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ENVIRONMENTAL IMPACT ASSESSMENT (EIA)
AND ENVIRONMENTAL MANAGEMENT PLAN (EMP)
FOR THE TUBUSSIS SMALL-SCALE
MINING HOTSPOT IN ERONGO REGION

ENVIRONMENTAL SCOPING REPORT

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LIST OF ACRONYMS

BID:	Background Information Document
CBO:	Community Based Organization
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
ERSMA:	Erongo Regional Small-scale Miner's Association
GDP:	Gross Domestic Product
I&APs:	Interested and Affected Parties
IUCN:	International Union for Conservation of Nature
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
NAMPOL:	Namibian Police
NBRI:	National Botanical Research Institute
NEPL:	Non-Exclusive Prospective Licence
NGO:	Non-Governmental Organizations
PPP:	Public Participation Process
QDS:	Quarter Degree Square
SSMs:	Small-scale Miners
TA:	Traditional Authority
ToR:	Terms of Reference
UNDP:	United Nations Development Programme

EXECUTIVE SUMMARY

The Ministry of Mines and Energy (MME) has recognized the need to enhance the quality of life for artisanal and small-scale miners working outside of formal legal and economic systems. Although it is recognized that small-scale mining creates employment opportunities for many and encourages entrepreneurship, majority of the small-scale mining activities have been taking place illegally. Farm Tubussis is one the hotspots in Erongo Region where small-scale mining activities have been taking place for many years without an Environmental Impact Assessment (EIA) study done and Environmental Management Plan (EMP) in place. Small-scale Miners (SSMs) have in the past been issued with Environmental Clearance Certificates (ECCs) upon completion of the Environmental questionnaire and signing a pro-forma Environmental Contract. In terms of the Environment Management Act (EMA) (Act No. 7 of 2007), all mining and quarrying activities cannot be undertaken without an EIA being carried out and ECC being obtained, hence this study.

The MME is assisting SSMs to transition to the formal system and to enhance the contribution of the small-scale mining sub-sector to sustainable development. As such, MME with assistance from the United Nations Development Programme (UNDP) is facilitating the development of the EMP and subsequent issuing of ECCs to SSMs operating at Farm Tubussis in Erongo region.

The EIA study was conducted in a systematic approach as outlined in the EIA Regulations of February 2012. The objective of this EIA was to identify the potential impacts associated with the small-scale mining activities and to provide mitigation measures and ensure that potential impacts to the environment are managed effectively and that positive impacts are enhanced.

This report contains a full description of the small-scale mining activities, 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 EMP appended to this report.

1. INTRODUCTION

1.1 Background

The small-scale mining activities at Farm Tubussis mainly include artisanal and semi-mechanized methods which are used in extracting a wide range of gemstones and specimens such as aquamarine, tourmaline, fluorite, and garnets. Small-scale mining activities at Farm Tubussis are concentrated in three main areas namely, Erongorous or Erongo Mountains, Springbokfontein and Tumib areas. However, this study only focusses on SSMs operating in the Springbokfontein and Tumib areas.

Although mining activities have been taking place for many years at Farm Tubussis, there has not been any EIA study done. SSMs have in the past been issued with ECCs upon completion of Environmental questionnaire and signing a pro-forma Environmental Contract. In terms of the Environment Management Act (Act No 7 of 2007), and the EIA Regulations of 2012, all mining and quarrying activities cannot be undertaken without an EIA being undertaken and ECC being obtained.

In order to facilitate the development of EMPs, and subsequent issuance of ECCs by the Environmental Commissioner, the MME in collaboration with the UNDP has appointed an Individual Consultant (IC) to carry out the Environmental Scoping study, prepare an EMP in order to assist SSMs in the Farm Tubussis area to comply with the statutory requirements.

1.2 Terms of Reference

The Terms of Reference (ToR) provided by the client is described in this section. These ToRs are aligned with the requirements of the EMA and the EIA Regulations of 2012. The IC is required to.

- i. Identify, investigate and evaluate all potential impacts of the 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 Scoping Report
- v. Compile an Environmental Management Plan
- vi. Submit the Environmental Scoping Report and Environmental Management Plan to MEFT in a prescribed manner as per EMA Regulations of 2012.

1.3 Independent Consultant (IC)

Mr. Joseph Kondja Amushila, hereby referred to as an IC is a qualified Environmental Assessment Practitioner (EAP) in terms of Section VII of the EIA Regulations of February 2012.

Full name	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 Honors Degree in Agriculture (Polytechnic of Namibia)• Bachelor's Degree in Agriculture (Polytechnic of Namibia)
Experience	Up to ten years' experience in conducting Environmental consulting services which include Strategic Environmental Assessment (SEA), Environmental Impact Assessment, Environmental Management Plans (EMPs) and specialist studies.
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2. APPROACH AND 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 to the small-scale mining areas of Farm Tubussis. During field inspection, the consultant interviewed small-scale miners that were found onsite on issues related to their operations and livelihoods. The consultant also conducted a walk-through-survey across the mining sites to record different plant and animal species observed. The data collected during the site visit can be summarized as follows:

- A list of all plant species observed at the site. This was verified with Quarter Dree Square (QDS) of vegetation from the National Botanical Research Institute (NBRI).
- Description and composition of the different habitats and plant communities observed on site.
- 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.

2.2 Collection and review of existing information

Previous studies and surveys were reviewed for collection of relevant secondary information. Information on the ecological setting of the area was collected from sources such as Tree Atlas of Namibia and the Vegetation Survey of Namibia and the National Botanical Research Institute (NBRI). The list of plants species of the area was derived from the NBRI data portal using a Quarter Degree Square (QDS) method. The QDS of the area are 2115AC, 2115AD, 2115BC, 2115CA. The conservation status of the species in the list was extracted from the database of the Ministry of Agriculture, Water and Forestry 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 on 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, No. 07 of 2007 and EIA Regulations of February 2012. The process that was followed is summarized below:

2.4.1 Stakeholders consultations

The project was formally introduced to key stakeholders such as Government Ministries, Regional and Local Government, Traditional Authorities, Parastatals and NGOs. The aim of these consultations was to ensure that all relevant stakeholders are aware of the development and to obtain consent and inputs (See appendix E. List of Registered IAPs).

2.4.2 I&AP consultations

SSMs were also given opportunity to give their inputs and contributions toward the study. These inputs are contained in the Issue Response Report and incorporated in the Scoping Report. Potential Interested and Affected Parties were invited to register through newspaper advertisements that were published in two local newspapers: New Era for 24 & 29 September 2020, and The Namibian newspaper for 25 and 29 September 2020. Several public notices were placed at public places i.e., government offices, conservancy offices. Relevant authorities were informed through notification letters send to them while the public was informed through the Traditional Authority.



Figure 1: EAP with some SSMs during the consultation

2.4.3 Public Meeting

As part of the study, a public meeting was held on the 01 October 2020 at the Community Hall in Tubussis. The meeting was attended by some SSMs, community members, members of the Traditional Authorities, and representatives of the Conservancy. During the meeting, participants were introduced to the study and informed of the purpose of the study and the purpose of the consultation and their rights toward the study.



Figure 2: SSMs at a public Meeting in Tubussis

2.4.4 Summary of Issues raised from Public Participation

The PPP has discovered an array of issues affecting small-scale mining activities most which relates to the socio-economic and land use issues. All issues collected during PPP have been outlined in the Issue Response Report attached to this report (Appendix G).

3. SMAL-SCALE MINING SITUATION

3.1 Definition of small-scale mining

The common definition for the small-scale mining sector has not been legally adopted as its legal status, defining criteria, and local definitions vary from country to country. In some countries, the sector is referred to as; Artisanal and small-scale mining (ASM) which refers to formal or informal operations with predominantly simplified forms of exploration, extraction, processing, and transportation.

In Namibia, the term small-scale mining is broadly used to define mining activities based on the area size or licence type i.e., Mining Claim and on the level of mechanization.

3.2 Mining rights

The Minerals (Prospecting and Mining) Act, 1992 provides the overarching legal control of rights related to reconnaissance, prospecting, mining sale/disposal in Namibia. In the case of small-scale mining activities, the following mining rights are applicable:

- **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 or area i.e., semi-precious stones.
- **Mining Claims (MCs)** – gives rights to prospect and mine and 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, 1992.

According to MME (2020), at Farm Tubussis, there are about 34 registered MCs, of which 9 MCs are active, 24 MCs are still pending renewals and 1 MC is pending ownership transfer. There are also about 40 MCs applications registered in the area (See appendix D).

Although majority of SSMs are aware of the requirements of mineral rights registration, there are still those operating without registered MCs. The SSMs at Farm Tubussis are currently not organized in a formal association, however, some individuals are members of the Erongo Regional Small-scale Miner's Association (ERSMA).

3.3 Scales of mining Farm Tubussis

Small-scale mining activities at Farm Tubussis can be classified into two forms, namely, Artisanal and Semi-mechanized methods. The two methods differ in scales, types of equipment utilized and their environmental footprint.

a). Artisanal method

The method involves manual digging and excavations along the identified pegmatite veins or reefs using pick mattocks and spades and extraction by chisel and hammer or by hand picking. Other artisanal methods also involve exposing the crystalized miarolitic or veins by drilling or breaking of granite rock bodies with generator powered drillers and grinders. The size of the mining area/site under the artisanal method range from 300m² to 500m² at a given site while the depths of the excavations range from 0.5 meters to 1.5 meters.



Figure 3: Excavations from artisanal operations

b). Semi-mechanized methods

Under the semi-mechanized method, pegmatite reefs are exposed by means of earthmoving equipment such as Backhoe loader, excavator, rock hammer, jackhammer etc. Large scale blasting is often used for rock breaking. Manual excavation is also done using pick mattocks and shovels while extraction of gemstones is done manually with a chisel and hammer or by hand picking.



Figure 4: Excavations from Semi-mechanized operations

The size of the mining area under this method ranges from 1ha to 1.5ha for a given site, while the depth of the excavations ranges from 3 meters to 5 meters. The environmental damages caused by the Semi-mechanized method is quite huge compared to the Artisanal method.

3.4 Blasting in small-scale mining

Given the two forms of small-scale mining operations, the scale and type of blasting technique used in each method also differ considerably.

3.4.1 Blasting in an artisanal operation

The most common explosive used in the artisanal operation are homemade explosives made of a mixture of gunpowder and smokeless propellant as depicted in Figure 5 below.



Figure 5: Composition of a homemade explosive

The blasting area is prepared by drilling few shots holes and loading explosive in each shot hole. Explosives are denoted by igniting the detonator cords. The explosion usually causes a few fragmentations of the rock bodies.

This blasting method is completely illegal since the manufacturing, storage, usage, and transportation of the homemade explosives is not in accordance with the Arms and Ammunition Act No. 7 of 1996. The method is equally dangerous to the public, animal and to the users.

3.4.2 Blasting in a semi-mechanized operation

Large scale blasting is often conducted by a registered blasting company or individuals. The Blasting technique normally follows six main steps as depicted in the Figure 6 below.

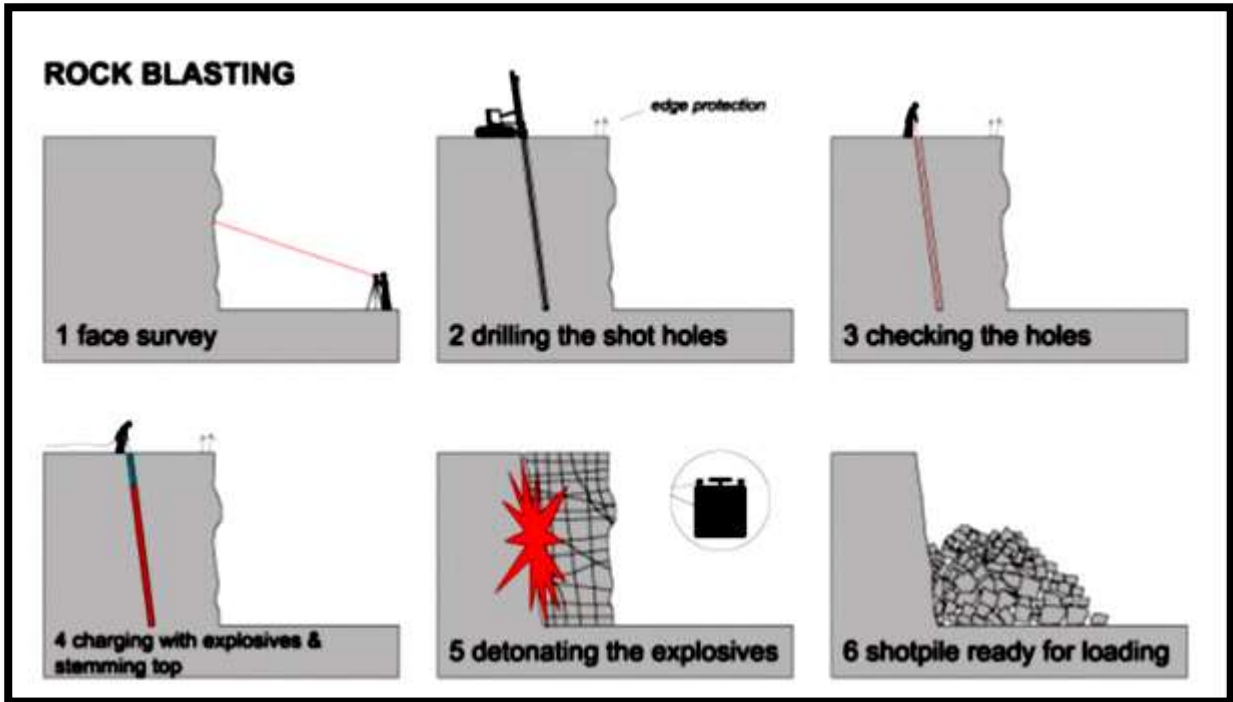


Figure 6: Typical example of the blasting process

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 10-30 shot holes per occasion.

Step 3: The area is then prepared for blasting and human and animal are withdrawn 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 to within a few meters of the top.

Step 4, 5 & 6: After blasting, the area is inspected to check that all the shot holes have fired correctly. This followed by extraction of gemstone using chisel and hammer or by hand picking. Step5 & 6 are only applicable in some cases when crushing is necessary i.e., extraction of garnet. There is one operator that occasionally does crushing in extraction of garnets at Farm Tubussis. However, the crush plant is currently halted due to Mining Licence issue.

Due the fact that large scale blasting is often carried out by registered companies or individuals, it was difficult to determine the exact amount of explosive kept or used at each mining claim. The manufacturing, storage and transportation of explosives remain a responsibility of the blasting company. The quantity of explosives used in blasting largely depend on the number and sizes of shot holes as well as types of abrasives at a given blasting site.

3.4.3 Blasting explosives

Table 1: Most common mining blasting explosive used in mining

Explosive	Compositions	Classifications	Possible Risks
Homemade -Small scale rock breaking	Alliant power and smokeless propellant	Hazardous substance	Highly flammable
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 substance and dangerous goods	Shock, Fire
ANFO -Used in dry blast holes for surface and underground operations	Ammonium nitrate and fuel oil	Hazardous substance	Emit hazardous gases (nitrogen oxides and carbon oxide)
Gunpowder -Blasting in opencast mines	Sulphur (S), Charcoal (C), and Potassium Nitrate (Saltpetre, KNO ₃)	Hazardous substance	Highly flammable, oxidizing, and toxic substances.

All explosives must be manufacture, stored, and transported in accordance with Arms and Ammunition Act of No.07 of 1996.

3.5 Workforce

Although there are about 34 registered MCs in the Tubussis area, only relatively few MCs were operational at the time of the study. Operations at many MCs has ceased or put-on hold understandably due to the consistently low market prices for garnet and due to uncompleted mineral rights registration processes.

Table 2: MCs that are operationa at Farm Tubussis

MC holders	Scale of Mining	No of MCs worked on	No. of Employees per MC/site	Total No. of Employees
Gideon Jacobus Du Preez	Sem-mechanized	1	10	10
Global Mining Corporation (Namibia) (Pty.) Ltd	Sem-mechanized	3	5	15
Zandre'Ruch	Sem-mechanized	1	5	5
Ichnasius August Gertze	Sem-mechanized	3	5	15
Namundjebo Shapange	Artisanal	1	5	5
Illegal Miners	Artisanal	0	20	20
Totals				120

According to the local Traditional Authority, the total number of SSMs operating at Farm Tubussis was estimated at about 120 people at the beginning of the year 2020. These included about 100 SSMs that were employed by MCs or middlemen and about 20 illegal SSMs operating at unclaimed sites or abandoned MCs. SSMs at Farm Tubussis work in groups of 5-14 people per MC or mining site. The exact number of SSMs operating per MC is hard to determine due to the frequent movement of miners between sites and in and out of the area in search for more promising opportunities.

3.6 Temporary accommodation facilities

Most of the miners reside at the mining area in tents and makeshift houses made of corrugated iron sheets while few of them resides in the nearby settlements such as Kudubis, Springbokfontein, Uigrana and Hobatre.



Figure 7: Temporary accommodation facilities for SSMs

3.7 Water requirements

The main source of water in the Tubussis area is groundwater which is abstracted from private and community boreholes. Water is mainly used for domestic purposes i.e., cooking, drinking, washing, bathing etc. The quantity of water usage differs between the two small-scale mining methods.

Table 3: Water requirements for Small-scale mining operations

Uses	Monthly water demand			
	Average demand (per site/MC)		Peak demand (per site/MC)	
	Artisanal	Semi-mechanized	Artisanal	Semi-mechanized
Domestic	±800L	±1800L	±1000L	±2,000L
Mining operations	±20L	±200L	±50L	±500L
Total	±820L	±2 000L	±1050L	±2500L

3.8 Waste management

SSMs using artisanal methods only produce a limited amount of mining waste rocks, most of which are unnoticeable at the site. However, SSMs using semi-mechanized method produces a large quantity of tailings as result of removal of overburden and excavations. This often create visible huge piles of topsoil and waste rocks.



Figure 8: SSM waste rocks (overburden)

SSMs activities also produce general waste from domestic activities such as food items, old clothes, abandoned fencing materials etc. Collection of general waste is hardly done, as windblown waste was observed in the surroundings. Abandoned mining areas and camping sites have also not been rehabilitated or decommissioned.



Figure 9; uncollected general waste at SSMs site

3.9 Summary of Small-scale mining activities at Farm Tubussis

Table 4; Small-scale mining activities used at Farm Tubussis

Aspects	Artisanal Method	Semi-mechanized																				
Description of the mining process	<p>This method is more labour intensive and uses limited technology. The operation starts with the identification of crystalized miarolitic veins or reef, followed by manual digging of open pits and/or drilling holes in granite rock bodies with a generator powered driller.</p> <p>The depth of an excavation or hole depends on the quality and quantity of crystals found, after which an excavation/pit/drill site can be abandoned for a more promising site.</p>	<p>This method includes using of semi-mechanized technologies with a combination of equipment such as excavator, bulldozers, and loaders to remove overburden and air compressor or jack hammer to break rock bodies.</p>																				
Energy requirements	<p><u>Fuel</u>: ±40-60 liter/MC/month of Petrol/Diesel</p> <p><u>Wood</u>: ±10-20 kg/per MC/month</p>	<p><u>Fuel</u>: ±1000-1500 liter/MC/month</p> <p><u>Wood</u>: ±20-50 kg/MC/month</p>																				
Tools and Equipment	<table border="1"> <thead> <tr> <th>Equipment</th> <th>Uses</th> </tr> </thead> <tbody> <tr> <td>Pick mattock and Shovel</td> <td>excavation</td> </tr> <tr> <td>Jackhammer</td> <td>rock breaking</td> </tr> <tr> <td>Driller</td> <td>drill holes/rock breaking</td> </tr> <tr> <td>Generator</td> <td>power</td> </tr> <tr> <td>Chisel, Hammer</td> <td>extraction</td> </tr> </tbody> </table>	Equipment	Uses	Pick mattock and Shovel	excavation	Jackhammer	rock breaking	Driller	drill holes/rock breaking	Generator	power	Chisel, Hammer	extraction	<table border="1"> <thead> <tr> <th>Equipment</th> <th>Uses</th> </tr> </thead> <tbody> <tr> <td>Hydro Compressor</td> <td>Rock breaking</td> </tr> <tr> <td>Excavator, TLB</td> <td>Excavation</td> </tr> <tr> <td>Spade, Chisel, Hammer</td> <td>Extraction</td> </tr> </tbody> </table>	Equipment	Uses	Hydro Compressor	Rock breaking	Excavator, TLB	Excavation	Spade, Chisel, Hammer	Extraction
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Pick mattock and Shovel	excavation																					
Jackhammer	rock breaking																					
Driller	drill holes/rock breaking																					
Generator	power																					
Chisel, Hammer	extraction																					
Equipment	Uses																					
Hydro Compressor	Rock breaking																					
Excavator, TLB	Excavation																					
Spade, Chisel, Hammer	Extraction																					
Supporting infrastructures	<ul style="list-style-type: none"> • Temporary accommodation/campsite • Water storage tanks • No ablution facilities • Convenient tuck-shop 	<ul style="list-style-type: none"> • Temporary Accommodation/campsite • Access Roads • Vehicle maintenance workshop • Crusher plant 																				
Environmental damages	<ul style="list-style-type: none"> • Excavations: 1 - 1.5m deep, 3 - 5m wide • Use of existing and limited routes • Open fire • Wood collection • Localized dust emission • Waste rocks (0.5-1ton per excavation) 	<ul style="list-style-type: none"> • Excavations: >3m deep, >50m wide • Creation of several new routes • Open fire • Wood collection • Noise, vibrations, dust etc. • Waste rocks (>10ton per excavation) 																				

3.10 Occupational health and safety

Like large scale mining activities, small-scale mining activities also pose 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 lack of the experience & limited knowledge, nature of work and non-compliance to health safety standards. The common hazards include physical, chemical, biological, radiological, agronomical, and behavioral hazards.

Table 5: Baseline Risk Assessment for small-scale mining activities

Occupational Hazard	Hazard type	Potential Risks	Likelihood (1-4)	
			Artisanal	Semi-mechanized
Dust	Ergonomic	Lung diseases, Skin irritation and Eye damages	2	4
Noise	Physical	Insomnia	2	4
Vibration	Ergonomic	Insomnia	1	4
Noxious gases	Chemical	Lung diseases, Cancer, and Respiratory diseases etc.	2	3
Falling rocks	Physical	Injuries or Death	3	4
Flying rocks	Physical	Injuries	2	1
Height	Ergonomic	Falling, Injuries, Death	2	4
Toxic and hazardous substances	Radiological	Poisoning	2	4
Explosion	Physical	Fire, damage, injuries, and death	2	4
Heavy loads	Ergonomic	Fatigue	4	2
Long distance	Physical	Physical fatigue	4	1
Long working hours	Ergonomic	Physical fatigue	4	4
Poisonous plants	Biological	Poisoning	4	2
Predators	Biological	Injuries, death	4	2
Snake bites	Biological	Injuries, death	4	4
Harsh weather	Physical	Fatigue	4	4
Conflicts	Behavioral	Injuries	4	4

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

Only few SSMS are equipped with basic Personal Protective Equipment (PPE) such as dust masks, hand gloves, overall and boots, but lacks PPE suitable for industrial or heavy duties such as safety harness, kneecaps, helmets, industrial respirators, safety goggles, etc. Those operating in underground holes make use of a small air compressors to supply oxygen during operations. The safety of this air-supply systems to human health remains a mystery.

3.11 Types of minerals, processing, and trading

The Springbokfontein area produces a range of gemstone such as aquamarine, tourmaline, crystals, topaz, while the Tumib area is well known for producing mostly garnets of different colors. Economic gains from small-scale mining activities are not guaranteed, as weeks and months can go by without extracting valuable gemstones. The Tubussis area occasionally produce high concentrations of exceptionally good quality crystals in “pockets” with the most sought-after gemstones being the aquamarine crystals.

The gemstone prices are determined based on the artworks, aesthetics, rarity, condition, and size of the gemstone. Prices are set on individual specimens, and there is no guiding price per kg or per ct. High quality crystals are sold to established buyers in nearby towns i.e., Karibib, and Omaruru while lower value gemstones i.e., black tourmaline are sold locally to collectors and tourists at Spitzkoppe-Uis crossing.

The processing methods used in small-scale mining consist of hand sorting with the aid of the visual characteristics of the gems (fluorescence, shine, and colour) and no equipment is used in this process. Prices of gemstones are determined based on the artworks, aesthetics, rarity, condition, and size of crystals and are set on individual specimens without any guidance. Namibia has very little Regulations on gemstones trading except for 2% of the gemstone value that is payable to the state through the MME. As such, some of the high value gemstones often get exported without their true value being declared (Amunkete and Nyambe 2009).

3.12 Gender aspects

Most of the small-scale miners at Farm Tubussis are men. Women and other household members are mostly involved in the sorting and selling of gemstones.



Figure 10: Gender aspects of small-scale mining

3.13 Challenges faced by SSMs at Farm Tubussis

Small-scale miners are faced with numerous challenges, which affect their daily operations and their ability to meet their environmental due diligences

3.13.1 Lack of capital

Like many others, SSMs at Farm Tubussis lacks capital to acquire proper machineries and mining equipment. Financial support from local financial institutions is hard to come by as the small-scale mining business is regarded as a risky business. The lack of funding also makes it difficult for the SSMs to carrying out rehabilitation of the mining areas.

3.13.2 Harsh working conditions

SSMs are often travel long distances to obtain basic amenities such as water, food, and fuel. Most of the SSMs, especially those operating on the Erongo Mountains are at risk of physical fatigue and exhaustion which is contributed by lugging heavy loads, working long hours, walking long distances, and engaging in other heavy duties.

3.13.3 Limited expertise

Majority of the small-scale miners are self-employed and did not go through formal recruitment process or received proper training. Hence, they lack proper understanding of the legislative requirements and have limited awareness on environmental due diligence.

3.13.4 Limited market information

Due to the informal status of the small-scale mining industry, there is lack of information relating to the potential market and latest market prices for gemstones. This has made small-scale miners to be price takers and losing out on the well-deserved profits.

3.13.5 Long distance support service

Since most of the administrative support for SSMs is only done in Windhoek, some small-scale miners often find it difficult to obtain legal requirements such as NELPs, MCs, permits, licences etc. This affects the efficiency of their operations, discourage them, and force some SSMs to engage in illegal mining activities

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

Below is the baseline for the affected environment. It entails a description of various environmental receptors that are likely to be affected by the small-scale mining activities. This include both the biophysical and socio-cultural-economic aspects.

The baseline study area chosen for physical and ecological data collection is mainly that area which is in the direct zone of influence of the mining activities, its process facilities and infrastructure. On the other hand, the socio-cultural-economic impacts will affect a greater geographical area than the direct environmental impacts. Hence, the baseline study area for the socio-cultural-economic study corresponds to the extent of the rural community in which the activities are taking place.

4.1 Socio-economics environment

4.1.1 The study area

The Tubussis mining hotspot is a communal land or State land under the !Oe-#Gan Traditional Authority and a small part to the north-east is a commercial farmland. Politically, Farm Tubussis falls under the Dâures Constituency and a small portion falls under the Karibib Constituency of Erongo region. Most the mining activities in Tubussis area taking place within the #Gaingu Conservancy.

Small-scale mining activities at Tubussis are concentrated in three main areas namely, Erongorus, Springbokfontein and Tumib area. For the purpose of this study only SSMS operating in the Springbokfontein and Tumib area were considered.

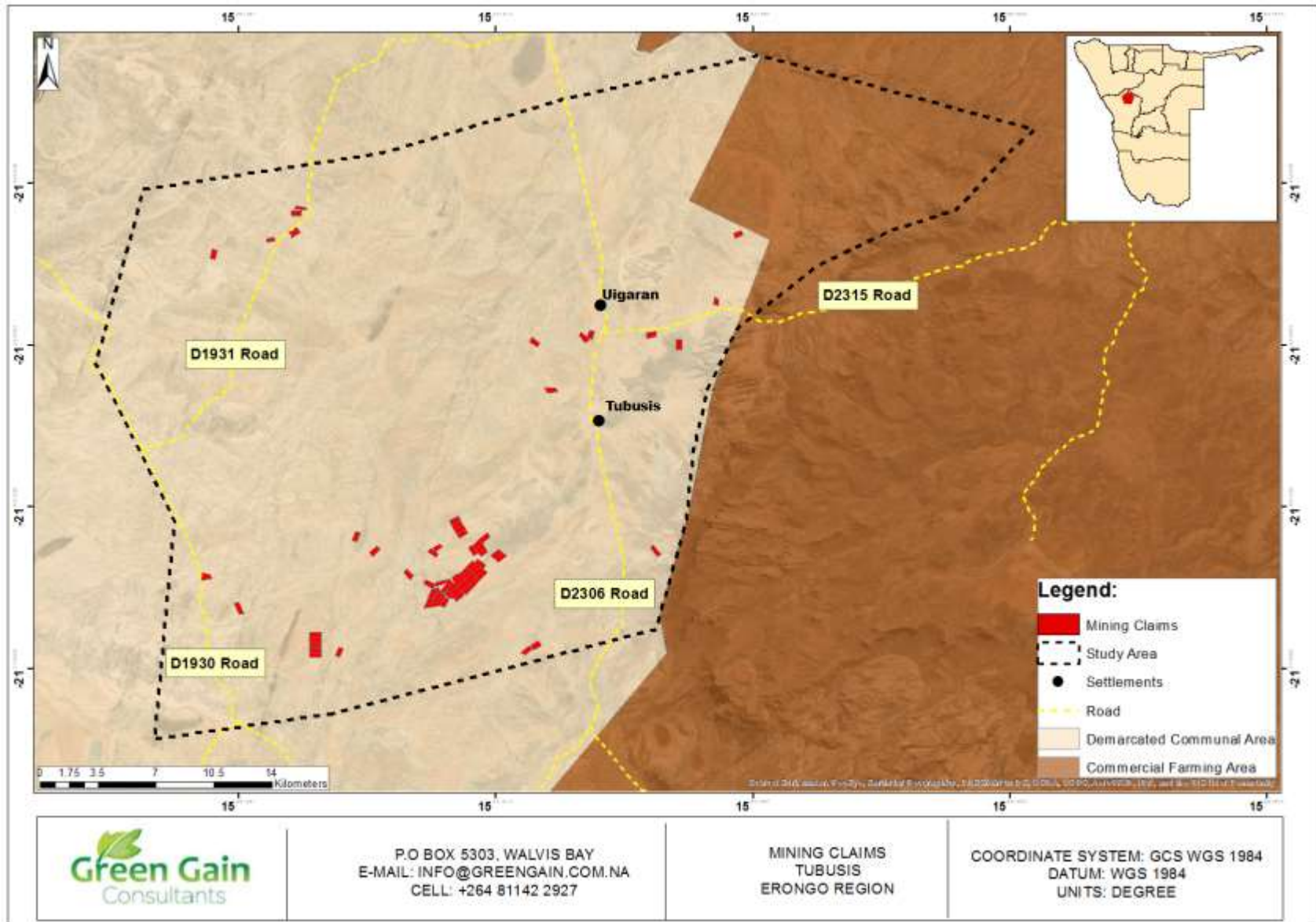


Figure 11: The study area

4.1.2 Surrounding land use patterns

Apart from small-scale mining activities, the study area is surrounded by several other existing land-uses such as settlements, agricultural, tourism and conservation. Settlements surrounding the study area include Kudubis, Tumib, Ketelbank, Tubussis/Springbokfontein, Hobatere, and !Uikrene (indicated in the map as Uigaran). The areas of Springbokfontein and Tumib are predominantly open grazing areas which supports an abundance of wildlife and domestic animals. There are also several private guest farms and tourism camping sites such as Omandumba Guest Farm and Bush Camp, Ai-Ai Rock Lodge and Hohenstein lodge just to mention a few. These are private land uses and are located on the commercial land. The Erongo Mountain Nature Sanctuary situated north-east of Farm Tubussis is the large private conservation area in the area.

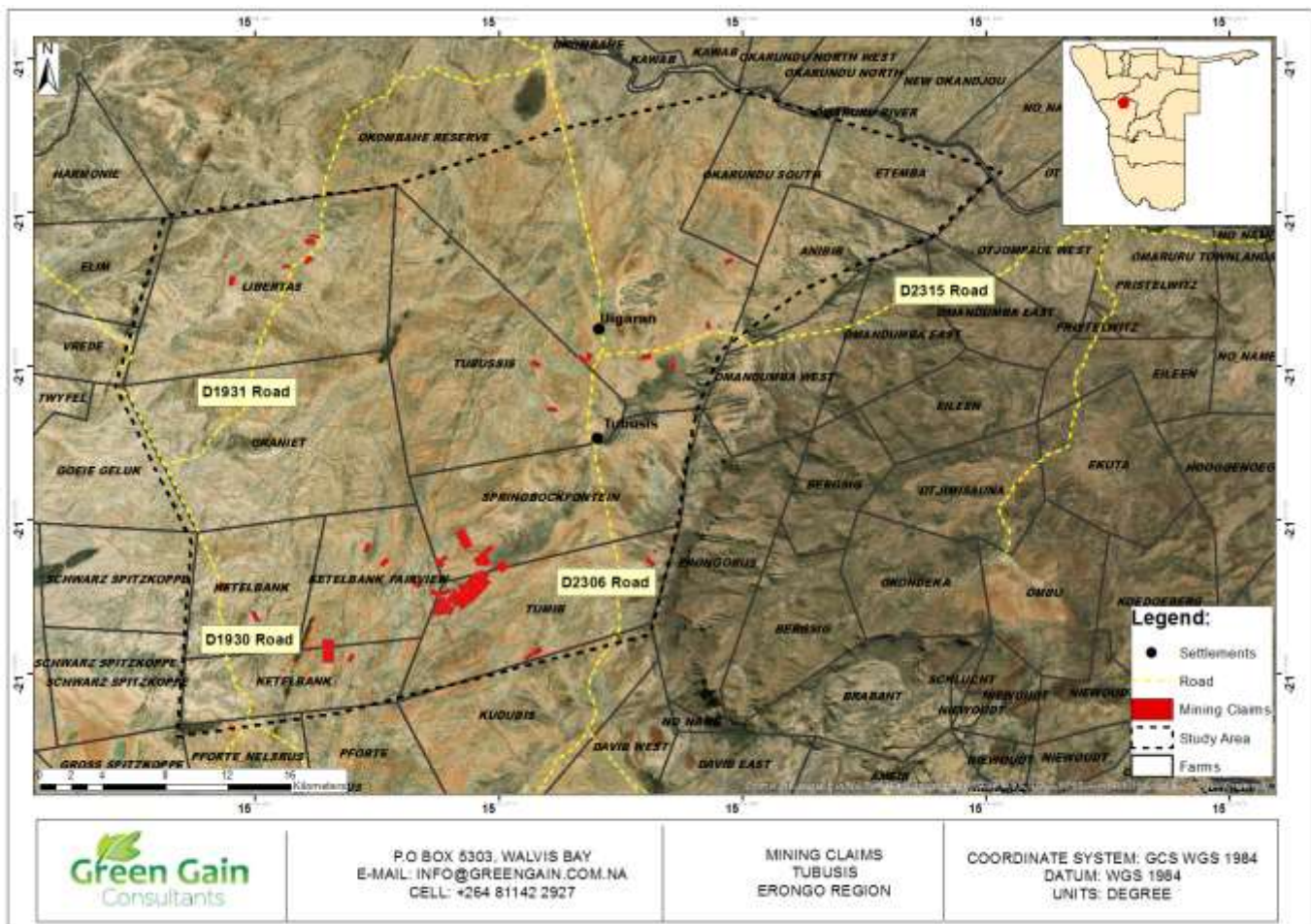


Figure 12: Land uses around the study area

The small-scale-mining activities are also within the jurisdiction of the #Gaingu Conservancy. The conservancy occupies about 7,731 km² of land and support a population of about 2,918 people. Main activities in the conservancy include, wildlife conservation, trophy hunting, tourist camping and semi-precious stone market (NACSO, 2020).

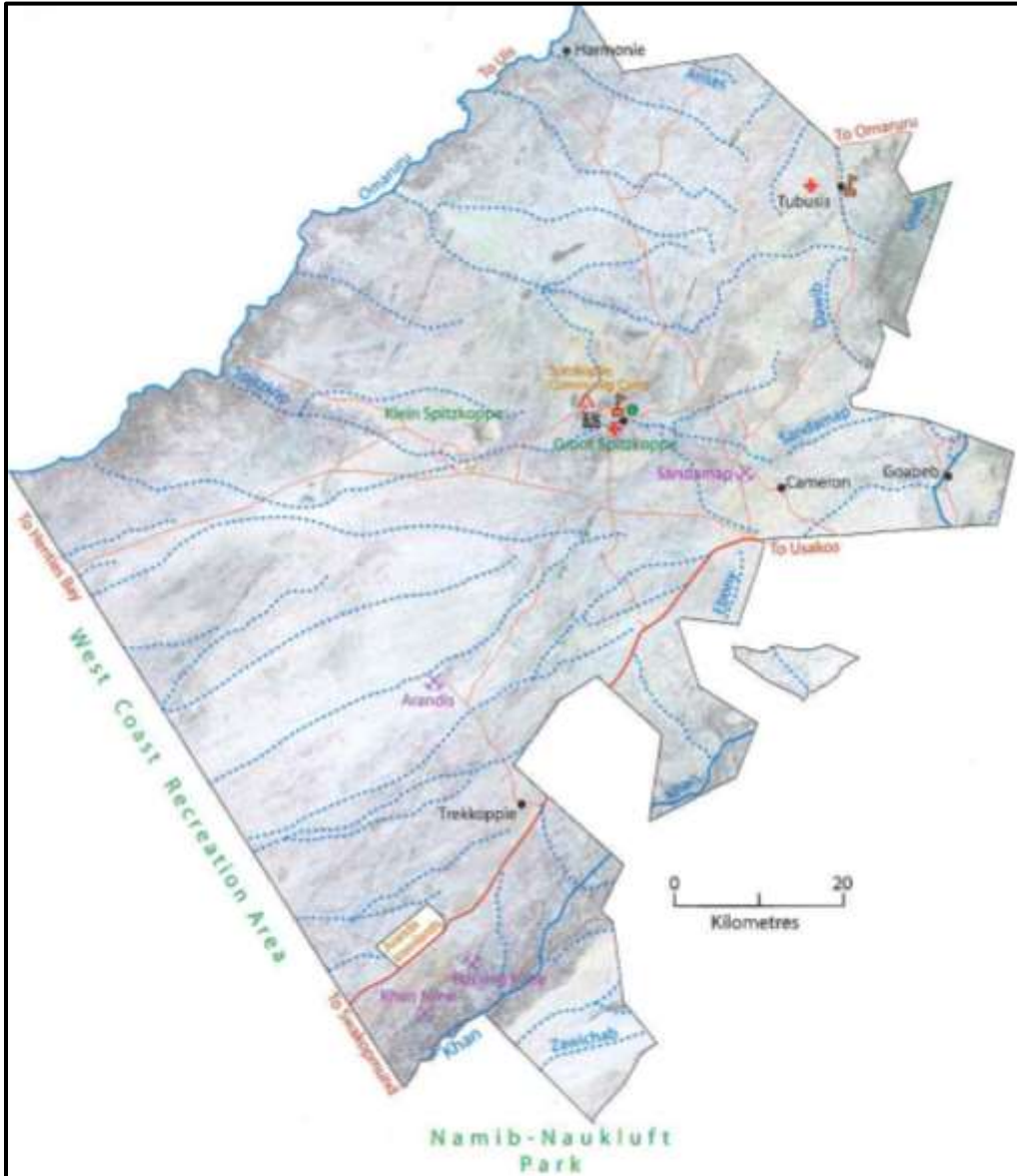


Figure 13: #Gaingu Conservancy map (Source: #Gaiingu Conservancy, 2020)

The conservancy has a Land Use Zoning map which depict different land uses zones and permitted activities (See Appendix A). The existing and future small-scale mining should be conducted in accordance with this Zoning map. To achieve this goal, all Mining Claims owners should obtain a consent letter from the Conservancy Management Committee.

4.1.3 Demographic features

The population of Dâures and Karibib Constituencies have population of 11,350 people and 13,320 people, respectively. Dâures Constituency is the largest constituency in Erongo Region covering an area of 13,490 km². According to the National Census of 2011, majority of the Erongo population are males (60%) between the ages of 15-59 years old.

4.1.4 Livelihood

The closest urban centers are Okombahe (±30km), Usakos (±50km) and Omaruru (±70km). Erongo Region is one of the most affluent regions in Namibia, with the second highest per capita income of N\$ 16819 per annum. About 80% of the population in Erongo live in urban areas while 20% live in rural areas. Majority of the rural communities in Erongo Region depend on communal subsistence livestock farming for their livelihoods. The region has the highest unemployment rate of 34% with the main source of income being wages and salaries. However, due to its arid nature, the area has very little agricultural potential. Mining is one of the biggest economic contributors in the region and it has been estimated that the small-scale mining activities alone provide employment to about 1600 and 3000 people in Erongo Region (National Planning Commission, 2010), whereas small-scale mining at Farm Tubussis is a source of livelihood to more than 100 families.

4.1.5 Development

Erongo Region has the second highest level of development and the second lowest rate of human poverty of 7.1% compared to the National poverty level of 28.7%. About 65% of the rural community of Dâures Constituency has access to fresh water, while 61% of the population has no access to toilet facilities (NSA, 2011).

Erongo region has an extensive network of tarred roads and various gravel roads which connects the region to the Transport corridors and the rest of the country. Erongo Region is connected to the well-developed national power grid through the Erongo Regional Electrical Distributor (ERONGO RED). Telecom Namibia and Mobile Telecommunication (MTC) are the main network providers in the region. However, the network coverage remains a big challenge to many remote areas in the region.

4.1.6 Health and Education

In terms of social development, there are 24 state health facilities in Erongo region which include 4 district hospitals, 4 health centers, and 18 primary health care clinics. The closest health facilities to Farm Tubussis are primary health care clinics in Okombahe and Karibib, and Omaruru district hospital. The main health concerns in the region are high prevalence of HIV/Aids and TB. HIV prevalence is high in productive age group between the ages of 30-39.

The main contributing factors to this high prevalence are flourishing of certain trades such as liquor selling, commercial sex and seasonal employment opportunities (MoHSS, 2012). The government through the MoHSS runs different programmes aimed at improving the health standards and community health education. One such interventions was the establishment of District Aids Committees to mobilize communities to curb the spread of the disease. Communities also received trainings such as senior Window of Hope, My Future is My Choice, Motivational speaking etc. In terms of education, the literacy rate in Erongo is at 82% with more than 80% those at the ages of 6 -15 attending school, while those older than ages of 15, 79 % has left school, 9% are still at school, and only 8% has never attended schools (MEAC, 2015).

4.1.7 Community vulnerability

There are no indigenous or vulnerable groups of people in Erongo Region. Some of the Ovahimba women that are found in the Uis area are believed to be origins of the south Kunene region and only comes to Uis for marketing their products and often travel back.

Due to the aridity nature of the Erongo Region, most rural communities in Erongo Region, especially those reliant on livestock and crop farming are extremely vulnerable to the impact of climate change. Hence, the communities are likely to be vulnerable to any action that may contribute to land degradation in the area.

4.2 Biophysical Environment

4.2.1 Climate and meteorology

The climate of the Tubussis area is referred to as “Pro-Namib’ which is the transition zone to the more mesic climate of central Namibia. The annual average rainfall is between 0-200mm and it occurs in late summer, between Januarys to April. Temperatures ranges from hot to very hot during the day and cooling at night due to outgoing solar radiation under typically clear skies. Wind directions are prominent southerly and south-westerly during the summer, and north-easterly during winter.

4.2.2 Topography and landscapes of the affected area

The topography of the area ranges from high, about 2559 m.a.s.l to very low, about 55 m.a.s.l. As depicted on Figure 10 below, mining areas represented by Mining Claims (in red) are concentrated on area with Moderate to low topography.

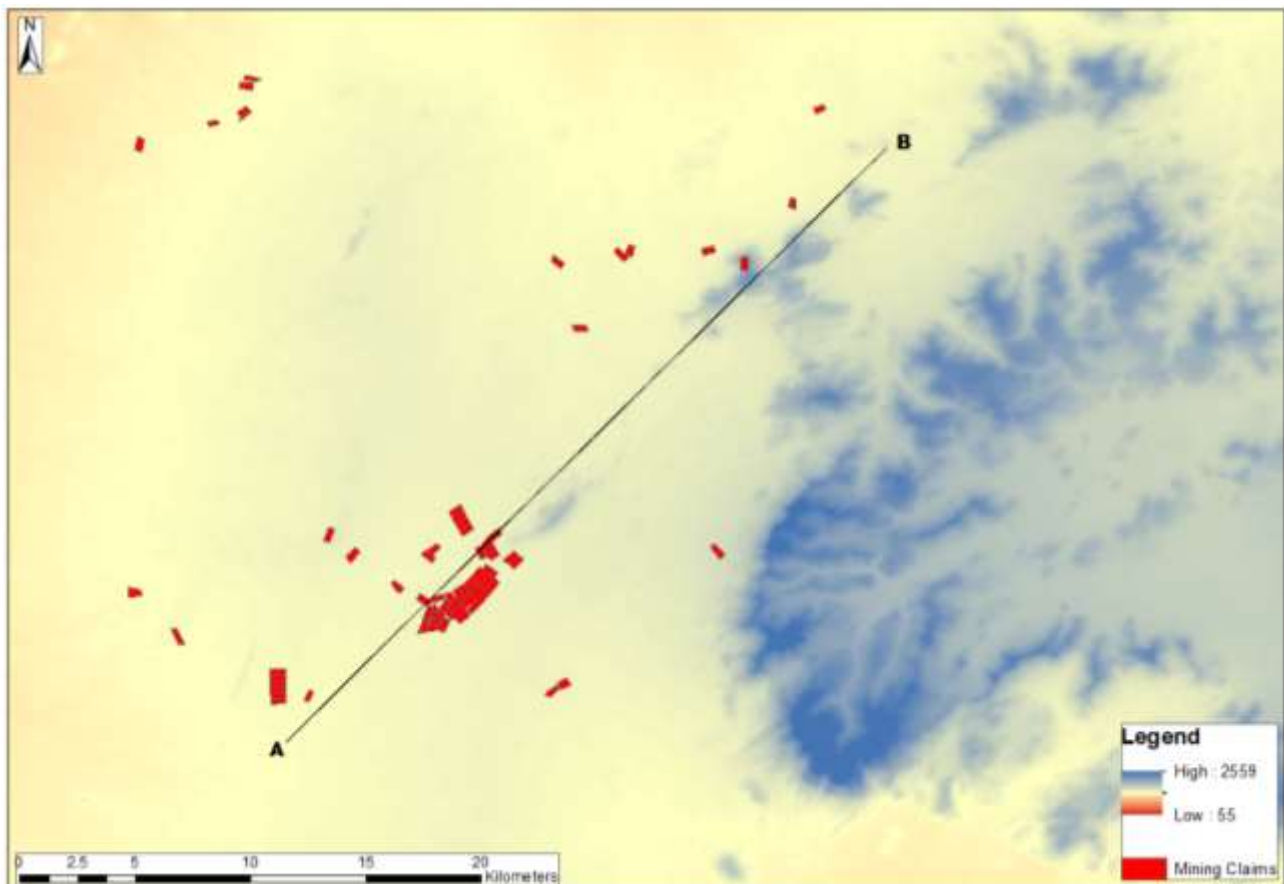


Figure 14: Topography of the area

The landscape of the mining hotspot is characterized by a central-western escarpment consisting of high granite cliffs, volcanic rocks, sandstones, and siltstones of the Triassic Lion's head formation and interspersed with peripheral and central granite intrusions. It is boarded on the south-eastern part by the inselbergs of the Erongo Mountains Complex which is one of the largest cretaceous granitic complexes in northwestern Namibia.

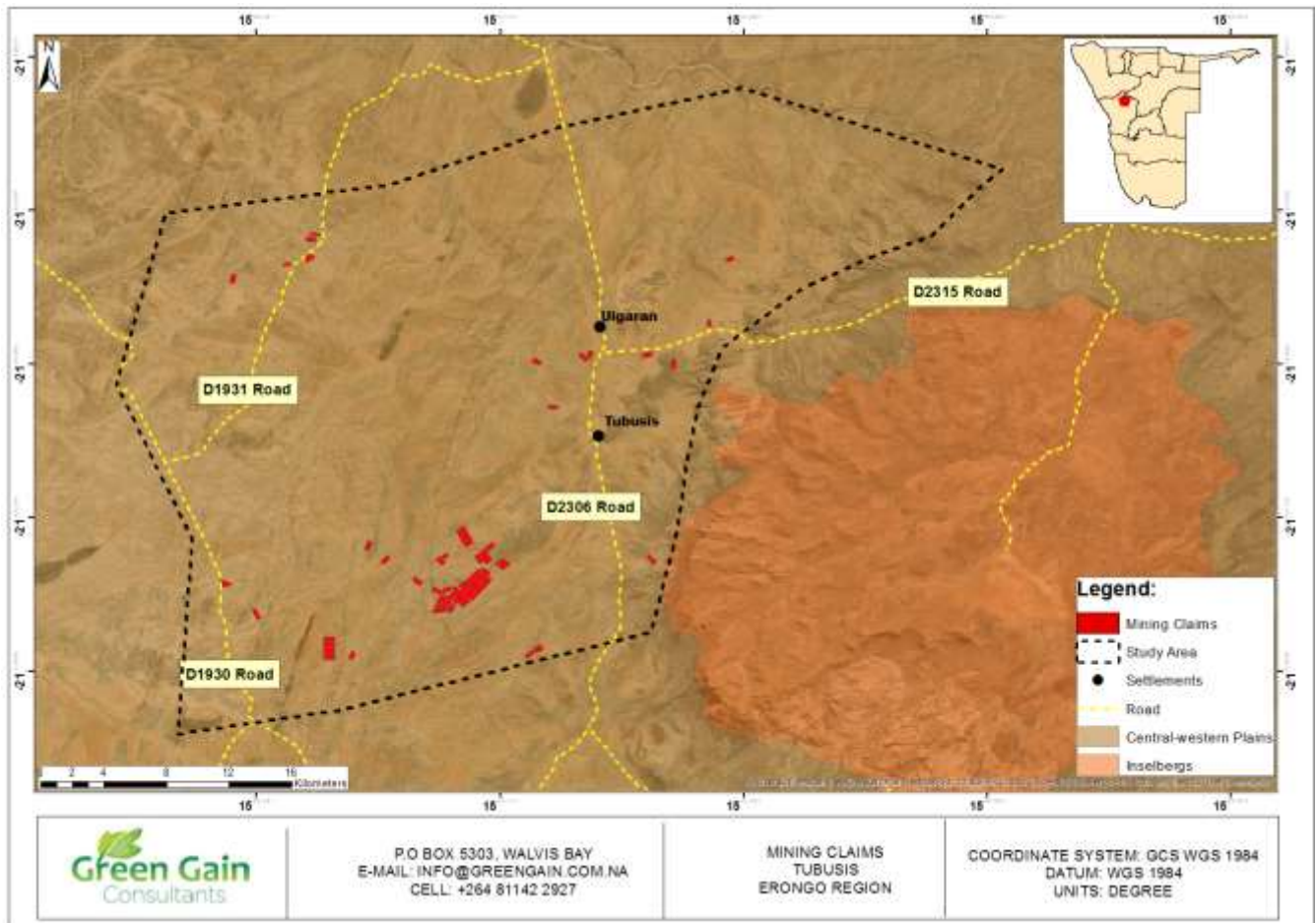


Figure 15: Landscapes of the area

4.2.3 Habitats and local flora

Most of the habitats affected by the small-scale mining activities includes open gravel plains, inselberg, Rocky ridges, inselbergs, and incised valleys. Other small habitats such as springs and caves are also indirectly affected by the small-scale miner's activities.

The vegetation of the Tubussis area is divided into main types; the Erongo mountains plains characterized by acacia mounts-ustin and the Central West plain made up of acacia reficiens in Figure 17 below.

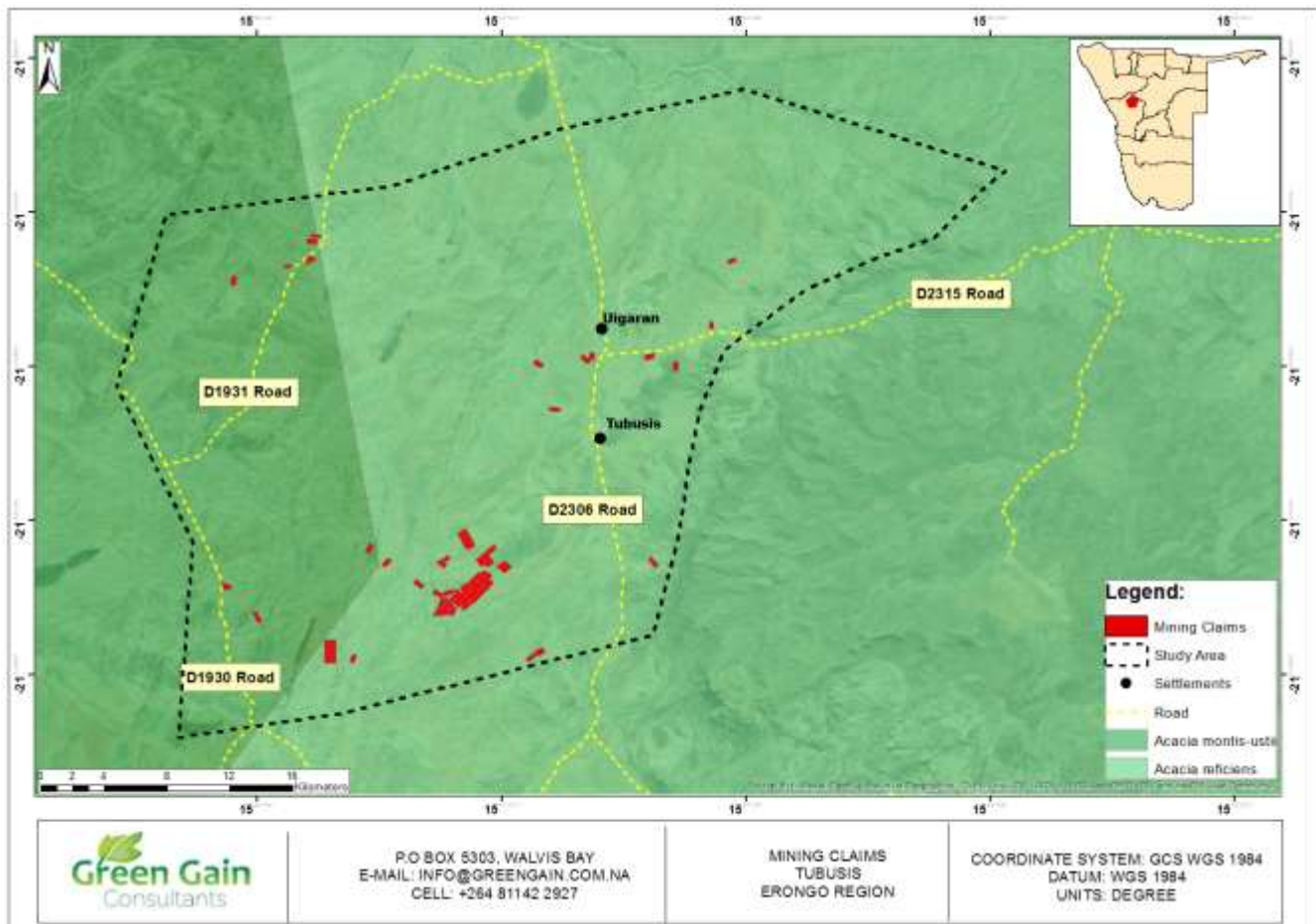


Figure 16; Vegetation distribution of the area

The vegetation of the Tumib and Springbokfontein areas are typical central western plains which are characterized by pegmatite outcrops and dry river courses. Vegetation in these areas is characterized by trees, shrubs, and bushes of common species such as *acacia*, *hibiscus*, *adenia pechuellii* as well as succulents and herbaceous grass species such *crotalaria poclolarpa*, *stipagrostis*, *panicum coloratum*. Protected species of *boscia albitrunca* and *boscia foetida* were also observed in abundance.

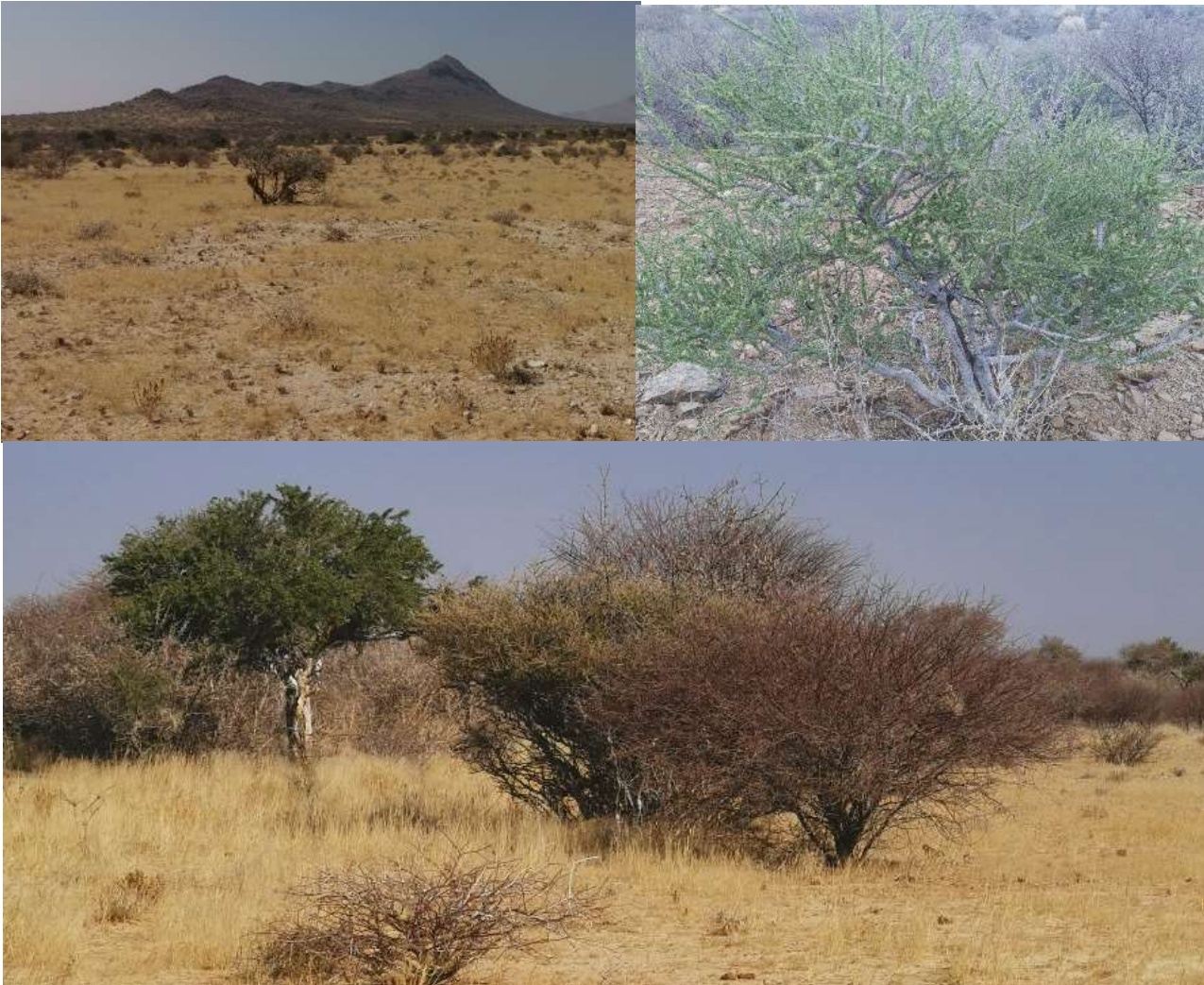


Figure 17: Vegetation of the Tumib area

A complete list of vegetation that are known to occur in the area was obtained from the Namibia Botanical Research Institute (NBRI). (See Appendix B).

4.2.4 Fauna and their habitats

The Tubussis area has very a low number of large wildlife such as *mountain zebra, kudu, Oryx, gemsbok, leopards, and klipspringer*. Local fauna may also include large and small mammals such as *monkey, rodents, shrews, hares and bats* as well as a host of reptiles *i.e. snakes, lizards, geckos*, and high endemism of invertebrates like *scorpions, spiders, solifuges, arachnids* and high diversity of non-wetland birds most which are considered vulnerable.

Most these animals prefer mountainous, rocky, hill, caves, and other remote habitats. Hence, the impacts of small-scale mining activities are likely to pose minimal risks to the occurrence of this species, provided that the activities are limited to open landscapes and minimum disturbance is ensured. Small-scale mining activities that could pose threat to these wild faunas are hunting, trapping, poaching and fire.

Being a communal area, Tubussis is home to large number of domestic animals mainly Donkeys, Cattle, Sheep and Goats. Most of these are looked after by owners and are kept in kraals during the night. The interaction between domestic animals and small-scale mining activities are mostly concentrated on the grazing, browsing fields and water point.



Figure 18; Common fauna of the area

4.2.5 Conservation priorities

a). Protected Species

Generally, all harvesting of trees and wood, anywhere in Namibia should be subjected to harvesting Permit. Moreover, certain plant species are protected under the National Forestry Act (2001) and Regulations (2015). Below is a list of protected species that were observed and/or are known to occur in the study area.

Table 6: List of Protected species in the area

English name/Local name	Scientific name	Occurrence
Plate thorn	<i>Acacia Fleckii</i>	
Kalahari pond acacia	<i>Acacia hebeclada</i>	
Omuama/Omupopo	<i>Albizia anthelmintica</i>	Open plains
Shepherd tree	<i>Boscia Albitrunca</i>	Open plains
Stinky-shepherd tree	<i>Boscia Foetida</i>	Open plains
Mopane/Omusati	<i>Colophospermum mopane</i>	Open plains
Red bush willow	<i>Combretum apiculatum</i>	Valleys
Russel bushwillow	<i>Combretum hereoense</i>	Valleys
Leadwood/omumburombonga/Omukuku	<i>Combretum Imberbe</i>	Valleys
Variable combretum	<i>Combretum collinum</i>	Valleys
Sand commiphora	<i>Commiphora Angolensis</i>	Valleys
Corkwood/Omukange	<i>Commiphora glandulosa</i>	Valleys
Three thorn/Driedoring/okatakambindu	<i>Rhigozum Brevispinum</i>	Open plains
Sesame bush	<i>Sesamothamnus Guerichii</i>	
Clusterleaf/Omugolo	<i>Terminalia sericea</i>	Open plan
Wild syringa	<i>Burkea africana</i>	
African teak	<i>Baikiaea Plurijuga</i>	
Sicklebush	<i>Dichrostachys cinerea</i>	
Lance pond	<i>Lonchocarpus nelsii</i>	

Sources: Forestry and Environmental Authorizations Process for Bush Harvesting projects; NBRI, 2020)

b). Species of IUCN importance

The International Union for Conservation of Nature (IUCN) Red List of Threatened Species (also known as the IUCN Red List or Red Data List), is the world's most comprehensive inventory of the global conservation status of biological species. The list uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. The aim is to convey the urgency of conservation issues to the public and policy makers, as well as help the international community to try to reduce species extinction.

The IUCN Red List threat categories are as follows:

- *Extinct or Extinct in the Wild*
- *Critically Endangered, Endangered and Vulnerable*: species threatened with global extinction.
- *Near Threatened*: species close to the threatened thresholds or that would be threatened without ongoing conservation measures.
- *Least Concern*: species evaluated with a lower risk of extinction.
- *Data Deficient*: no assessment because of insufficient data

The central Namib in which the study area exist is home to several species listed under the IUCN list.

Table 7: Local species found on IUCN Red List

Scientific name/s	Local name/s	Habitats	IUCN category
<i>Equus zebra hartmannae</i>	Mountain Zebra	Rocky slopes	Endangered
<i>Laephotis namibensis</i>	Namib Long eared Bat	Caves	Least concern
<i>Acinonyx jubatus</i>	Cheetah	Commercial farmland	Vulnerable
<i>Felis lybica</i>	African Wild Cat	Rocky areas	Vulnerable
<i>Vulpes chama</i>	Cape Fox	Woodland	Vulnerable
<i>Otocyon megalotis</i>	Bat-eared Fox	Woodland	Vulnerable
<i>Polemaetus bellicosus</i>	Martial Eagle	Large trees in riverbeds	Endangered
<i>Bufo capensis</i>	Cape Eagle-Owl	River valleys	Near Threatened
<i>Aquila verreauxii</i>	Verreaux's (Black) Eagle	Mountains	Near Threatened
<i>Falco peregrinus</i>	Peregrine Falcon	Cliff	Near Threatened

Sources: Namibia Biodiversity Database and Red data book

4.2.6 Water resource management

➤ Surface water availability

The availability of surface water resources is very limited and mainly occur through surface water runoff during rainy season.

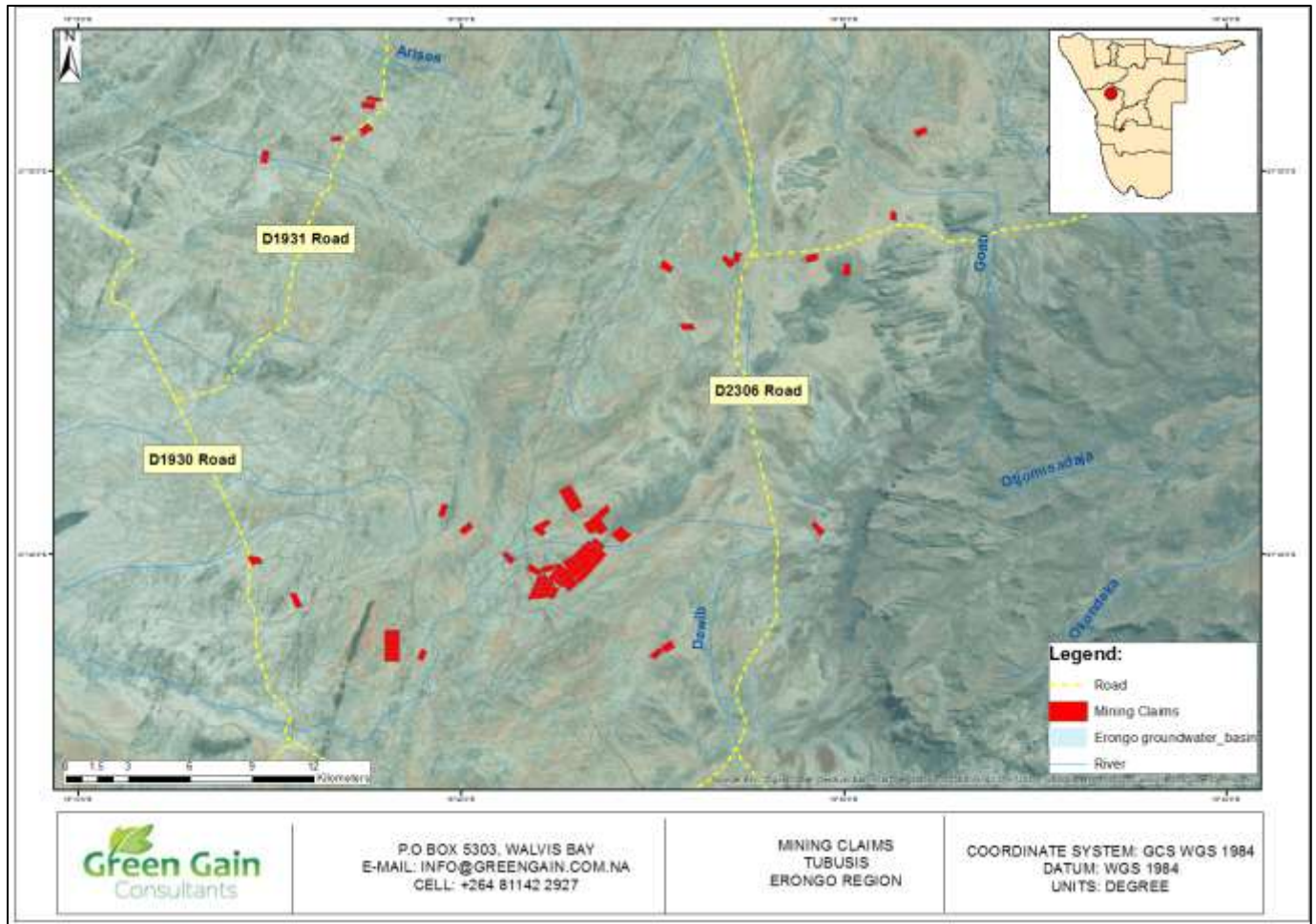


Figure 19: Surface water availability of Tubussis area

❖ Hydro-geological setting

The aquifer of the area is of aquitard and aquiclude type. The aquifer potential is generally low to locally moderate. Aquifer recharge occurs at certain fractures and faults within the river streams.

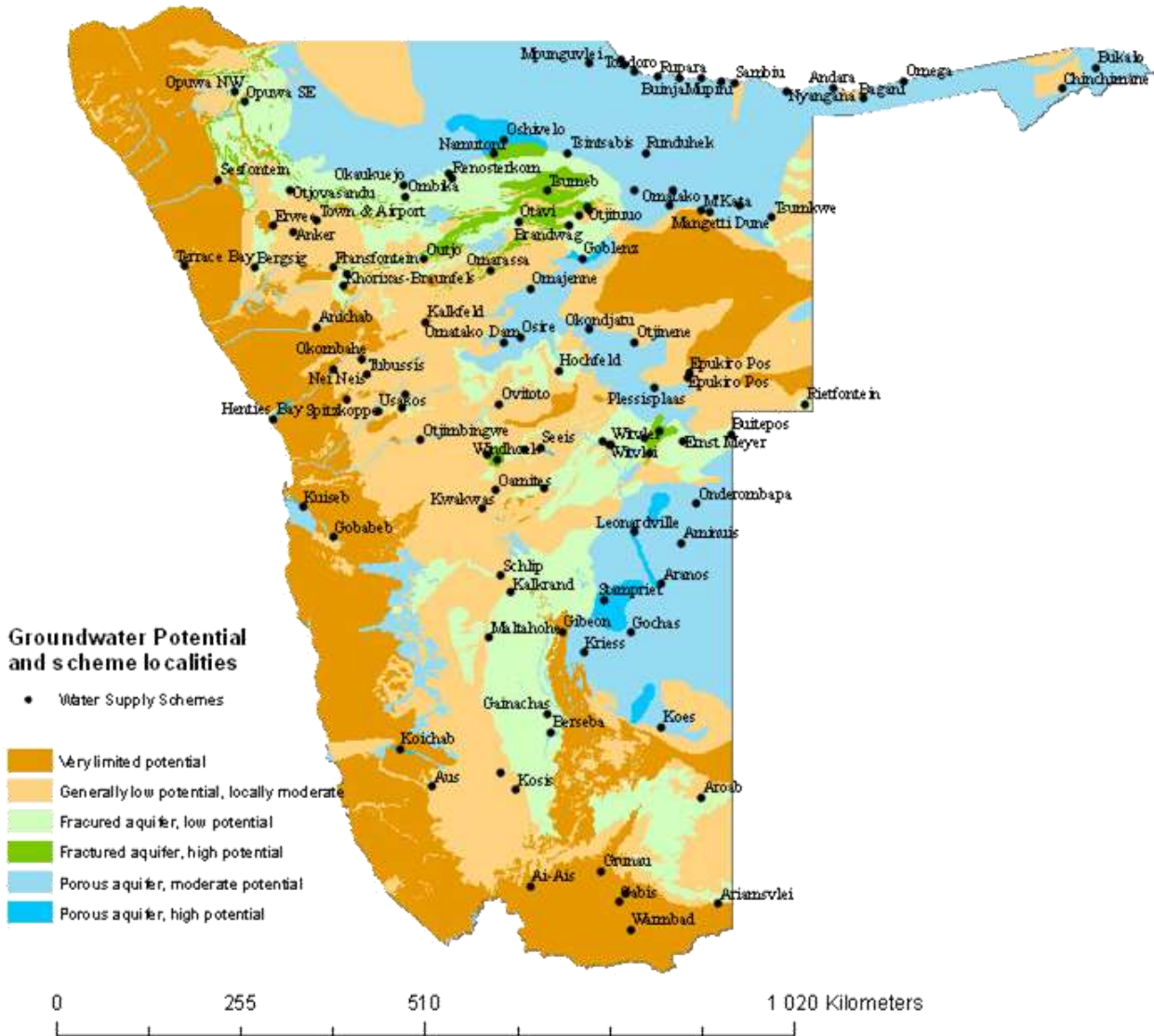


Figure 20; Groundwater map of Namibia (Source: MAWLR, 2020)

➤ Groundwater potential

Groundwater potential in the Tubussis area ranges from little or no water (pale blue color) to moderately productive aquifer (sky-blue color) Figure18. Abstraction of groundwater is mainly through boreholes and wells.

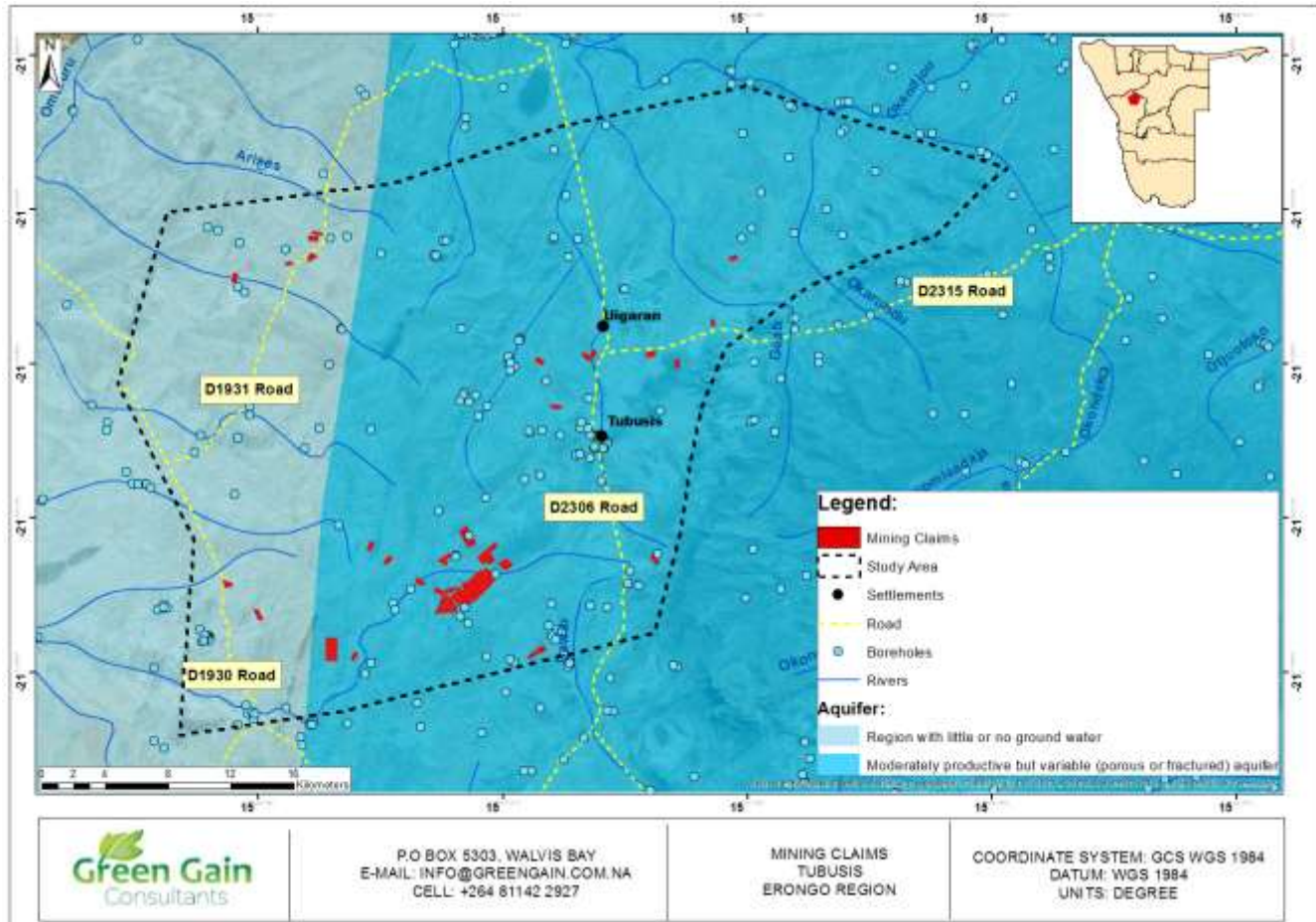


Figure 21: Groundwater potential in the area

As depicted in Figure 23 above, the abstraction of groundwater in the area has reached an unprecedented rate as boreholes can be found everywhere including in areas with little or no groundwater. The uncontrolled abstraction of groundwater will lead to the decline in the water quality and subsequent degradation of the local aquifer.

❖ Integrated water resource management

Water resources management 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. Tubussis area is in the Omaruru - Swakop River Basin.

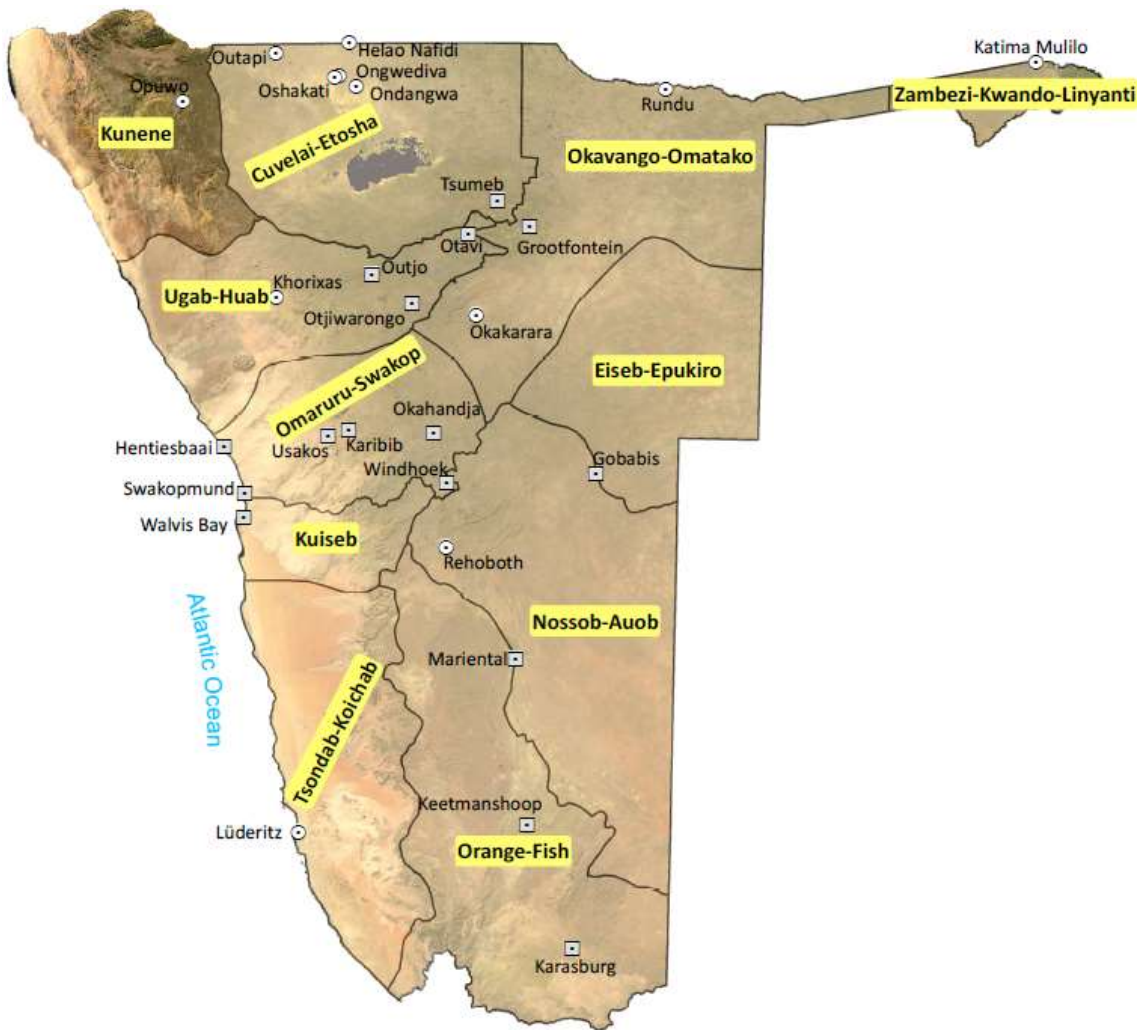


Figure 22; Hydro-geological regions of Namibia (Source: Central Bureau of Statistics, 2010)

The Omaruru River Basin supports a diverse blend of agricultural activities, urban and rural settlements, vegetation and wildlife, about 98% of the catchment is defined as agricultural and 2% as recreational. Groundwater recharge is normally from rainfall and runoff seeping into the aquifer. The WRMA, 2004 provides for the establishment of Basin Management Committees (BMC) which are tasked with reasonability of to provide scope for addressing various issues affecting water resources in the basin, ranging from efficient water use to monitoring the health of the basin.

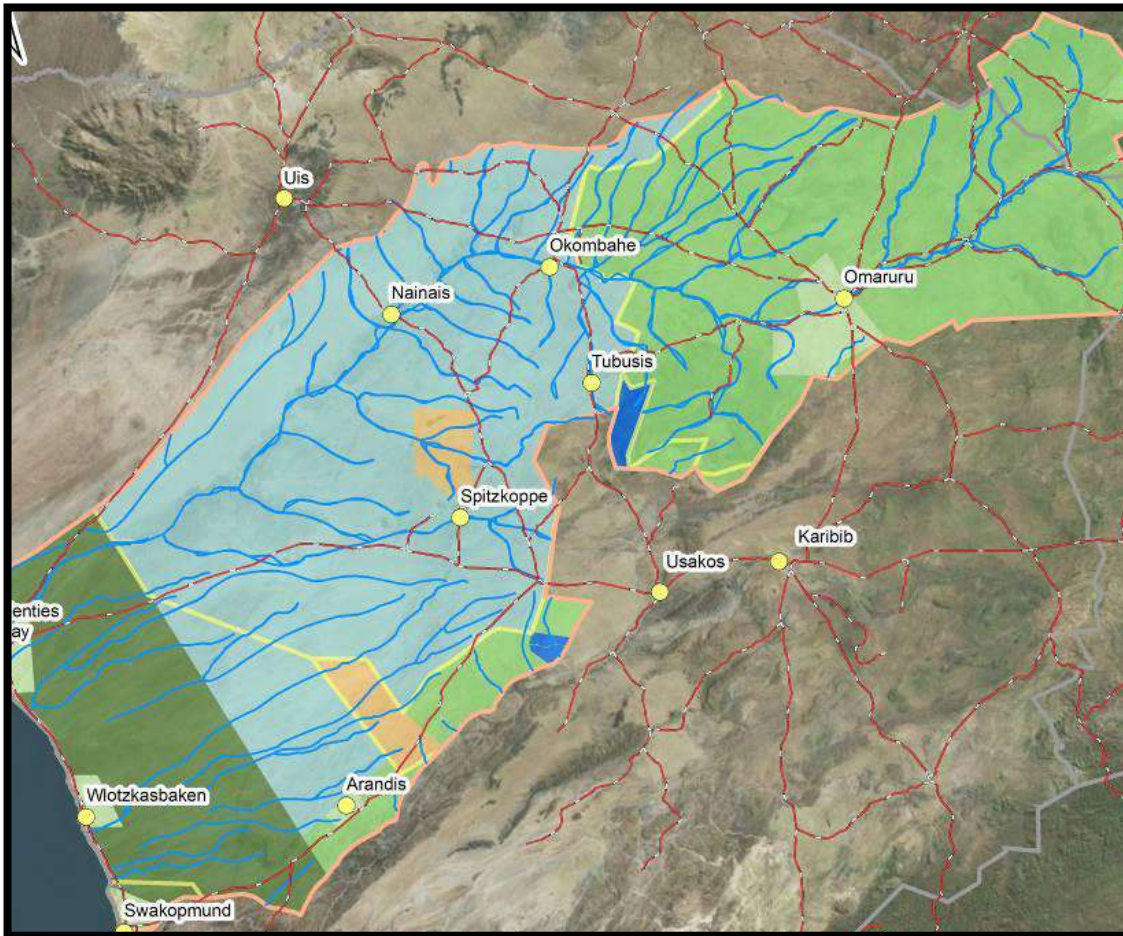


Figure 23 Omaruru-Swakop River Basin (Source: MAWLR, 2020)

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). On the other hand, the Namibia Water Cooperation (NamWater) is responsible for bulk water supply from primary water sources (dams, aquifers, rivers etc.) to the community. Private consumers (commercial farmers, mines, tourism operators etc.) have private boreholes for water abstraction.

4.2.7 Soils

The local occurring soil is mostly outric regosoils and petric calcisoils which are generally thin and poorly developed. These however, still have limited potential for agricultural production since they are often calcareous and saline. According to Jacobson et al, (1995)., the alluvial and colluvial deposits are generally responsible for the thickest and most fertile soils in the region.

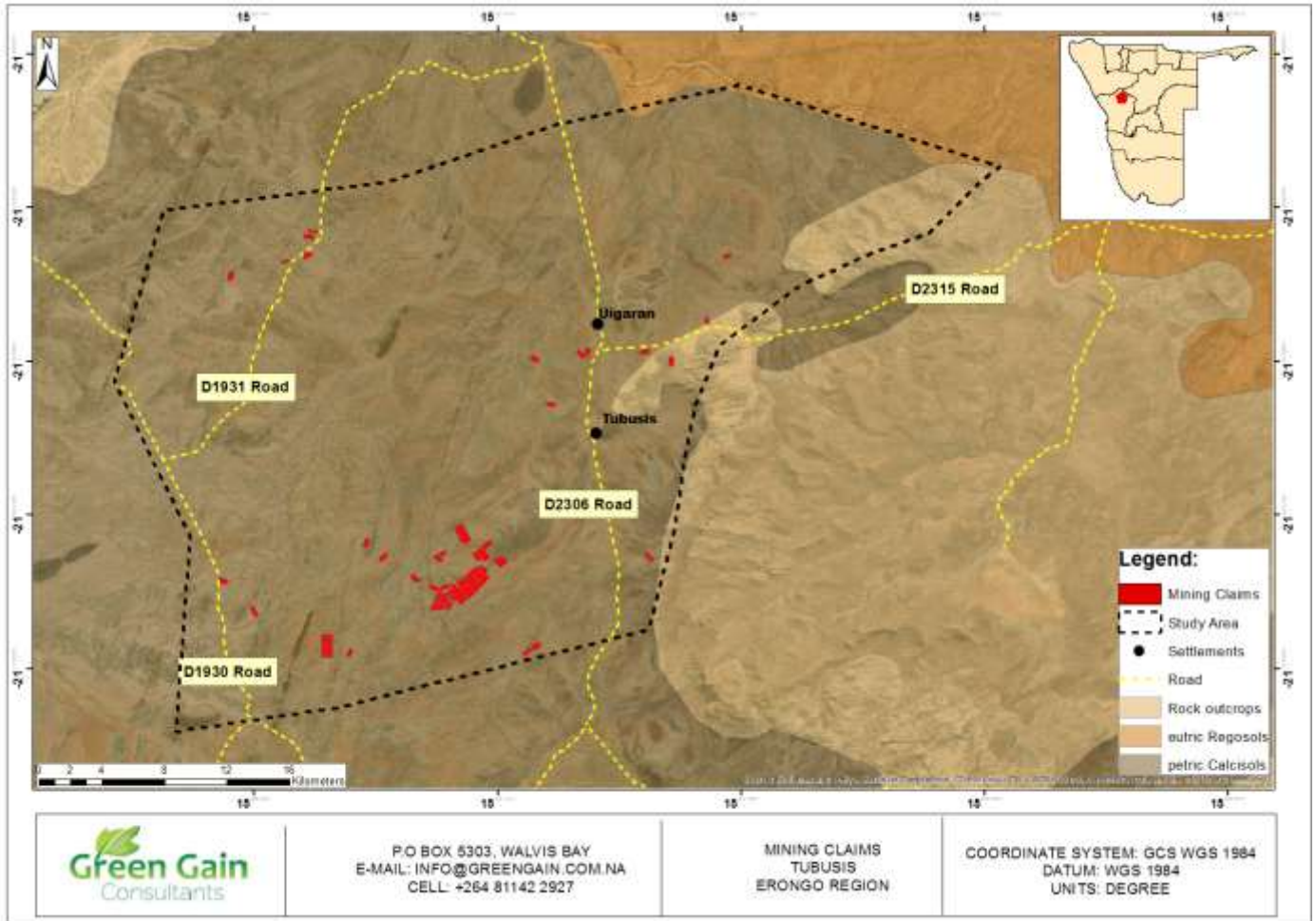


Figure 24: Soils of the area

4.2.8 Geology

The Tubussis area is surrounded by the high Erongo granite cliffs of the well-known Erongo Mountains Complex as well as the central granite intrusions made up of volcanic rocks, sandstones, and siltstones of the Triassic Lion's Head Formation. Small-scale mining activities are concentrated on the mineralized groups consisting of *mica schist*, *minor quartzite*, *graphic schist*, *marble* and *post-tectonic granite*, *granodiorite*, *monzonite*, and *pegmatite* (Figure 27 below).

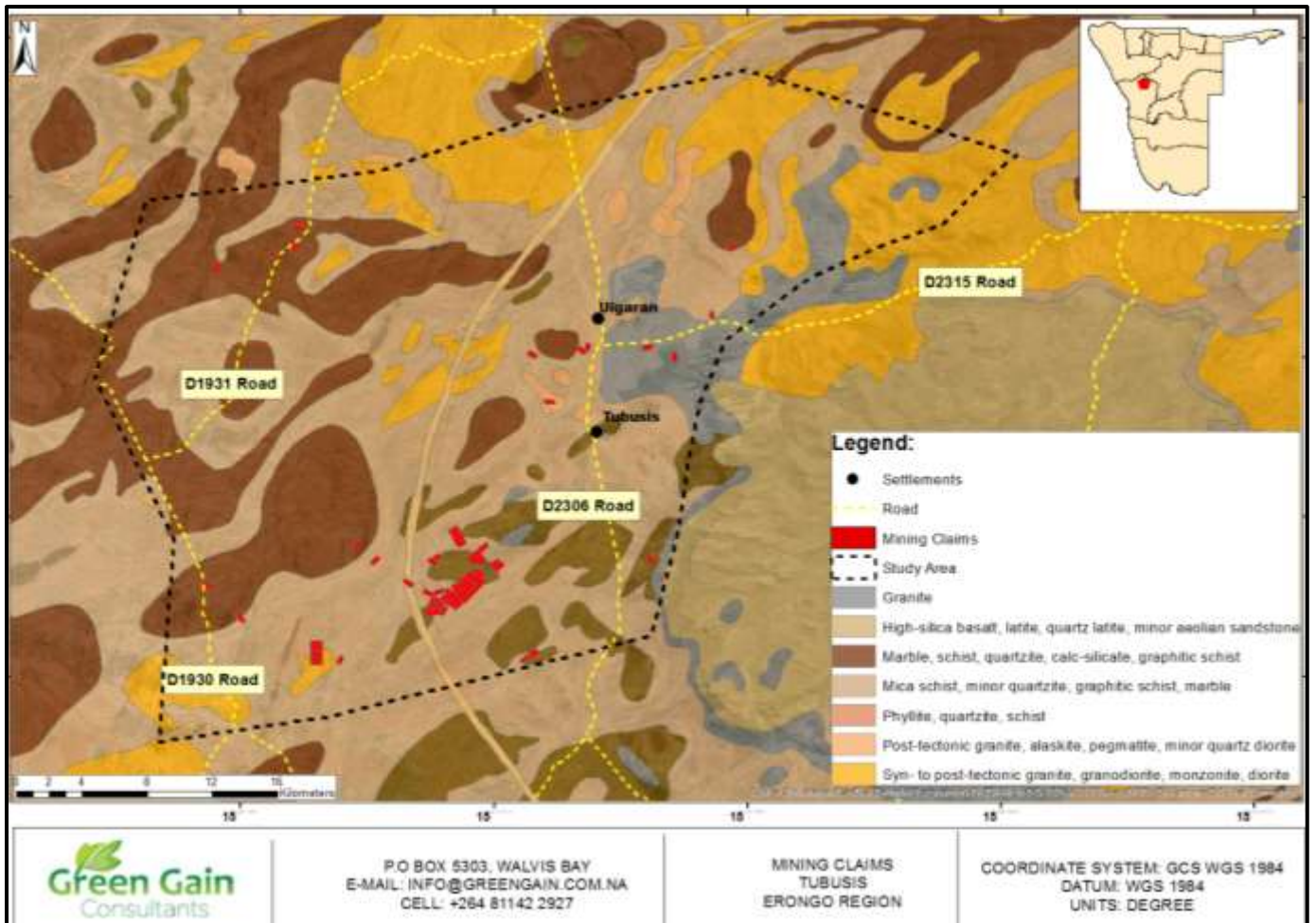


Figure 25: Local geology

4.2.9 Archeology

Two sites of archeological importance have been identified in the study. These areas mainly consist of Rock painting or Rock Arts and are found in private farms. According to the local community there are other places with Rock painting in the area, however these have not been marked or recognized by the National Heritage Council (NHC, 2020).

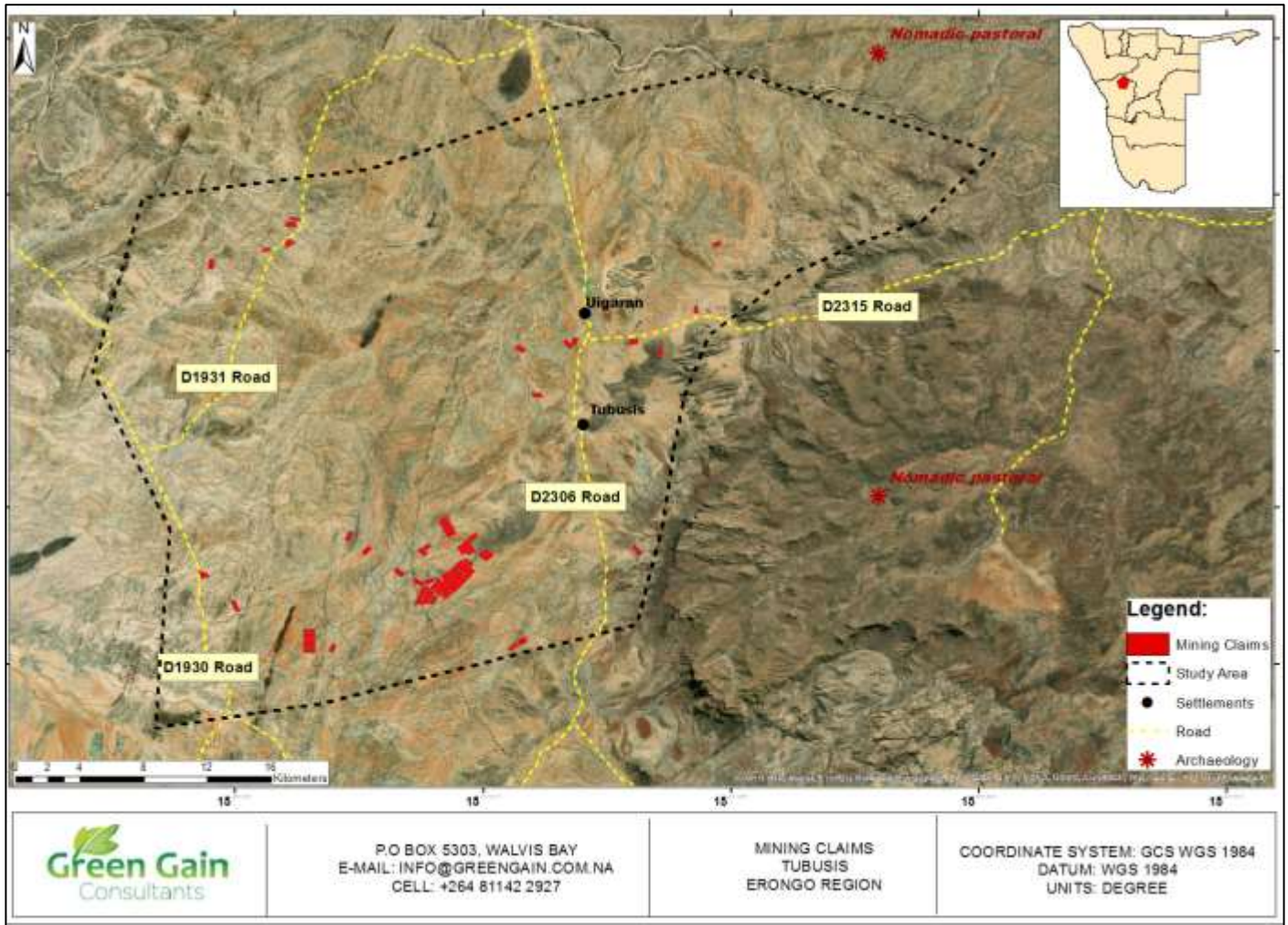


Figure 26: Site of Archeological importance in the area

5. LEGISLATIVE FRAMEWORK

5.1 Environmental Management Requirements

The Environmental Management Act (EMA) 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 small-scale mining activities triggers activities listed under the EMA Regulations of 2012, as follows.

- **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 Applicable National legislation

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 small-scale mining activities.

Table 8: Applicable National Legislation

Legislations	Provisions applicable to Small-Scale mining 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(l) 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 in particular.</i>	GRN
Environmental Management Act (Act No.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 (MEFT)
National Forestry Act, 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</i>	Ministry of Environment, Forestry and Tourism (MEFT)

	<p><i>that tree species and any vegetation within 100m from a watercourse may not be 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, 2015	<p>Section 119 of this Act prohibits the existence of a nuisance on any land owned or occupied by SSMs. 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 (MoHSS)
Minerals (Prospecting and Mining) Act 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>	Ministry of Mines and Energy (MME)

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 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 sale 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 the 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.

	<p>(c) to obtain a supply of water or any other substance in connection with such operations.</p> <p>(d) to dispose of water or any other substance obtained during such operations.</p> <p>(e) To do anything else in order to exercise any right conferred upon him or her by such licence or mining claim.</p>	
Communal Land Act, of 2015	<p>To provide for the granting of occupational land rights in respect of portions of communal land to institutions providing public services; and to provide for incidental matters. The Act gives power to Traditional Authorities to handle all land occupation and customary rights under the communal land.</p> <p>SSMs shall obtain Consent Letters from Traditional Authority prior to pegging and registering any claim. Further, a leasehold should be applied for those wish to erect temporary or permanent residential properties.</p> <p>In terms of Section 31. (l) An application for a right of leasehold in respect of communal land must be made in the prescribed manner to the board in whose area the land in question is situated.</p> <p>(2) A right of leasehold may not be granted in respect of a portion of land which another person holds under a customary land right, unless such person agrees to relinquish his or her right in respect of the land, subject to the payment of compensation as agreed to by such person and suitable arrangements for his or her resettlement on alternative land.</p> <p>Section 17B provides Restriction on right of access of foreign national to customary land right or right to leasehold and Section 18 Prohibition against fences.</p>	Ministry of Agriculture, Water and Land Reform
Traditional Authorities Act 25 of 2000	<p>The Act establishes the legal framework for the recognition of Traditional Authorities. It allows for a community to designate one person to be their Traditional Authority (in accordance with customary law), who must then be approved by the Minister responsible for Regional and Local Government.</p>	Ministry of Urban and Rural Development (MURD)
Draft Waste Management Bill	<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>	Ministry of Environment, Forestry and Tourism (MEFT)

<p>Atmospheric Pollution Prevention Ordinance no. 11 of 1976</p>	<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 SSMS 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>	<p>Ministry of Environment, Forestry and Tourism (MEFT)</p>
<p>Soil conservation Act 76, 1969</p>	<p>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.</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. SSMS 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</p>	<p>Ministry of Agriculture, Water and Land Reform</p>

	when rehabilitation of the area is conducted after mining has been completed.	
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 SSM 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 (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 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</p>	Ministry of Agriculture, Water and Land Reform

	<p>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, SSMs, 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.</p> <p>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 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 applies, 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 with regard to any replacement or installation</p>	<p>Ministry of Mines and Energy</p>

	<p>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. Small-scale miners 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 are 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 in the Brandberg Heritage site is 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
National Labour Act (No 11 of 2007)	<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’ organization; to regulate</p>	Ministry of Labour and Employment Creation

	<p>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 work-place, including a mine, or if an employee dies, or suffers a serious injury as a result 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>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.</p> <p>All employment issues should be handled in accordance with relevant Sections of the National 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.</p> <p>Human Wildlife Conflict occurs throughout Namibia on communal as well as freehold land and involves a variety of species. The main problems occur on</p>	Ministry of Environment Forestry and Tourism

	<p>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>	
Nature Conservation Act (No.05 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> <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>	Ministry of Safety and Security

	<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 No. 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></p> <p>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 sub-section (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> (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.</p> <p>Of relevance to the Small-scale mining activities is Section 4: Possession of and dealing with controlled wildlife products.</p> <p>(1) Any person who - (a) possesses any controlled wildlife product the possession of which is unlawful in terms of Schedule 1. (b) deals in any controlled wildlife product if the dealing therein is unlawful in terms of Schedule 1. (c) manufactures anything from a controlled wildlife product if such manufacture is unlawful in terms of Schedule 1.</p> <p>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). 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>Ministry of Environment, Forestry and Tourism</p>

5.3 Legislation of international significance

a) 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 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.

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, taking into account all rights over those resources and to technologies, and by appropriate funding.

SSMs should therefore prevent the unnecessary removal of any species prior and during the operational phase. 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. 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

In this chapter, a summary of the potential impacts associated with the SSMs activities are presented, together with suggested mitigation measures required to ensure impacts are managed effectively. Within the accepted broad definition of the term “environment” that applies to EIAs, it is required to assess potential impacts on both socio-economic and Biophysical settings.

Table 9: Assessment Criteria

CRITERIA	DESCRIPTION			
EXTENT	National (4) The whole country	Regional (3) Erongo 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 construction 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 construction 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 10: Color coding meaning

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.
Medium 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 – i.e. should the project not proceed. Therefore, not all negative impacts are equally significant.	
<p>Significance Rating Scale</p> <p>Points 1-4 Insignificant/low Points 5-8 Significant /Moderate Points 9-12 Very significant/High Points 13-16 Highly significant /Very high</p>	

6.2 Anticipated Biophysical impacts

Below are possible negative impacts of the SSMs activities on the biophysical environment. The significance of each impact has been rated under each small-scale mining method used at Farm Tubussis. 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 loss or destruction

The Tubussis area is characterized by an abundance of protected plant species and the Erongo Mountains is home to species which are endemic to the area. Small-scale mining activities pose serious negative impacts to the local flora through vegetation clearance, trampling, dust generation, soil disturbance and veld fire.

Mitigation measures

Only plants that are directly affected by the mining activities may be cleared. Areas with abundance of protected flora must be avoided. SSMs should also by all means reduce the excessive dust generation and vegetation trampling and keep fire under control. Excavations should be backfilled with the original topsoil as far as possible. Encourage the revegetation of the area with indigenous plants species.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	3	1	1	6	4
Semi-mechanized		2	4	4	4	14	12

➤ Loss or reduction of local fauna

Most of the impacts on the local fauna can occur because of fragmentation of natural habitats i.e., hillside, caves, valleys etc. Animals are also risk of falling in the un-rehabilitated excavations and disturbance through generation of excessive dust, noise, and vibration. Surface disturbance of grazing land will also reduce the availability of fodder to the greater extent while the un-controlled movement of people, especially in wildlife core habitats will result into human-wildlife conflicts.

Mitigation measures

The impacts on the local fauna can be avoided through minimizing the fragmentations of sensitive habitats such as core wildlife zones or potential grazing areas. Poaching of both small and large wildlife is prohibited and is a punishable by law. No mining activities should take place within the proximity of waterholes (wildlife drinking spots). Only use existing and designated access roads and abide to a minimum driving speed of 40km/hr., within the conservancy zone. The possession of and dealing with controlled wildlife products is prohibited under the Controlled Wildlife Products and Trade Act 9 of 2008.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	1	2	2	6	4
Semi-mechanized		1	3	2	2	8	6

➤ **Destruction of topography, landscape, and drainage**

The area of Tubussis is made up of different landscapes and varying rugged granite outcrops standing out of the arid plains. One such important landscapes is the Mount Erongo which a well-known and often photographed landmark which attracts a number of tourists in the area Uncontrolled mining activities, especially by semi-mechanized methods have potential to cause surface disturbances of the natural landscapes, reduce the aesthetic view thus, degrading the sense of the place.

Mitigation measures

Important local viewpoints and landscape features should be identified and protected from mining activities. Large scale blasting should not be allowed in the Erongo Mountains complex and other important viewpoints. Waste matrix should be properly and carefully disposed of and where possible excavations caused by the mining activities should be backfilled with waste rocks.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	3	2	2	8	6
Semi-mechanized		2	4	4	3	13	11

➤ **Ecological degradation and habitat fragmentation**

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. Small-scale 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. Habitats affected by the SSMs activities are open gravel plains, inselberg, Rocky ridges, and incised valleys.

Mitigation measures

Sensitive areas such as incised valleys, caves, fountains, and areas with abundance of protected vegetation species should be avoided and designated as “No-go-zone areas”. SSMs should also reduce their ecological footprint by minimizing disturbances and sustainable utilization of natural resources such as water, wood etc.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	1	2	1	5	3
Semi-mechanized		3	4	3	3	13	11

➤ **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 is the possible contamination from spillage, leakages, and direct discharge of pollutant in the soil.

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.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	1	1	1	4	2
Semi-mechanized		1	3	3	3	10	8

➤ **Disturbance of geology**

Most of the small-scale mining activities are based on traditional and limited indigenous knowledge. As such, mining activities are likely to cause unintended disturbances to the local geology and geomorphology.

Mitigation measures

SSMs should seek technical support i.e. geo-data, maps etc. from the Geological Society of Namibia or from local geologists. This will help them to make informed decision when conducting their explorations and mining activities.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
<i>Artisanal</i>	Negative	1	1	2	1	5	3
<i>Semi-mechanized</i>		3	4	3	3	13	11

➤ **Water resources pollution and increased demand**

Due to the limited availability of freshwater in the area, the presence of SSMs in the area has already put immense pressure on the available water resources. The situation is likely to become untenable should the number of SSMs in the area increase.

Moreover, disturbance of surface drainage and pollution of surface water runoffs may occur as a result of mining in drainage, valleys or waterways.

Mitigation measures

Although SSMs activities do not necessarily use fresh water in their mining operations, domestic use of water should be closely monitored by keeping records of monthly water usage. Water should also be used sparingly and when necessary recycled for other least essential activities i.e. dust suppression. SSMs who intend to drill borehole(s) in the area should obtain an Abstraction Permit from the Directorate of Water Supply and Sanitation Coordination (DWSSC).

Moreover, the targeted mineral deposits are not necessarily found in riverbeds or waterways, hence, the impact on the surface drainage by small-scale mining activities is unlikely. However, waste rocks and overburdens from excavations should not be placed within the drainage areas to avoid sedimentation of streams.

All mining areas must be rehabilitated upon mine closure and all discharge must be properly disposed as per Minerals (Mining and Prospecting Act), of 1992 and the Environmental Management Act, of 2007. 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.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
<i>Artisanal</i>	Negative	1	1	1	1	4	2
<i>Semi-mechanized</i>		1	2	2	2	7	5

➤ **Groundwater contamination and over-abstraction**

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.

Mitigation measures

Mining areas and camping sites should be provided with portable toilets connected to septic tanks to avoid any spillage or contamination. Permits to install septic tanks should be obtained from the Ministry of Agriculture and Land Reform (DWSSC). Spillage or leakage should be contained, and contaminated soil should be carefully removed and disposed of to the nearest waste disposal site (Okombahe, Omaruru or Usakos).

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	1	1	1	4	2
Semi-mechanized		2	2	3	2	9	7

➤ **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 in local vegetation.

Mitigations measures

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 i.e. water sprinkling should be adopted to control dust emissions.

Proper maintenance of equipment should also be ensured on a 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 No. 156 of 1992, 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, (Act No. 01 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.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	1	1	1	1	1
Semi-mechanized		2	2	3	3	10	8

➤ **Land degradation**

Land degradation is one of the most significant impacts associated with any mining activities. Given the limited climatic conditions of the area, a further decline in vegetation cover can affect the availability of fodder and carrying capacity of the area. The impacts of land degradation would not be limited to the mining but could be felt in the whole constituency and the region at large.

Mitigation measures

The waste matrix generated during the mining operation should be back filled in the mined area to prevent soil erosion. Rehabilitation of mined out areas should be done on a continuous basis, i.e. as

soon as the mining in an area has been completed. Only designated access routes should be used to reduce trampling on vegetation and fragmentation of sensitive habitats.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
<i>Artisanal</i>	Negative	1	1	1	1	4	2
<i>Semi-mechanized</i>		1	2	3	3	9	7

6.3 Anticipated Socio-Economic Impacts of the project

Small-scale mining activities is 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 i.e. constituency, regional and national.

➤ **Public health and safety**

Public health hazards associated with Small scale 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.

Mitigation measures

- 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 1000m from residential areas
- Do not keep explosions more than 500kg at any site
- 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.
-

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	1	1	1	4	2
Semi-mechanized		2	2	3	3	10	8

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.

Mitigation measures

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

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	1	2	2	6	4
Semi-mechanized		2	3	3	3	11	9

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, (Act No.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.

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 of 1992).
- 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

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	1	1	1	4	2
Semi-mechanized		2	2	2	2	8	6

➤ **Explosions and fire outbreaks**

The most critical issues regarding impacts on energy resources is 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.

The other energy related impact is the collection of firewood for domestic use. Uncontrolled firewood collection could lead to deforestation and may result into conflicts with the local communities.

Mitigation measures

SSMs are advised to keep less than 200L of fuel at the site as per the Petroleum Products Regulations of 2000. Petrol should be stored in underground sources while diesel should be kept at properly secured site.

Collection of firewood should be minimized, and permission should be obtained from the local Forestry office (Omaruru office) in case a large quantity of wood is required. SSMs should not venture into collection and selling of firewood.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	1	1	1	4	4
Semi-mechanized		2	1	2	2	7	5

➤ **Visual appeal and aesthetics**

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.

Mitigation 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.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	1	2	2	6	4
Semi-mechanized		2	2	2	3	9	7

➤ **Waste generation**

Small-scale mining activities 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 i.e. contamination of fresh water sources, soil contamination, sedimentation of river streams, pollution of the surrounding environment and many more.

Mitigation measures

Waste rocks and overburdens should not be placed in riverbeds or on areas with high grazing potential. General waste generated on site should be gathered, collected regularly and properly dumped at the nearest Municipal or approved disposal site (Okombahe, Usakos or Omaruru). Hazardous waste i.e. used oil, batteries generated should be collected and transported to specialized waste collectors for proper dumping. No dumping or littering should be allowed. Unwanted and old temporary structures not in use must be removed from the site and disposed of by the responsible person.

All mining sites and camping sites must be equipped with portable ablution facilities connected to septic tanks. SSMs shall enter into agreement with contractors for the emptying of septic tanks whenever required. 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.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
<i>Artisanal</i>	Negative	2	2	2	2	8	6
<i>Semi-mechanized</i>		2	2	3	2	9	7

➤ **Land use conflicts and competition**

The intensification of mining activities in the area is likely to encroach on community settlements and grazing lands and interfere with the community livelihoods. As such, it will result in land use conflicts especially with the conservancy.

Mitigation measures

The Traditional Authority must be consulted prior to any pegging of mining claims. TA, Conservancy and SSMs should hold regular meetings to resolve conflicts and maintaining a health working relationship. MME should also hold regular inspections at mining sites to resolve conflicts.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
<i>Artisanal</i>	Negative	2	1	2	2	7	5
<i>Semi-mechanized</i>		2	2	3	2	9	7

➤ **Temporal housing for employees**

Majority of the SSMs reside at their place of work and only few reside in nearby farms and villages. SSMs use temporary structures such as tents and corrugated iron sheets for accommodation. Open fire cooking is a common practice among the SSMs while lack proper sanitation is a grave concern. Some SSMs reside in the jurisdiction of the conservancy which is home to dangerous predators such leopards etc. Hence, settling in wildlife zones could cause conflicts and leads to illegal hunting of both small and large wildlife. SSMs residing in remote areas might be tempted to resort to poaching as a source of livelihood.

Mitigation measures

Establishment of temporary housing should be done in consultation with the Conservancy Committee. No settlement should be allowed in wildlife corridors or hunting/concession areas. The housing areas should be at secured sites and movement of people during night hours should be limited. Fireplaces should be at secure sites and the fire should be put out after use.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
<i>Artisanal</i>	Negative	2	1	2	2	7	5
<i>Semi-mechanized</i>		2	2	3	2	9	7

➤ **Influx of people to the area**

SSMs 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 put pressure on the local available natural resources such as land, water, energy etc.

Mitigation measures

All SSMs who are employed or seeking employment in the area should be registered with the Traditional Authority and the local SSMs committee. Small-scale mining sites should not be a place of abodes, hence only people who are actively involved in mining should be allowed to stay there. Establishment of permanent residence at mining sites is prohibited and application for a leasehold should be obtained from TA and the Communal Land Board.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	2	1	1	2	6	4
Semi-mechanized		2	1	3	2	8	6

➤ **Traffic related impacts**

The affected area is frequented by several people other than SSMs such as tourists, government officials etc. Thus, whether the SSMs 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 SSMs alone.

Mitigation measures

All vehicles are required to make use of existing access routes and abide to the speed limit of 40km/hr. within the Conservancy area. If there is a need for new access routes it should be done in consultation with the Conservancy Committee and Traditional Authority. All access routes joining in district roads should be approved by the Conservancy Committee.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	1	1	1	4	2
Semi-mechanized		2	1	3	3	9	7

➤ **Occupational safety and health impacts**

Like in other mining activities, SSMs are exposed various occupational health during operations. The most common hazards associated with small-scale 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.

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.
- SSMs should cease the manufacturing of homemade explosives as it is against the Arms and Ammunition Regulations.
- SSMs must be provided with training on occupational health and safety standards
- SSMs should also register themselves with the Social Security Commission (SSC)
- SSMs should go for regular health check-ups at the nearest health centre.
- SSMs must have proper PPPE suitable for each job
- Consider the use of available technologies to reduce workloads
- Regular inspections by the relevant Inspectors such as Labour, Mines and NAMPOL
- SSMs should adhered to hazard exposure limits as listed under the National Labour Act No.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.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	1	1	2	3	7	5
Semi-mechanized		1	1	3	2	7	5

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

According to the local community, there are many unmarked sites of archaeological importance in the area. Such sites are at risk of being removed, damaged, and tempered with by small-scale mining activities.

Mitigation measures

Should there be sites or materials of archaeological importance uncovered during mining, such incidences should be reported to the National Heritage Council.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Negative	2	1	1	1	5	3
Semi-mechanized		2	1	3	3	9	7

➤ **Impacts on gender roles**

Small-scale mining activities are likely to contribute to the increase in female headed households as small-scale mining activities are carried out mostly by men. Thus, most men leave their villages and homesteads for temporary settlements at mining claims. Although, females and other members of households also participates in the sector through cleaning, polishing, and marketing of gemstones they are not considered as “miners”. Consequently, the roles of women in small scale-mining have been largely overlooked by researchers and policy makers.

SSMs activities	Impact Type	Ratings (before mitigation/measures)				Significance	
		Extent	Duration	Intensity	Probability	Without measures	With measures
Artisanal	Neutral	2	1	1	1	5	3
Semi-mechanized		2	1	3	3	9	7

Mitigation measures

Develop targeted trainings for women especially with regards to polishing and trading of gemstones. This will encourage and sustain participation of women in the industry, hence improving the gender ratio for this sector.

6.4 Cumulative Impacts

Although, many of the effects of small-scale mining are of less significance, when they occur simultaneously, their significance may increase by order of magnitude. The greater the number of small-scale miners in an area, the greater the cumulative impacts are on the environment.

Possible cumulative impacts of SSMs are as follows.

- Tubussis is a remote area and lacks basic social services such as sanitation, waste collection etc. Migration of more people in the area will result in serious environmental pollution.
- Unemployed family of SSMs residing at mining sites are likely to resort to other activities such as poaching, collection of wild flora, animal theft etc.
- Water is a scarce commodity in the area, hence an increase in the number of people in the area will also increase water demand which in turn will result into over-abstraction, poor sanitation etc.
- The higher the number of SSMs at the mining site, the bigger the disturbance of the area (ecological footprint). The increased footprint could result into serious negative repercussions such as deforestation, trampling of vegetation and land degradation.

Possible measures

- At least three (3) portable ablution facilities should be established at Tubussis. Due to the absence of a sewer line, the use of a communal tank or septic tank is encouraged.
- SSMs should not be allowed to bring or stay with family at mining sites for an extended period. Only those people who are directly involved in the mining activities may stay on site. This measure is already being enforced by the local committee. As such, all SSMs are registered with the local SSMs committee and the local Traditional Authority.
- Poaching of wildlife and collection of wild flora or mining in sensitive areas is prohibited and is punishable by law.
- No permanent residence should be established at mining sites without prior approval from TA and the Communal Land Board.
- Permits should be obtained from the MAWLR-DWSSC before drilling any borehole.

6.5 Positive Impacts of SSM

Apart from the identified negative impacts, the small-scale mining sub-sector also provides an array of socio-economic benefits. However, certain enhancement measures should be implemented to fully realize these benefits.

➤ **Employment creation**

According to the National Planning Commission (2010), the small-scale mining sub-sector provides employment opportunities to about 1600-3000 people in Erongo region. Farm Tubussis provides opportunities to about 130 people through direct employment. This is a significant contribution, considering the current unemployment rate (20.27%) in the country.

Despite the above, SSMs are still finding it difficult to operate efficiently due to high input costs, lack of appropriate tools and uncompetitive prices for their products. This underdevelopment trend of the small-scale sub-sector continues to deny many jobseekers employment opportunities they hoped to find.

Enhancement measures

Notwithstanding the support the government continues to provide to this industry, it is recommended that the SSMs be supported with machineries and the latest mining technologies. This will allow them to operate efficiently and with high due diligence. SSMs should also be provided with the latest market information to determine fair prices for their gemstones and enable them to generate profits.

➤ **Secondary opportunities**

Small-scale mining activities at Farm Tubussis has also created indirect employment opportunities to about 100 women who are involved in polishing and selling of gemstones at informal markets such as Omaruru, Uis-Spitzkope road, Usakos etc. However, due to very little processing in the country, high-quality crystals are usually sold as raw products to tourists and international customers. On the other hand, lower quality crystals and gemstones are not fully utilized and sometimes only get polished into simple jewelries (Amunkete and Nyambe, 2009). If properly supported, the sector has potential to generate secondary spin off jobs in the off-site service.

Enhancement measures

The government should discourage the export of unpolished gemstones and support the establishment of value addition factories in the country.

➤ **Livelihood**

Small-scale mining activities at Farm Tubussis is a source of livelihood for more than 160 families through direct employment and income generation. However, According to Amunkete and Nyambe, 2009., very little processing takes place in the country as high-quality crystals are usually cleaned and sold as raw products to tourists and international customers. On the other hand, lower quality crystals and gems are not fully utilized and sometimes only get polished into simple jewelries.

Enhancement measures

All efforts must be used to sustain and expand this important sub-sector of the economy. Hence, doing so will ensure livelihood for many Namibians who could languish in poverty and unemployment.

➤ **Foreign Exchange and GDP Contribution.**

Small-scale mining activities have potential to contribute to the mainstream economy through Gross Domestic Product (GDP), and earn foreign exchange through international markets. Although the area is known for producing unique crystals which are in the international markets, some high value gemstones are still exported without their true value being declared. This is because most of the gemstones are sold locally to international tourists at prices below their market values. Since most of the gemstones are sold as raw products and only get processed abroad, the finished products are often not marketed as Namibian products.

Enhancement measures

It is therefore important that Namibia's "brand" in terms of gemstones and crystals is protected by ensuring a consistent supply of high-quality product mined at low environmental and social cost, and maximum benefit to communities. Moreover, the Government should assist SSMs in collecting market information on potential market niches and best prices for gemstones to make this sector profitable.

6.6 Summary of identified negative impacts

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

Table 11: Significance of impacts (after mitigations)

Potential Impacts on Environmental Receptors	Significance of impacts under different SSM scale (after mitigation)	
	Artisanal	Semi-mechanized
A. Impacts on Biophysical environment		
Impacts on flora	Insignificant	Very significant
Impacts to fauna	Insignificant	Significant
Impacts on Landscapes and surface disturbance	Significant	Very significant
impacts on Ecological settings	Insignificant	Very significant
Impacts to soils	Insignificant	Significant
Impacts on geology	Insignificant	Significant
Impacts on water resources	Insignificant	Significant
Impacts groundwater	Insignificant	Significant
Impacts on air quality	Insignificant	Significant
Impacts related to Land degradation	Insignificant	Significant
B. Impacts on Socio-economic environment		
Impacts on Public Safety: Blasting	Insignificant	Significant
Impacts on Public Safety: Excavations	Insignificant	Very significant
Public and Health Safety: Nuisance	Insignificant	Significant
Impacts to Energy	Insignificant	Significant
Impacts on visual amenity	Insignificant	Significant
Waste Management Impacts	Significant	Significant
Impacts related to temporary infrastructures	Significant	Significant
Influx of people	Insignificant	Significant
Archeological impacts Traffic volumes impacts	Insignificant	Significant
Occupational Health Impacts	Significant	Significant
Impacts on Archeological, Culture and Heritage	Insignificant	Significant
Gender roles	Insignificant	Significant

7. CONCLUSIONS AND RECOMMENDATIONS

The objective of this Scoping 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 small-scale mining activities have been adequately assessed and necessary control measures have been formulated to meet statutory requirements, hence the following conclusion and recommendations.

7.1 Assumptions and Conclusions

- Small-scale mining activities at Farm Tubussis is taking place in two forms, namely, the artisanal or manual and semi-mechanized operations. The impacts caused by these two methods differs significantly in nature, scale, and intensity.
- Most of the environmental impacts caused by artisanal method are manageable with minimum measures and limited to the area of operations, whereas environmental impacts caused by semi-mechanized ranges from highly significant to very significant, thus requires extensive mitigation measures.
- The implementation of mitigation measures should be accompanied by compliance monitoring of certain environmental parameters. This will ensure continual improvement in environmental performance and reduce adversity of potential negative impacts.
- Small-scale miners are exposed to a number of occupational health risks which is attributed to the nature or work, limited capacity and lack of protective clothing.
- Small-scale mining at Farm Tubussis is a source of livelihoods for more than 100 families through employment creation and income generation. Hence, the Government should continue giving the necessary support to expand and sustain the Small-scale mining sub-sector.

7.2 Recommendations

- All Mining Claim holders should obtain consent letters from the local Traditional Authority and conduct their activities in line with Section 30 of the Communal Land Act of 2005.
- Consent must also be obtained from the Conservancy Management Committee for all mining activities taking place within the Conservancy area. This will avoid land-use conflicts and maintain the existing environmental management priority of the area.
- No establishment of residential properties is allowed on any communal land without prior approval from the Communal Land Board as per the Communal Land Act of 2005.
- Small-scale miners are advised to cease the manufacturing, storage and use of homemade explosives as it is against the Arms and Ammunition Act (No.07 of 1996). Blasting Permits should be obtained from the NAMPOL Explosive unit.
- Large-scale blasting should not be allowed in the Erongo Mountain Complex and other important landscape considered as local landmarks in the area.
- Lastly, it is also recommended that a tailor-made training should be given to all small-scale miners and to all mining claim holders within the study area. The purpose of this training is to create awareness among the SSMs on the environmental issues and legislative requirements in order to ensure successful implementation and promote environmental due diligence.

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9. APPENDICES

- 9.1 Appendix A: Conservancy zoning map**
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- 9.3 Appendix C: Background Information Document (BID)**
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