The ECO is responsible for monitoring and verifying the implementation of the Plan during the construction phase of the project. To effectively implement the Plan, the ECO must be aware of the findings, mitigation measures and conclusions of the Final EIA Report, the EA, and this Plan

Species of conservation concern that occur on-site

The affected species of concerns include stem, compact and leaf succulents as depicted on Figure below. This is not an exhaust list, see appendix A for details.



Plant Rescue Action Plan

Below is the list of actions that need to be taken to rescue all plant species listed in this report and other plants to be identified by the NBRI or MEFT. The

Action	Responsible person
<p style="text-align: center;"><u>Identification of species of concern</u></p> <p>Initial identification of all listed species that may occur within the project area was done as part of the ecological study; the list is hereto attached. The attached list should be verified with MEFT-DoF.</p>	Botanist
<p style="text-align: center;"><u>Determine the footprint of activities</u></p> <p>The initial footprint has been identified in Figure 1 of this report. The final layout plan depicting all laydown areas should be shared with the Botanist prior to the final vegetation survey and also with MEFT.</p>	Proponent/Mine Engineer
<p style="text-align: center;"><u>Permits requirements</u></p> <p>Some species cannot be handled without a permit. Hence, all necessary permits required for the collection, movement/relocation, and propagation of listed plant materials should be obtained from DoF.</p>	Botanist
<p style="text-align: center;"><u>Plant marking and information requirements</u></p> <p>For all plants that are rescued, relevant information should be collected for record-keeping and monitoring.</p>	Botanist
<p style="text-align: center;"><u>Temporary nurturing of plants</u></p> <p>It is recommended that rescued plants should be nurtured temporarily before placing them back into suitable habitats. This can be done through the establishment of a temporary nursery onsite.</p> <p>There must be a method statement that details the nursery locality, layout, structures, operations, and security. The method statement must also cover all aspects of operation, including sources of water and growing medium and a description of the intended practices to be used.</p> <p>The nursery must include a storage area with adequate capacity to provide an amount of material and must also be cool and dry and rodent free</p>	Botanist

<p style="text-align: center;"><u>Species search and rescue mission</u></p> <p>Locate and rescue all the listed plant species occurring within marked-out areas (within the mining footprint). The marked-out area must be walked and required species rescued.</p> <p>The rescue mission should be supervised by an experienced Horticulturist</p> <p>The rescue mission should take into account the overall genetic variability and alternatives to preserving genetic variability.</p> <p>Habitats that are outside the mine footprint are possible sites for relocation where a positive biodiversity outcome can be locally achieved.</p> <p>Rescued plants must be planted into a container to be housed within a temporary nursery on-site or immediately planted into the target habitat.</p> <p>Where appropriate, it may be possible to directly transplant individual plants from the affected areas to identified habitats or to areas that are already undergoing rehabilitation.</p>	<p style="text-align: center;">Botanist</p>
<p style="text-align: center;"><u>Control of impacts on areas outside the footprint</u></p> <p>Any listed plants close to the development servitude that will remain in place may not be defaced, disturbed, destroyed or removed.</p> <p>They should be cordoned off with construction tape or similar barriers and marked as no-go areas.</p> <p>The collecting of plants by unauthorized persons should be prevented.</p> <p>ECO to monitor that vegetation clearing only happens once all search and rescue operations have been completed.</p> <p>The ECO should monitor construction activities in sensitive habitats to ensure that impacts within these areas are kept to a minimum.</p>	<p style="text-align: center;">ECO</p>

Monitoring

The following monitoring activities are recommended as part of the plant rescue plan:

- Post-relocation monitoring of plants relocated during search and rescue to evaluate whether the intervention was successful or not. This should be undertaken on a three-month basis over a period of two years in order to evaluate the success thereof.
- Provision of a detailed record, including photographs, that indicates the success of the plant rescue operation.

This plan will be updated upon recommendations/approval by the MEFT-NBRI

6. BIBLIOGRAPHY AND REFERENCES

- Cooper K. 1983, Trees of Southern Africa, 2nd Edition, Strik Publisher Pty. Ltd, Republic of South Africa
- Loots. S. 2005. Red data book of Namibia, National Botanical Research Institute, MAWF, Windhoek, Namibia
- National Herbarium of Namibia (WIND). 2022 BRAHMS Database. National Herbarium of Namibia (WIND), National Botanical Research Institute, MAWF, Windhoek, Namibia
- Government Gazette. No.3564 Promulgation of Forest Act (Act NO. 13 of 2005 of Parliament), 2005, Windhoek, Republic of Namibia
- Government Gazette. No.5367 Promulgation of Water Resource Management Act, 2013 (Act No. 11 of 2013 of Parliament), 2013, Windhoek, Republic of Namibia.
- Mendelsohn, J., Jarvis, A., Roberts, C., & Robertson, T. 2002. Atlas of Namibia. New Africa Books (Pty) Ltd: Cape Town.
- Jacobson, J. P, 1997. An ephemeral perspective of fluvial ecosystems: Viewing ephemeral rivers in the context of current lotic Ecology
- "BirdLife IBA Factsheet NA019 Sperrgebiet". BirdLife International. Retrieved 2008-05-24.
- Pickford, M. and Senut, B. 2000. Geology and Palaeobiology of the Namib Desert, Southwestern Africa. Mem. Geol. Surv. Namibia, 18, 150 pp.
- Ward, J. 1995. Geology and Geomorphology. In: J. Pallett (Ed.) The Sperrgebiet – Namibia's least known wilderness, 27-32. NAMDEB, Windhoek.
- "Succulent Karoo Ecosystem Programme". Rufford Maurice Laing Foundation. Retrieved 2008-05-24.