



## **EXPLORATION FOR MARBLE**

# **SCOPING REPORT: ENVIRONMENTAL IMPACT ASSESSMENT (EIA)**

---



***FOR THE PROPOSED EXPLORATION STUDY  
FOR MARBLE AT CLAIM No: 69059-69060  
ERONGO REGION, KARIBIB DISTRICT, NAMIBIA***

## PROJECT DETAILS

---

**TITLE: SCOPING REPORT ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED EXPLORATION STUDY FOR MARBLE AT CLAIM No: 69059-69060 ERONGO REGION, KARIBIB DISTRICT, NAMIBIA**

### PROPONENT:

Mr. Melvin Pienaar  
POBOX 2  
Usakos, Namibia

### CONSULTANCY:

HJGeo-Enviro Consulting and Trading Cc  
P.O.Box: 8574  
Backbench, Windhoek  
Email: [hjgeoenviro@gmail.com](mailto:hjgeoenviro@gmail.com)  
Cell: + 264811450613

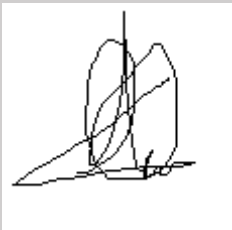
### ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP):

Mr. Johannes Sirunda (BSc (Hon) and MSc)  
POBOX 32237  
Pioneerspark, Windhoek  
Email: [hjgeoenviro@gmail.com/johannes.sirunda@gmail.com](mailto:hjgeoenviro@gmail.com/johannes.sirunda@gmail.com)  
Cell: +264811450613

## DECLARATION

We hereby declare that:

- a. We have the knowledge of and experience in conducting assessments, including knowledge of the Acts, regulations, and guidelines that are relevant to the proposed exploration project.
- b. We have performed the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.



---

**Mr. J.J Sirunda**

**Position: Environmental Assessment Practitioner (EAP)**

**REPORT/DOCUMENT CONTROL FORM****PROJECT NAME: EXPLORATION FOR MARBLE DIMENSION STONES QUARRY**

<b>Document Title:</b>	SCOPING REPORT ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED EXPLORATION STUDY FOR MARBLE AT CLAIM No: 69059-69060 ERONGO REGION, KARIBIB DISTRICT, NAMIBIA	
<b>Document status:</b>	<b>Draft/Interim/Final:</b> FINAL	<b>Issue Date:</b> 21 May 2021
<b>Prepared for:</b>	<b>Client Name:</b> Mr. Melvin Pienaar	<b>Contact Person:</b> Mr. Melvin Pienaar POBOX 2 Usakos, Namibia
<b>Prepared by:</b> Mr. J.J Sirunda		
<b>Verification by:</b> Mr. J.J Sirunda		
<b>Client approval:</b> Mr. Melvin Pienaar		

# TABLE OF CONTENTS

TABLE OF CONTENTS.....	4
LIST OF FIGURES .....	8
LIST OF TABLES.....	9
ABBREVIATIONS AND ACRONYMS .....	10
ENVIRONMENTAL IMPACT ASSESSMENT (EIA) (SCOPING) REPORT .....	11
EXECUTIVE SUMMARY .....	11
1. Introduction.....	13
1.1. Project Background .....	13
1.2. The objectives of the Environmental Assessment Process.....	14
1.3. Terms of Reference.....	14
2. Background to Marble exploration.....	16
2.1. What is dimension stone? .....	16
2.2. What is Marble dimension.....	19
2.3. Concluding remark on this section.....	19
3. Project description.....	20
3.1. The rationale for the proposed project.....	20
3.2. Proposed locality.....	21
3.3. Infrastructure and exploration equipment required for the project.....	0
3.3.1. Exploration equipment's.....	0
3.3.2. Infrastructure requirements.....	0
3.4. Project Alternatives.....	2
3.5. Decommissioning plan.....	2
3.6. Concluding remark on this section.....	2
4. Legal and regulatory framework review.....	3
4.1. Mineral Act of 1992 and the types of license it regulates.....	3

4.2.	Legal instrument relevant to this project .....	5
4.3.	Regulatory authorities and permitting .....	8
4.4.	Concluding remark on this section.....	9
5.	Receiving environment.....	10
5.1.	General description of the project.....	10
5.2.	Social-economic environment .....	10
5.2.1.	Erongo region socio-economic perspectives.....	10
5.3.	Archaeology and heritage sites .....	12
5.4.	Water resources.....	13
5.4.1.	General hydrology of the study area .....	13
5.4.2.	Geology of the area.....	15
5.4.3.	General hydrogeology.....	19
5.5.	Biodiversity (fauna and flora).....	20
5.5.1.	Flora.....	21
5.5.2.	Fauna.....	22
5.6.	Climate.....	24
5.7.	Potential impact identified .....	27
5.8.	Concluding remark on this section.....	27
6.	Public consultation process .....	28
6.1.	Legal and policy requirement.....	28
6.2.	Consultation approach.....	30
6.3.	The interested and affected parties (I & AP's).....	30
6.4.	The outcome of the public consultation meeting .....	30
6.5.	Concluding remark on this section.....	30
7.	Impact assessment.....	31
7.1.	The methodology used or adopted for the impact assessment.....	31

7.2.	Identification of key issues.....	32
7.3.	Social-economic implications .....	35
7.3.1.	Background to the problem.....	35
7.3.2.	The potential effect of the project.....	35
7.3.3.	Significance.....	35
7.3.4.	Mitigation and enhancement measures .....	36
7.3.5.	Monitoring.....	36
7.4.	Liquid waste: used oil or oil spillage and wastewater .....	36
7.4.1.	Background to the problem.....	36
7.4.2.	Potential effect form liquid waste.....	36
7.4.3.	Significance.....	38
7.4.4.	Mitigation measures.....	38
7.4.5.	Monitoring .....	38
7.5.	Solid waste: wires, drill bits, and human waste .....	38
7.5.1.	Background to the problem.....	38
7.5.2.	Potential effects from solid wastes .....	39
7.5.3.	Significance.....	39
7.5.4.	Mitigation measures.....	39
7.5.5.	Monitoring.....	39
7.6.	Land or soil disturbance: on-site and the proposed 1km stretch road from B2 road.....	40
7.6.1.	Background to the problem.....	40
7.6.2.	The potential effect of land or soil disturbance .....	40
7.6.3.	Significance.....	40
7.6.4.	Mitigations and recommendation.....	40
7.6.5.	Monitoring .....	41
7.7.	Impact on biodiversity: fauna and flora .....	41

7.7.1.	Background to the problem.....	41
7.7.2.	The potential effect of biodiversity impact.....	41
7.7.3.	Significance.....	41
7.7.4.	Mitigations and recommendations.....	42
7.7.5.	Monitoring.....	42
7.8.	Air quality onsite.....	42
7.8.1.	Background to the problem.....	42
7.8.2.	The potential effect of impact on air quality.....	42
7.8.3.	Significance.....	43
7.8.4.	Mitigations and recommendation.....	43
7.8.4.	Monitoring.....	44
7.9.	Archaeological Impact.....	44
7.8.5.	Significance.....	44
7.10.	Noise on site.....	46
7.11.	Decommissioning phase.....	47
7.12.	Concluding remark on this section.....	48
8.	Conclusion and recommendations.....	49
8.1.	Conclusion.....	49
8.2.	Recommendations.....	49
9.	References.....	51
10.	Appendices: List of appendices.....	54
	Appendix A: Abridge CV.....	55



## LIST OF FIGURES

Figure 1: Mining Claims in Erongo Region.....	14
Figure 2: Locality of Farm 64, Sadamab, Erongo where the Mining Claims are located .....	0
Figure 3: Infrastructure map of Erongo Region .....	0
Figure 4: Existing road to the site.....	1
Figure 5: Hydrography of Namibia.....	14
Figure 6: Ground water basin in the project area .....	15
Figure 7: Geology of the study area .....	16
Figure 8 Ground water potential of the study area .....	18
Figure 9: Groundwater basins & rock types in Namibia .....	20
Figure 10: Vegetation of Erongo and the mining claims .....	22
Figure 11:Types of vegetation and vegetation cover at Project Site .....	24
Figure 12: Rainfall of the study area.....	26

## LIST OF TABLES

Table 1: Infrastructure and services nearby the project area.....	0
Table 2: List of machines/equipment and quantity to be used in exploration.....	0
Table 3: Types of license regulated by the Mineral Act of 1992, activities and environmental requirements.....	3
Table 4: Legal instruments relevant to this project.....	5
Table 5: The regulatory authority and permitting.....	8
Table 6: The stratigraphy of the Swakop Group (Damara Sequence) based on Miller 2008.....	17
Table 7: Definition of criteria for assessing the significant impact.....	31
Table 8: Definitions of various significant rating.....	32
Table 9: Potential significant impact screening process.....	33
Table 10: The expected significance of the project on social-economic implications.....	35
Table 11: The expected significance of the project on liquid waste.....	38
Table 12: The expected significance of the project on solid waste.....	39
Table 13: The expected significance of the project on soil or land disturbance.....	40
Table 14: The expected significance of the project on Biodiversity: fauna and flora.....	41
Table 15: Expected significance of the project on dust generated on site.....	43

## ABBREVIATIONS AND ACRONYMS

<b>EMP</b>	Environmental Management Plan
<b>EIA</b>	Environmental Impact Assessment
<b>EC</b>	Environmental Commissioner
<b>SADC</b>	Southern African Democratic Country
<b>RSA</b>	Republic of South Africa
<b>MME</b>	Ministry of Mines and Energy
<b>MEFT</b>	Ministry of Environment, Forestry and Tourism
<b>MAWF</b>	Ministry of Agriculture Water and Forestry
<b>DWA</b>	Department of Water Affairs
<b>ML</b>	Mining License
<b>DEA</b>	Department of Environmental Affairs
<b>SM</b>	Site Manager
<b>ENC</b>	Environmental Coordinator
<b>SF</b>	Site Foreman
<b>PS</b>	Project Staff
<b>PP</b>	Project Proponent
<b>EIA-C</b>	Environmental Impact Assessment Consultant
<b>I&amp;Aps</b>	Interested and Affected Parties
<b>EAs</b>	Environmental Assessments

# ENVIRONMENTAL IMPACT ASSESSMENT (EIA) (SCOPING) REPORT

## EXECUTIVE SUMMARY

Mr. Melvin Pienaar (the proponent) is a Namibian national that have various exploration projects in Namibia. The Proponent is seeking to further partake in dimension stone exploration opportunities and propose to undertake exploration activities on mining claims **69059 – 69060** located in the Karibib District, Erongo Region. The claims are located at 7Km Northwest of Uiba Oas Crystals Market along the D1918 route. Which is about 31.1km Northwest of Usakos which is the nearest town, falling within the following coordinates:

- **Mining claim 1 Claim No: 69059.**
  - *21° 55'23.09"S, 015°18'14.24"E;*
  - *21° 55'20.39"S, 015°18'24.28"E;*
  - *21°55'17.68"S, 015°18'34.33"E;*
  - *21° 55'27.05"S, 015°18'37.23"E;*
  - *21° 55'32.48"S, 015°18'17.28"E.*
- **Mining claim 2 Claim No: 69060**
  - *21° 55'41.84"S, 015°18'20.04"E;*
  - *21° 55'32.48"S, 015°18'17.28"E;*
  - *21°55'27.05"S, 015°18'37.23"E;*
  - *21° 55'34.87"S, 015°18'40.15"E;*
  - *21° 55'38.36"S, 015°18'30.10"E.*

The proposed project is part of the listed activities in the Environmental Management Act 7 of 2007, therefore, an environmental clearance certificate is required. As part of the environmental clearance certificate application, an environmental impact assessment has been undertaken to satisfy the requirements of the Environmental Management Act, 2007. This Environmental Scoping Assessment Report and Environmental Management Plan shall be submitted as part of the application for the Environmental Clearance (ECC).

The proposed exploration project will involve drilling, aerial or remote sensing, and mineral sampling. Furthermore, non-invasive ground penetrating radar is planned to be undertaken in the initial stages on the sites, potentially followed by a drilling program. If mineralization is identified, further exploration methods shall be applied; if not identified; the Claims shall be rehabilitated and returned to the government. The area where the mining claims are located is classified as Zone two (2) areas of medium sensitivity, which is a zone permitted for prospecting and mining activities. The mining claims site is in an area that received less than 100mm of rainfall annually and has unique vegetation and wildlife species including reptiles and avifauna, many of which are endemic to the Namib Desert. The Claims fall within the Namib Desert Biome and Central Desert vegetation type, which tends to have grassland occupying the gravel plains. The cover of grass is very sparse but nevertheless dominates the little vegetation that grows on the gravel plains. The majority of grasses are annuals and coverage is sparse. The plants

diversity of the areas is low (less than 50 species). The mining claims site has a great diversity of grasses and shrubs, however still sparse, with no visible outcrops for lichen. The Claims are covered with soil with limited geological features and are mainly composed of plains.

In view of the above, the environmental impact assessment (EIA) was undertaken by HJGeo-Enviro Consulting and Trading Cc. Through the scoping process, a review of the site and surrounding environment was completed by undertaking a desktop review and site visitations. The assessment is considered to be comprehensive and sufficient to identify impacts, and it is concluded that the likely effects were not deemed significant and therefore no further assessment is required. On this basis, it is of the opinion of HJGeo-Enviro Consulting and Trading Cc that an environmental clearance certificate could be issued, on conditions that the management and mitigation measures specified in the EMP are implemented and adhered to by the proponent.

## **1. Introduction**

---

### **1.1. Project Background**

The proponent Mr. Melvin Pienaar is proposing to carry out an exploration study to quarry for Marble in the Karibib district Area in Erongo Region (Figure 1) on the following registered mining claims numbers: **69059 – 69060**.

In accordance with the Environmental Management Act (2007) and EIA Regulations (2012) an Environmental Impact Assessment (EIA) is required for any “Mining and Prospecting Activities”. HJGeo-Enviro Consulting and Trading Cc was appointed to conduct an EIA and develop an Environmental Management Plan (EMP) for the proposed project. Johannes J. Sirunda is the Environmental Assessment Practitioner that conducted the EIA. His CV is attached as Appendix A. The above-mentioned mining claims are located in SADAMAB, FARM 64.

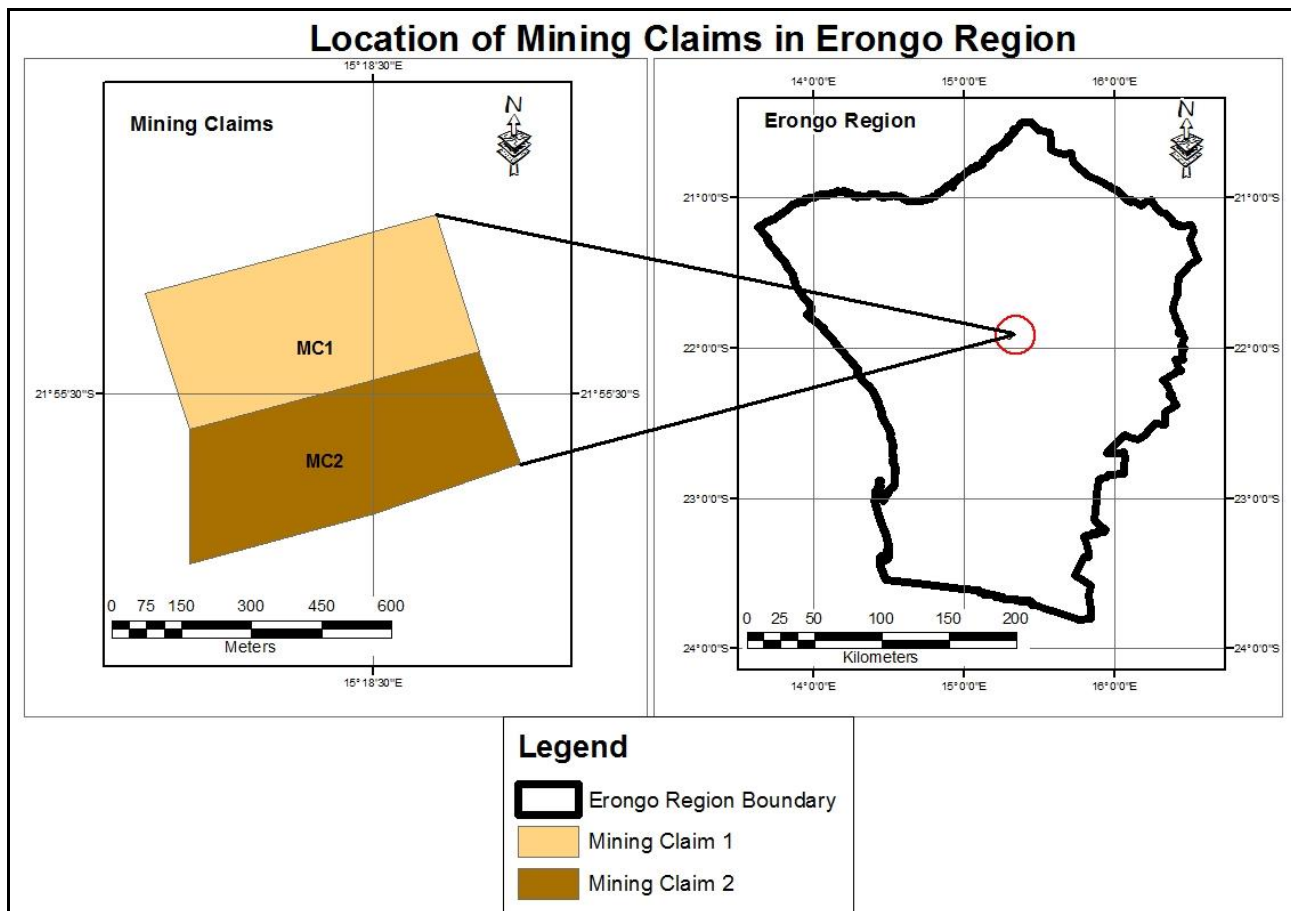


Figure 1: Mining Claims in Erongo Region

### 1.2. The objectives of the Environmental Assessment Process

The study will involve investigation and assessment of the likely short and long-term positive and negative environmental impacts of the proposed exploration and possible testing of a quarry with the following main objectives:

- To prepare an Environmental Impact Assessment report including details of the proposed exploration and possible test a quarry mining;
- Develop an Environmental Management Plan (EMP) based on the outcomes of this study report to support the environmental management of the proposed exploration and possible test quarry mining;

### 1.3. Terms of Reference

Terms of reference” means a document which forms part of a scoping report and sets out how an assessment must be carried out. The term of reference for the proposed project was set out based on the requirement by the Environmental Management Act (2007) and Regulation (2012). The steps which were followed are described as follows:

- a) a description of all tasks to be undertaken as part of the assessment process, including any specialist to be included if needed;
- b) an indication of the stages at which the Environmental Commissioner is to be consulted;
- c) a description of the proposed method of assessing the environmental issues and alternatives; and
- d) The nature and extent of the public consultation processes to be conducted during the assessment process.



## **2. Background to Marble exploration**

---

### **2.1. What is dimension stone?**

Dimension stone in accordance with the provisions of Schedule 1, Groups of Minerals, Elements and Rock (Section 1), Part 2 of the Minerals (Prospecting and Mining) Act, 1992, (Act No. 33, 1992), Dimension Stone Group include all rock material occurring naturally in, on or under the earth which is capable of being cut, shaped or used in blocks, slabs, sheets and tiles for the construction or cladding of buildings, paving, monuments and memorials. Exploration or prospecting means any operations carried on in connection with prospecting, including any accessing, extraction or incidental winning of any mineral or group of minerals for the purposes of mineralogical examination, assaying, test work or marketability surveys. While exploration area or prospecting area means the area of land to which an exclusive prospecting license relates or prospecting area.

Dimension stone is one of the oldest and most durable building materials. The Egyptian pyramids were built from quarried stone in about 2800 B.C., and the Babylonians used to cut stone in 600 B.C. to build the renowned Hanging Gardens, one of the Seven Wonders of the World. The Greeks and Romans also used cut and finished stone widely as construction, decorative, and statuary material.

The principal rock types used for dimension stone are granite, limestone, marble, sandstone, Marble, and slate. Of these, Marble, granite, limestone, and marble are the three main materials for construction, decorative and statuary. Physical properties, such as durability, strength, and the ability of the stone to hold a surface finish, are important in the industry. To the customer, the esthetic properties such as color, texture, and pattern, and surface finish are very important.

Besides meeting the desired physical and esthetic properties, the rock must be relatively free of fractures so that it can be split or cut from a quarry face in large multi-tonne blocks and transported to the processing plant. Prospecting for, and mining and production of dimension stone are more sophisticated and require more care than the same processes or the methods used for natural stone aggregate or sand and gravel.

Dimension stone exploration involves seven phases but completion of each phase prior to test quarrying does not guarantee a successful quarry, but it provides sufficient

information to make an informed decision as to whether or not to proceed to the next stage taking the risks of a negative outcome into account. Below are the seven phases that will be applicable to this project:

- Desktop Study
- Field evaluation
- Detailed mapping
- Drilling
- Geophysical methods
- Bulk Sampling
- Test Quarrying

**Desktop Study:** the first phase of any dimension stone exploration should comprise a desktop study. This phase involves the investigation of available geological maps and reports, with focus placed on desired rock types (i.e. Marble). For example, when looking for Marble, it would be suitable to target lithologies, while if a multi-colored patterned material is sought, regional metamorphic provinces should be examined for potential outcrops of suitable stone.

**Detailed Mapping:** this phase involves field evaluation to indicate a potentially economically viable resource, and detailed geological mapping of the deposit should be conducted. Mapping traverses should be planned, and if necessary cleaned by mechanical means, compressed air or pressurized water jets. After cleaning and washing, the traverses should be measured and mapped in detail on a scale of between 1:100 and 1:250 according to the size of the deposit. During detailed mapping, special attention should be paid to the composition, color, and structure of the stone, as well as the fracturing. Important portions of the traverses should also be photographed. A geological map should be constructed as a record of field results and also to give a basis for further evaluations of the physical extent and morphology of the prospecting area.

**Geophysical methods:** While the previous steps or phases give an indication of the deposit from a surface point of view, a thorough three-dimensional assessment is a prerequisite prior to taking the risk of bulk sampling and test quarrying, which entail significantly higher expense and are far more environmentally disruptive than the previous stages of exploration for dimension stone. Indeed, Luodes et al concluded that

for a successful evaluation study, the discontinuous and varied nature of geological features in three dimensions must be clearly understood. Geophysical methodologies are important in the more detailed research stages as a complement to the in situ fracturing surveys and are significantly cheaper than core drilling.

**Drilling:** if the outcome of field evaluation and geophysical investigations (if conducted) is positive, the next step should be to drill the formation in order to demarcate the ore deposit as well as to provide information on the vertical extent of the formation and possible defects with depth; which has implications on the recovery. Generally, diamond core drilling is preferable, as the core can be evaluated not only for color consistency but also for defects such as joints, veins, and banding which may influence the recovery of marketable blocks. Percussion drilling is cheaper than diamond core drilling but has the limitation that chips of stone are produced which are only indicative of color consistency.

**Bulk Sampling:** should the results of drilling prove positive, the next phase is to conduct bulk sampling to remove several blocks in order to test market acceptance. The number of blocks required will depend on the marketing strategy and whether or not the prospector has access to a factory that can cut slabs of the material. In general, most non-vertically integrated companies will need to remove around twenty blocks for distribution into the market, while a vertically integrated company may get away with as few as two blocks, as it is able to distribute slabs into the world market in order to evaluate response to the material. Many operators confuse the stage of bulk sampling with the stage of test quarrying. It should be emphasized that the aim of bulk sampling is to get sufficient representative sample blocks of the stone in order to test the market reaction to the material and that it is not necessary to open a full-blown quarry for this purpose.

**Test Quarrying:** In the case of successful market feedback to bulk samples, or in the case of an established material, the final phase of prospecting is test quarrying. The aim of test quarrying is to fully evaluate the recovery of saleable blocks within the formation in order to determine whether full-scale mining is economically viable, as well as to evaluate the implications of extraction methods on the economics of quarrying. Test quarrying is required, as other methods described above can only give an indication of the range of possible recovery, and the actual recovery possible can only be established by actual mining of the formation and recording the resultant production and costs. It

also allows for the adjustment of extraction methods in order to determine the most feasible method to be employed.

## **2.2. What is Marble dimension**

Marble is defined commercially as any crystalline rock composed predominantly of calcite, dolomite, or serpentine that is capable of taking a polish. Calcareous materials account for approximately 57%, siliceous materials for around 38% (of which granites account for probably over 95%), and slates for around 5% of total world production of around 93 million tons in 2007 (Ashmole and Motloun, 2008).

## **2.3. Concluding remark on this section**

In this section, information was provided to explain different steps or phases that are involved in demission stone exploration, and also explaining what is Marble as a dimension stone. The following section provides information on what the applicant proposes for this project.

### **3. Project description**

---

#### **3.1. The rationale for the proposed project**

The mining claims 69059-69060 are situated in a highly prospective area for dimension stones (marble) associated with local Damara metamorphic rocks. The proposed exploration and mining activities will have good socioeconomic benefits including value addition to the potential marble resources in the area. The dimension stone industry in Namibia has been in existence for many years; however, its potential has not yet been fully developed. The prospecting company should utilize this opportunity to take advantage of this development. The demand for dimension stone is increasing in Namibia, SADC, and the rest of the world.

Namibia's internal market for dimension stone is small, being limited mainly to tombstone manufacture with the occasional building cladding/flooring application. Regionally, Namibia exported (10,830 t) and (41,456 t) of its 2004 marble and granite production respectively to SADC countries, mainly South Africa.

The annual production of marble and granite has shown a rapid increase in tonnage since 2003. There has been an increase in the variety of dimension stone now available, which is mainly due to the upswing in dimension stone exploration in Namibia, with 28 exploration licenses, 19 Mining Licenses (2004) for dimension stone granted and several applications pending.

The proposed project development will have great positive benefits at local (Karibib, Usakos, and Walvis Bay areas), regional (Erongo Region), and national (Namibia) levels and these benefits include the following:

- i. Provide direct and many more indirect contracts and employment opportunities, to local Namibians especially the Erongo Region where the quarry site is located. About 15+ people will be employed by the proponent
- ii. Other direct and indirect socioeconomic benefits in terms of increased in local communities purchasing power and support to local businesses and services providers including the local authorities of Karibib
- iii. Additional socioeconomic benefits will also be realized at regional and national levels in terms of capital investments, license fees, royalty taxes payable to government, export earnings, foreign direct investments and various taxes payable to the Government.

- iv. Support to the increase in local minerals resources value addition and beneficiation opportunities through the operations of the Karibib and Walvis Bay stone processing plants.
- v. Support to local skills transfer and training of local Namibians in dimension stones mining and processing techniques and technological know-how
- vi. Socioeconomic benefits including upgrading and maintenance of the local road and water infrastructures in the local areas for greater benefits of the local community.

For this reason, the applicant is proposing to carry out an exploration or prospecting study to quarry for Marble for several weeks which will be done in various stages. The geological mapping will be done in months; and 3 to 6 months of exploration period is envisioned.

### **3.2. Proposed locality**

The proposed exploration will take place on mining claims situated about 7Km Northwest of Uiba Oas Crystals Market along the D1918 route. The site sits at about 31.1km Northwest of Usakos which is the nearest town, falling within the following coordinates (Figure 2):

- **Mining claim 1 Claim No: 69059.**
  - *21° 55'23.09"S, 015°18'14.24"E;*
  - *21° 55'20.39"S, 015°18'24.28"E;*
  - *21°55'17.68"S, 015°18'34.33"E;*
  - *21° 55'27.05"S, 015°18'37.23"E;*
  - *21° 55'32.48"S, 015°18'17.28"E.*
- **Mining claim 2 Claim No: 69060**
  - *21° 55'41.84"S, 015°18'20.04"E;*
  - *21° 55'32.48"S, 015°18'17.28"E;*
  - *21°55'27.05"S, 015°18'37.23"E;*
  - *21° 55'34.87"S, 015°18'40.15"E;*
  - *21° 55'38.36"S, 015°18'30.10"E.*

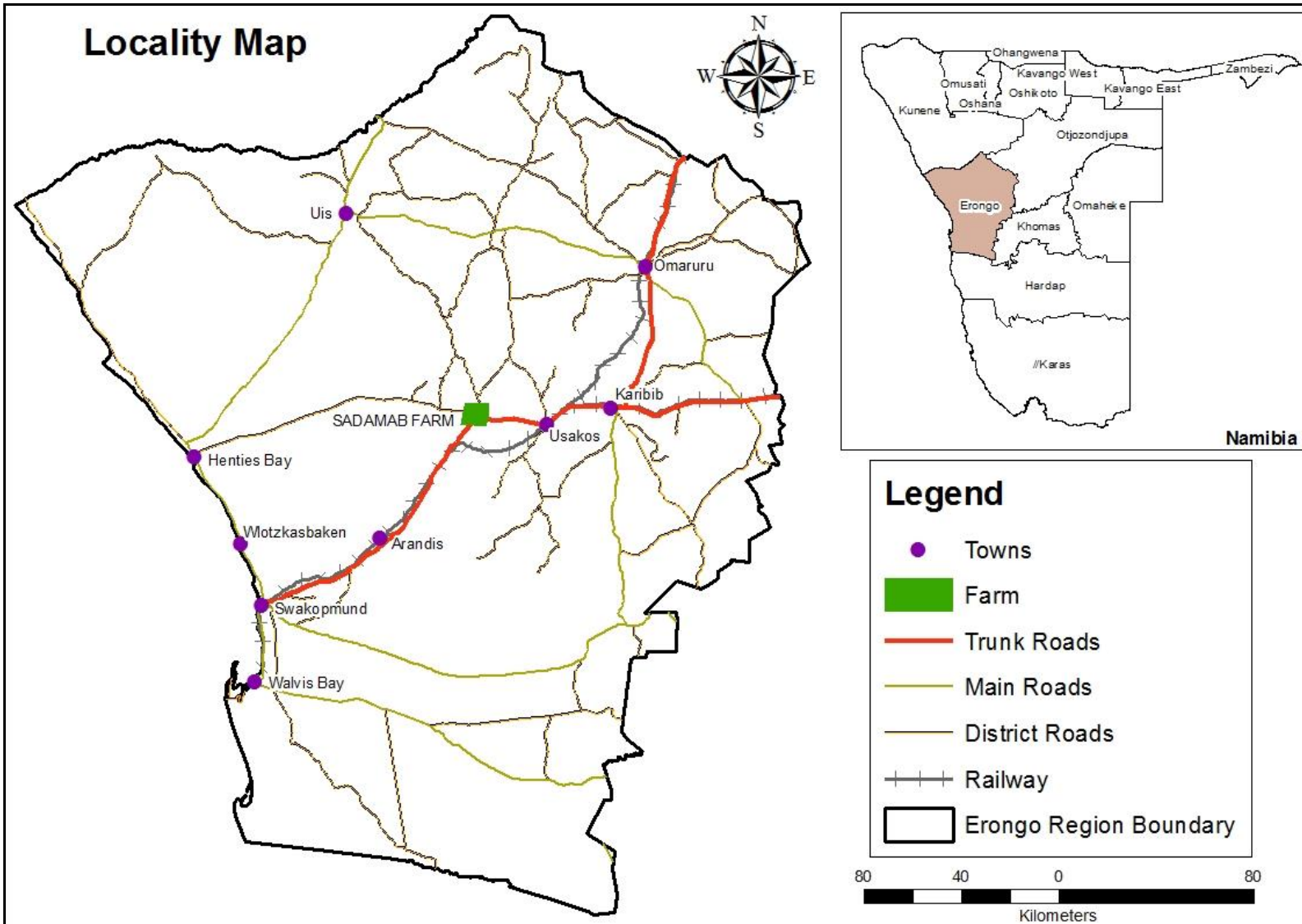


Figure 2: Locality of Farm 64, Sadamab, Erongo where the Mining Claims are located

### 3.3. The available regional and local infrastructure and services to the project area

The mining claims 69059-69060 are linked to the national road network by B2, connecting D1918 the road after Usakos (Figure 3). Usakos is the major settlement found nearby the claim areas. To access the claim, an existing gravel road will be used. The nearest port for transporting the Marble slab to South African markets will be through Walvis Bay. Below find the summarised table depicting the available infrastructure and services to the project area or mining claim area numbers 69059-69060:

**Table 1: Infrastructure and services nearby the project area**

<b>Location</b>	The Mining Claim area located 31.1 km from Usakos
<b>Main Town / Settlement</b>	The main town close to the claim area is Usakos
<b>Road Linkages</b>	B2 connecting to D1918
<b>Rail Linkages</b>	None
<b>Estimated Distances</b>	Claim to Usakos 31.1km
	Claim to Karibib 62.8km
	Claim to Arandis 75.5km
	Claim to WalvisBay 164km
<b>Nearest Port Facility</b>	The nearest Port Facility is at WalvisBay
<b>Water Availability</b>	During the exploration phases, water will be transport to the site to fill up a 500L tank.
<b>Electricity Availability</b>	There are no power infrastructures nearby the exploration site. Generators will be used on-site for the power supply.



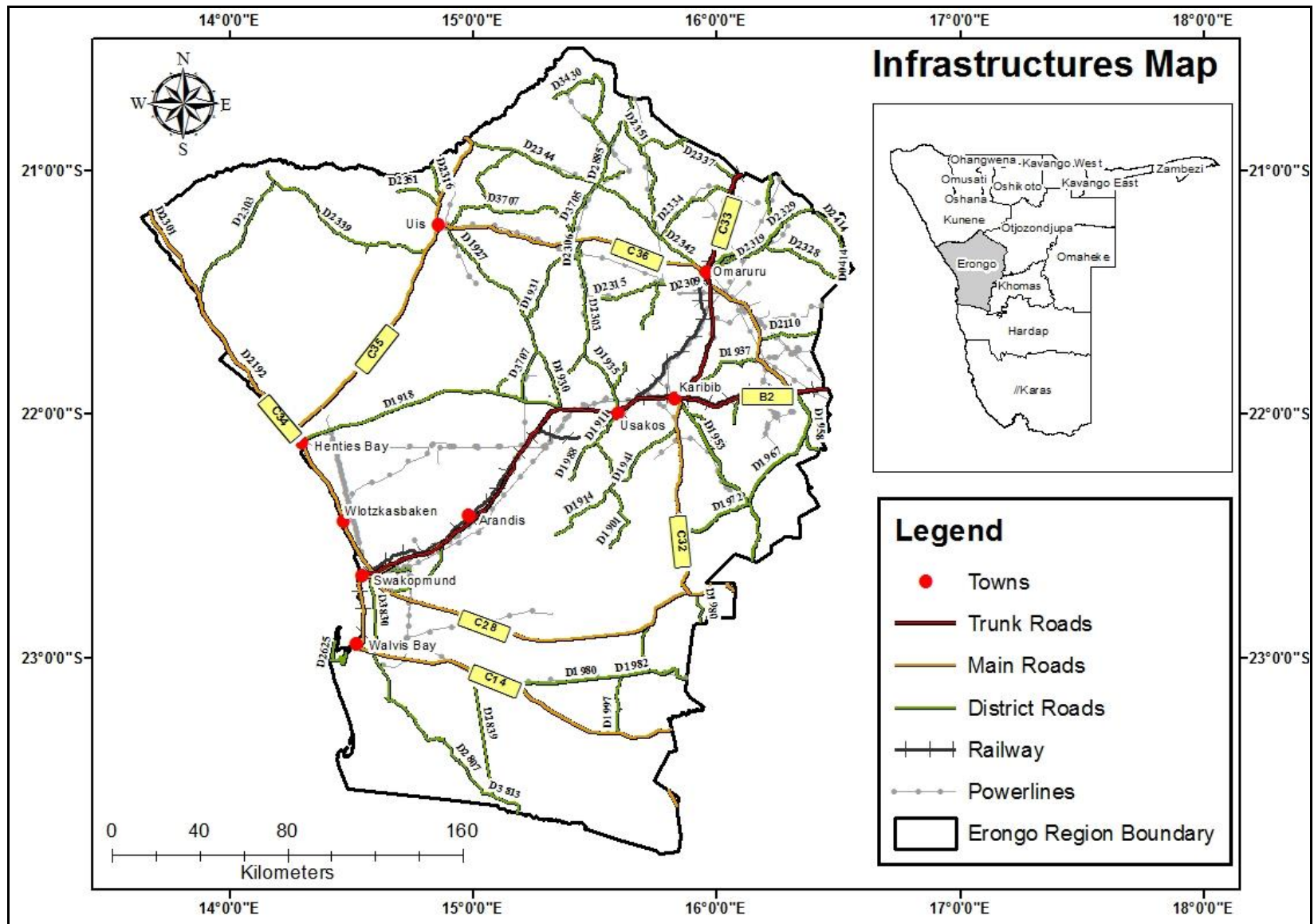


Figure 3: Infrastructure map of Erongo Region

### 3.4. Infrastructure and exploration equipment required for the project

The exploration period will last for a period of six (6) Months using the exploration methods outlined above. During the exploration process, compressed air-powered Jack Hummers will be used to drill 5mm diameter holes to a depth of 200cm. To create weak points for bulk sampling, the holes will be drilled in a rectangle pattern. The collected bulk samples will ship to The Republic of South Africa (RSA) and Italia for geotechnical and construction material tests. Besides drilling which induced shallow cracks into the Marble, and no blasting will be conducted.

#### 3.4.1. Exploration equipment's

The lists of machines/equipment that will be used in the exploration process are given in **table 3** below.

**Table 2: List of machines/equipment and quantity to be used in exploration**

Item	Quantity
Compressor	2
Jack Hummer	2
Perforator	1
Diamond Wire Saw	1
Generator	1
Front End Loader	1
Water Tank	1
Diesel Tank	1

#### 3.4.2. Infrastructure requirements

##### a. Waste disposal infrastructure

Bins will be provided, and all litter will be disposed of at the nearest municipal dumping site (I.e. Proposed Usakos). Industrial waste will be mainly wire, cable, drill bits, these items will be collected and removed from the site. No unused machines part will remain on-site Chemical Toilets (Mobi Loo) will be erected on-site for the use of the workers.

**b. Proposed access road to the exploration area**

The existing roads D1918 connecting to B2 will be used for transportation of types of equipment to and from the site and also the bulk samples collected for testing. To get to the site a small existing stretch of road will be use to access the claim and the road is about +- 1 km long (Figure 4).



Figure 4: Existing road to the site

### **3.5. Project Alternatives**

The proponent believes that it has searched for the best technical, environmental, and economic solution for the proposed prospecting for a quarry project. The prospecting location is dependent on the local tectonostratigraphic and the potential regional economic geology. Therefore, finding an alternative location for the planned exploration activities is not possible. In other words, the target mineralization is area specific, which means exploration targets are primarily determined by the geology (host rocks) and the tectonic environment of the site (ore forming mechanism). An alternative to the proposed quarrying activities would be to allocate the land usage to other income generating activities such as farming and tourism activities. Although the above-mentioned activities (farming and tourism) may generate revenue for the government and provide employment to a few individuals, they may not have a significant impact on the surrounding community in comparison to the proposed marble quarrying project. The tenement has sufficient surface area that, should an economic good dimensions stone deposit be defined there is adequate area for potential tailings storage areas, waste disposal, heap leach pads if required and processing facilities.

### **3.6. Decommissioning plan**

The economic situation or unconvincing exploration results may force the Proponent to eventually cease with the exploration program. However, during the operational phase and before decommissioning, the Proponent will need to put site rehabilitation measures in place. Where necessary, stockpiling of top soil for rehabilitation at a later stage will be undertaken. Necessary landscaping of exploration areas will be undertaken upon completion of each phase of exploration

### **3.7. Concluding remark on this section**

In this section the information on the rationale for the project, project location, regional infrastructure, needed infrastructure, and decommissioning of the project. Human waste from the chemical toilets (Mobi loo) will be dumped at Usakos Municipality Sewerage System.

#### 4. Legal and regulatory framework review

The national regulations governing prospecting and mining for dimension stone activities in Namibia fall within the jurisdiction of the Ministry of Mines and Energy (MME). The Minerals (Prospecting and Mining) Act (No 33 of 1992) is the most important legal instrument governing the mining and prospecting industry in Namibia.

The Minerals (Prospecting and Mining) Act (No 33 of 1992) regulates reconnaissance license, prospecting license, and mining of minerals and dimension stone or rocks. The Act details reporting requirements for monitoring of activities and compliance with environmental performance, such as disposal methods and rehabilitation. The Mining Commissioner, appointed by the Minister, is responsible for implementing the provisions of this Act as well as the associated regulations such as the Health and Safety Regulations. Several explicit references to the environment and its protection are contained in the Minerals Act, which provides for environmental impact assessments, rehabilitation of prospecting and mining areas and minimizing or preventing pollution.

##### 4.1. Mineral Act of 1992 and the types of license it regulates

Below is an outline of the Mineral Act, linking the type of license it regulates, project activities at every license stage and the environmental requirements are (**Table 3**).

**Table 3: Types of license regulated by the Mineral Act of 1992, activities and environmental requirements**

Types of license	Activities	Environmental Requirements
Exclusive Reconnaissance License (ERL)	1. Project Identification, 2. Reconnaissance	None Complete Environmental Questionnaire
Exclusive Prospecting License (EPL)	Exploration based on the following steps: Desktop study, Detailed Mapping, Geophysical methods, Drilling and Bulk Sampling, Test a quarrying	Scoping Report, Environmental Impact Assessment (EIA)

Types of license	Activities	Environmental Requirements
<p style="text-align: center;"><b>Mining License</b></p>	<p style="text-align: center;">Preconstruction and Construction, Operation and, Ongoing Monitoring, Decommissioning, Closure, Restoration, and Aftercare</p>	<p style="text-align: center;">Full Environmental Assessment, covering Scoping, Environmental Impact Assessment(EIA) and the development of and Environmental Management Plan (EMP)covering the complete project lifecycle including preconstruction, construction operation, and ongoing, decommissioning and aftercare. Aspects of the Environmental Management Plan are usually incorporated into an Environmental Management Systems</p>

#### 4.2. Legal instrument relevant to this project

There are various legal instruments that advocates for the effects of prospecting or exploration on the environment and prospecting in general. Table 4 shows the summaries of the legislation that are relevant to this project:

**Table 4: Legal instruments relevant to this project**

Topic	Legislation	Provisions	Regulatory Authority
Marble exploration	Mineral (Prospecting and Mining) Act of 1992	The Minerals Act of 1990 governs minerals prospecting and mining. The Act provides for the reconnaissance license, prospecting license and mining for, and disposal of, and the exercise of control over minerals in Namibia.	Ministry of Mines and Energy
Environmental Impact Assessment	Environmental Management Act of 2007 and EIA regulation of 2012	Provides a list of activities that require an environmental assessment, including Mining and Quarrying. Activities such as exploration or prospecting for minerals or dimension stone, mining for minerals or dimension stone. 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 a project.	Ministry of Environment, Forestry and Tourism
Water Supply and Effluent Discharge	Water Resources Management Act of 2004	<p>This Act provides provisions for the control, conservation and use of water for domestic, agricultural, urban and industrial purposes.</p> <p>The Act states that a license or permit is required to abstract and use water, and also discharge effluent.</p> <p>In accordance with the Act, and due to the nature of the project, abstraction and use permits won't be required for this project as an on-site water tank (500L) will be used. The capacity of the onsite tank is less than 20000m<sup>3</sup> benchmark for the water work permit.</p> <p>Effluent (i.e. Human Waste) from the mobile toilet will be discharged at the Karibib Municipality sewerage system. No effluent will be discharged in a watercourse. Wastewater from dust suppression will be minimal and the water is expected to evaporate faster than it infiltrates. Therefore, no effluent discharge permits will be required for this project</p>	Ministry of Agriculture Water and Forestry



Topic	Legislation	Provisions	Regulatory Authority
Hazardous Substance such as used oil which (e.g. diesel)	Hazardous Substance Ordinance 14 of 1974	The Act provides for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature of the generation of pressure thereby in certain circumstances; to provide for the prohibition and control of the importation, sale, use, operation, application, modification, disposal or dumping of such substance; and to provide for matters connected therewith”	Ministry of Health and Social Services
Fauna and flora	The Nature Conservation Ordinance, Ordinance of 1975,	In the course of the Mine's activities, care must be taken to ensure that protected plant species and the eggs of protected and game bird species are not disturbed or destroyed. If such destruction or disturbance is inevitable, a permit must be obtained in this regard from the Minister of Environment and Tourism. For this project, due to its areal extent and location outside a protected area, a permit will not be required.	Ministry of Environment, Forestry and Tourism (MEFT)



Topic	Legislation	Provisions	Regulatory Authority
Used oil	Petroleum Products and Energy Act 13 of 1990	The Act provides provisions for any certificate holder or another person in control of activities related to any petroleum product is obliged to report any major petroleum product spill (defined as a spill of more than 200l per spill) to the Minister. Such a person is also obliged to take all steps as may be necessary for accordance with good petroleum industry practices to clean up the spill. Should this obligation not be met, the Minister is empowered to take steps to clean up the spill and to recover the costs thereof from the person. Used oil from this project will be disposed of at the Walvis Bay Municipality Hazardous Waste Site. Permission will be required from the facility owner prior to the dumping of the used oil.	Ministry of Mines and Energy
Employees	The Labour Act, 2007 (Act No. 11 of 2007)	The Labour Act gives effect to the constitutional commitment of Article 95 (11), to promote and maintain the welfare of the people. This Act is aimed at establishing a comprehensive labor law for all employees; to entrench fundamental labor rights and protections; to regulate basic terms and conditions of employment; to ensure the health, safety, and welfare of employees	Ministry of Labour and social welfare
Archaeological sites	National Heritage Act 27 of 2004 Ministry of Youth	This Act provides provisions for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. The proposed exploration project will ensure that if any archaeological or paleontological objects, as described in the Act, are found in the course of its construction, mining operations or closure that such find is reported to the Ministry immediately. If necessary, the relevant permits must be obtained before disturbing or destroying any heritage.	National Service, Sport, and Culture
Desertification	United Nation Convention to Combat Desertification 1992	The convention objective is to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability	United Nation Convention

Topic	Legislation	Provisions	Regulatory Authority
Biodiversity	Convention on Biological Diversity (CBD) 1992	This convention advocates for 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.	United Nation Convention

#### 4.3. Regulatory authorities and permitting

The environmental regulatory authorities responsible for environmental protection and management in relation to the proposed exploration project including their role in regulating environmental protection are listed in Table 5. Table 5 below shows an extract from the legal instruments of the regulating authorities with respect to the relevant permits/ licenses required for the proposed exploration study.

**Table 5: The regulatory authority and permitting**

Activities list	Applicable Legislation	Permitting Authority	Current Status
Exploration and small-scale mining programme	Minerals (Prospecting and Mining) Act, 1992	Ministry of Mines and Energy	Field Work to follow on the issue of Environmental Clearance
EIA Clearance for Exploration	Environmental Policy and Environmental Management Act, (Act No. 7 of 2007)	Ministry of Environment, Forestry and Tourism (MEFT)	To be applied upon completion of this EIA and EMP Report for Exploration
EIA Clearance for Mining	Environmental Policy and Environmental Management Act, (Act No. 7 of 2007)	Ministry of Mines and Energy	To apply if Economic Resources are Discovered and Project Advances to Feasibility and if the Feasibility Proves Positive

Activities list	Applicable Legislation	Permitting Authority	Current Status
Construction, alteration of Waterworks with the capacity to hold in excess of 20,000L. The abstraction of water other than that provided by Nam Water. Discharge of effluents or construction of effluent facility or disposal site	Water Resources Management Act, 2004 (No. 284 of 2004).	Ministry of Agriculture, Water and Forestry	To Apply when Required
Removal, disturbances or destruction of bird eggs	Nature Conservation Ordinance 4, 1975.	Nature Conservation Ordinance 4, 1975.	To Apply when Required
Removal, destruction of indigenous trees, bushes or plants within 100 yards of stream or watercourse	Forestry Act, 12 of 2001	Ministry of Water Affairs and Forestry (MWAFF)	
Discarding or disposing of used oil	Petroleum Products and Energy Act 13 of 1990	Ministry of Mines and Energy (MME).	
Construction of waste Disposal sites.	Environmental Policy and Environmental Management Act, (Act No. 7 of 2007)	Ministry of Environment, Forestry and Tourism (MEFT)	
License to Purchase, store and use of Explosive	Explosives Act 26 of 1956 (as amended in SA to	Ministry of Safety and Security in	
Magazines for Blasting	April 1978),	consultation with Ministry of Mines and Energy (MME).	

#### 4.4. Concluding remark on this section

In this section information on the relevant legislation to the project, the types of license required and the permits were presented. The regulatory authorities relevant to the project were also mentioned in this section.

## **5. Receiving environment**

---

### **5.1. General description of the project**

The proposed exploration project for mining claims number: **69059-69060** involves undertaking an exploration study and small-scale surface mining for dimension stone in particular Marble. The overall aim of the project is to evaluate the possible development of a viable quarry for Marble. The activities that will be undertaken will start with preliminary studies, detailed assessments, construction, operation closure, rehabilitation, and aftercare. The mineral groups that are targeted in these claims are dimension stone in particular Marble.

**Dimension Stone:** In accordance with the provisions of Schedule 1, Groups of Minerals, Elements and Rock (Section 1), Part 2 of the Minerals (Prospecting and Mining) Act, 1992, (Act No. 33, 1992), Dimension Stone Group include all rock material occurring naturally in, on or under the earth which is capable of being cut, shaped or used in blocks, slabs, sheets and tiles for the construction or cladding of buildings, paving, monuments and memorials.

Exploration phases for the dimension stone described in section two will be followed.

The following are the exploration phases:

- a) Desktop Study
- b) Field evaluation
- c) Detailed mapping
- d) Drilling
- e) Geophysical methods
- f) Bulk Sampling
- g) Test Quarrying

### **5.2. Social-economic environment**

#### **5.2.1. Erongo region socio-economic perspectives**

In 1991 the Erongo Region had a population of 55 470. A decade later, this number had increased to an estimated 107 663, resulting in a growth rate of almost 94% during the period 1991 to 2001 (NPC, 2001). The Erongo region comprises seven constituencies, namely Karibib, Daures, Omaruru, Karibib, Brandberg, Walvis Bay Rural, Walvis Bay Urban, and Swakopmund. The proposed project will take place in Karibib District.

The Erongo Region is one of the most affluent regions in Namibia, with the second highest per capita income at N\$16 819 per annum. This income is mainly comes from the tourism, fishing, and the mining economic sectors. Compared to other regions in

Namibia, this region has the second highest level of development and the second lowest rate of human poverty, yet it still has a high unemployment rate at 34 % as of 2001. The private sector employs approximately 68% of the employed population, while 16% are employed by the government and the remaining 16% is unaccounted for (ERC, 2007). The fishing and mining industries are the main employers, while the main economic drivers are the mineral sector, fishing, tourism, the Walvis Bay Corridor Group and Namport.

The economic activities in the Erongo Region revolve around its natural resources both renewable such as fish, as well as non-renewable resources which include minerals. Over the past few years, Namibia has experienced an unprecedented interest in its uranium deposits. This resulted from a sharp increase in demand and the resultant increase in the price of uranium oxide. A number of predominantly international mining companies commenced with exploration and development of new mines, mostly in the Erongo Region.

According to the Uranium Rush SEA, the mining industry as a whole throughout Namibia accounts for approximately 20% of the GDP, while in 2009, 4% of the GDP was accounted for by the uranium industry (SAEIA, 2011). In this region, industrial infrastructure is provided by a railway connection that is also used by the mines to transport ore to Walvis Bay from where it is shipped for export. Consequently, an increase in mining activities has also contributed to the increase in container shipments through the Port of Walvis Bay (SAEIA, 2011).

The Erongo Region is also connected by the national road network to the rest of the country via Okahandja, Windhoek, Omaruru, and Otjiwarongo and forms part of the Trans Kalahari Highway. Thus, the transport networks within the Erongo Region play a key role in the facilitation of trade via Walvis Bay, supporting it as a hub for commercial trade.

The fishing industry is another key economic activity and forms the base of the industrial activity in the region (SAEIA, 2011). The commercial fishing industry contributed 5 % to the Gross Domestic Product (GDP) in 2005 according to a study undertaken by Investment House Namibia (2011).

The study area is situated in the Usakos area, Karibib Constituency, Erongo Region. There is a high level of unemployment in the area with a high crime rate and other social pathologies such as sexually transmitted diseases and substance abuse. Most of the people live in Usakos Town and have access to electricity and piped water. Based on the latest census results (Namibia Statistics Agency (NSA), 2012) Usakos has a total population of approximately 3 583 inhabitants. Economic activities taking place in the Usakos and the surroundings comprise of mining (large and small scale) and farming activities. Navachab Gold Mine is the largest mine in the area and employs approximately 480 people. There is an existing marble cutting and polishing facility but has since stopped operations.

With regard to employment, about 5 to 10 people will be recruited on this project during the exploration period and more during the quarrying phase. It is anticipated that the project will not have any negative impact on the people within its vicinity. Instead, the project poses a significant positive impact on the people within its vicinity for employment creation, support of local retailers, export taxes and VAT payment to the Government. The project site is located very far from major settlements such as Henties Bay, Swakopmund, and Walvis Bay. Karibib and Usakos are the only major settlements near the project site, with a distance of about 44.8 km to Usakos and 47.4km to Karibib respectively. Both Karibib and Usakos are linked to this project on the B2 road. Waste that will be generated on-site is proposed to be dumped at Karibib and Usakos.

### **5.3. Archaeology and heritage sites**

No archaeological and heritage sites are known to be located within the proposed exploration site of the mining claims. The exploration site is located away from the archaeological sites. The mitigations measure for the protection of archeological sites are addressed in section 7 of this document and the EMP. The project management should, however, be made aware of the provisions of the National Heritage Act regarding the prompt reporting of archaeological findings.

## **5.4. Water resources**

### **5.4.1. General hydrology of the study area**

The project site is situated in the southern part of the lower Omaruru Catchment with typical lower catchment characteristics (narrow width, relatively deep soil cover, flat slope, low altitude, low runoff velocity, and a characteristic depositional sediment transport), about 65 Km south of the currently active Omaruru River channel, 13km north of the Khan River and 28km north of the Swakop River (Figure 5). The local surface drainage trends northwest, while the regional trend of surface water flow is essentially southwest. The average annual rainfall of the area is between 50 and 100 mm, therefore the area has a very limited potential for surface runoff. Although the potential is limited for surface runoff, during heavy reason seasons an area of this nature could generate runoff for a short period, which could reach the nearby active stream of the Khan River. All in all, it can be claimed that the area is generally vulnerable to erosion considering the less than 2 % vegetation cover and strong desert winds. However, the low runoff potential, flat overall slope and typical depositional sediment transport character of lower catchments tend to moderate the area's vulnerability to erosion. The mining claims are located within the Erongo underground water basin (Figure 6). In view of the above, care should be taken by the proponent to ensure that, potential surface water pollution contributing factors such oil spill and other waste are managed on site properly as the EMP.

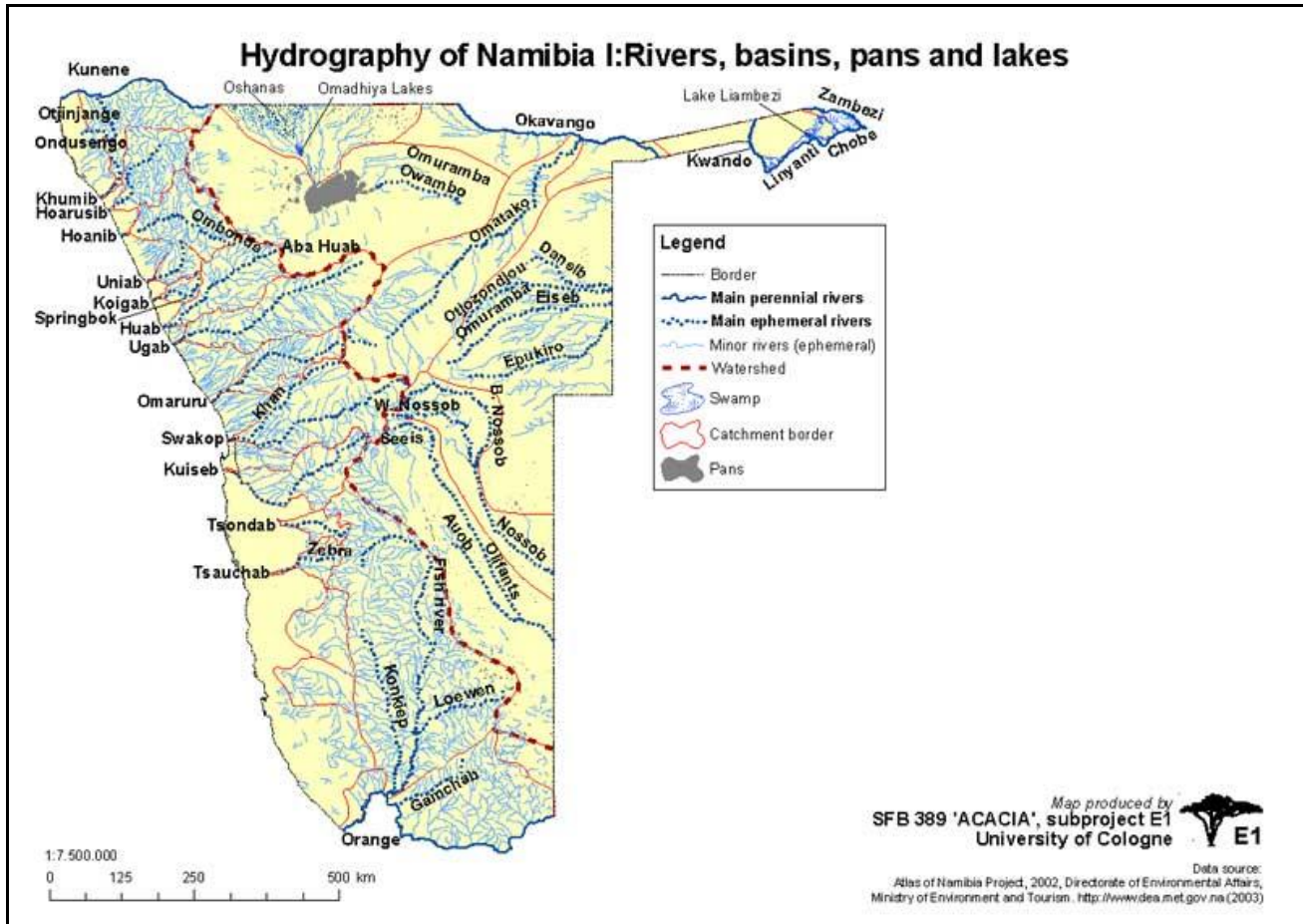


Figure 5: Hydrography of Namibia



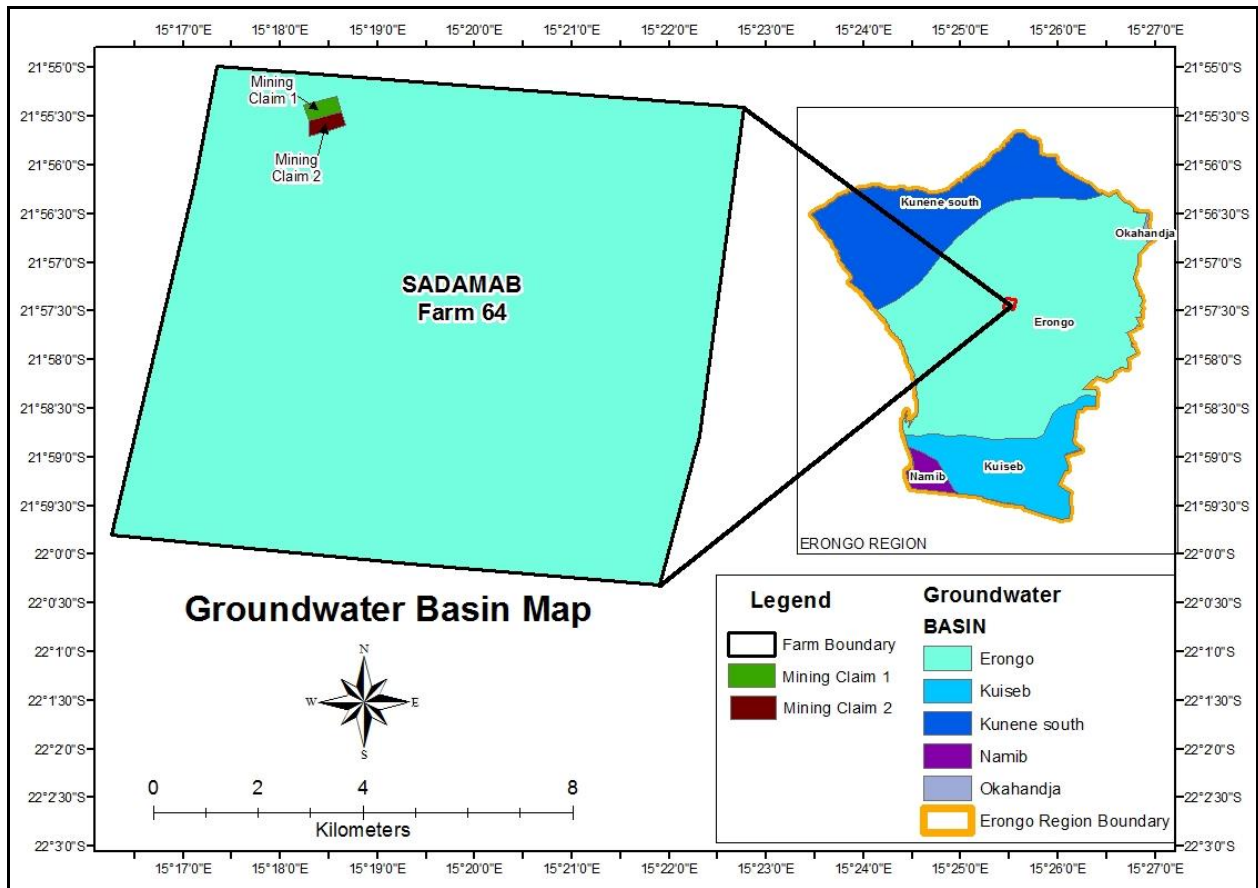


Figure 6: Ground water basin in the project area

#### 5.4.2. Geology of the area

It is well known that the Karibib-usakos District which is part of the Erongo region in Namibia lies within the Damara Belt which is an ENE-trending belt that was formed during the Damara Orogen (Figure 7). The belt is a divergent orogen that formed during high-angle convergence between the Congo and Kalahari Craton (Miller, 1983). The belt is made up of fault – and shear zone bounded zones of varying structural style, ranging from north to south as a fold-thrust belt displaying complex fold interference, a granite dominated inner-zone with elongate, WNW-trending basement cored domes and Damara Sequence basins and in the south a transposed schist belt and another marginal fold-thrust zone with basement cored fold nappes (Gray et al., 2006). Figure 6 below shows the geology of the project area.

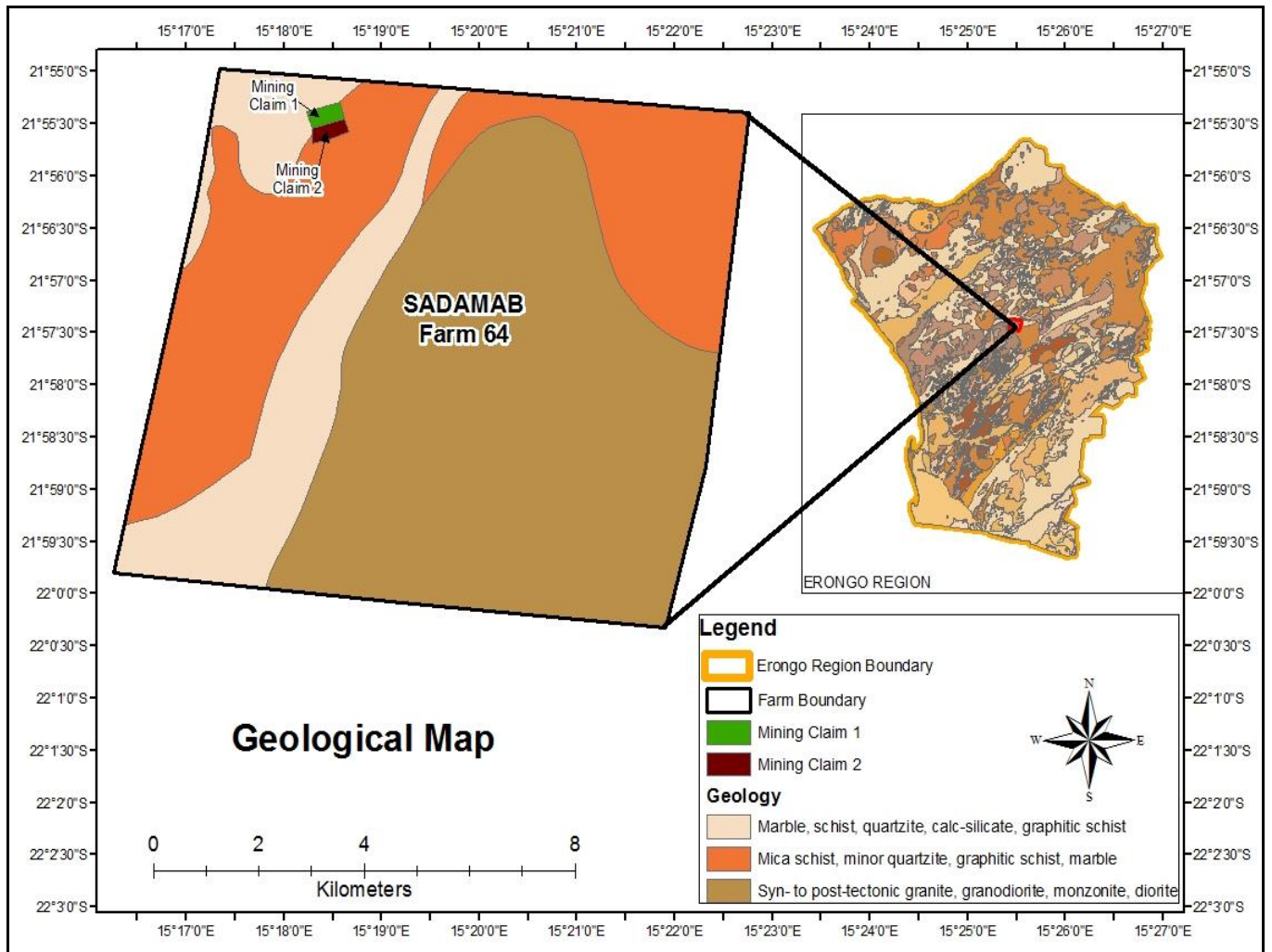


Figure 7: Geology of the study area

The Karibib Marbles belong to the Swakop Group (739-650 Ma) which was formed during the Damara Orogen (Figure 7). The Swakop Group was deposited when limestone and dolomite were precipitated in the submerged deeper parts of the volcano-related graben. The basement on which the Swakop Group rocks rest is made up of rocks of the Abbabis metamorphic Complex (De Kock, 2001). The Swakop facies are generally known to be deeper water turbidites within the ocean basins and they form part of the major geologic components of the Damara Orogen (Gray et. al., 2006). The Abbabis metamorphic Complex is a granitic gneiss basement found within the central zone. It is largely composed of quartzofeldspathic gneiss with minor amphiboles, schist, marble and calc-silicates (Kinnaird & Nex, 2007). The marbles within the Mining Claims belong to the Karibib Formation which is found within the Khomas Subgroup of the Swakop Group. The formation extends from the Northern Zone (NZ) to the southern Central Zone (sCZ) of Namibia and despite a broad similarity across this region it does however show considerable facies changes between each of the NZ, nCZ and sCZ (Miller, 2008). In terms of its composition, the Karibib formation consists chiefly of a thick succession of dolomite marble with very subordinate intercalations of biotite-quartz schist. The development of this formation varies considerably from place to place. It is

therefore difficult to establish a complete and correct stratigraphic section for this unit (Porada & Hill, 1974).

**Table 6: The stratigraphy of the Swakop Group (Damara Sequence) based on Miller 2008**

GROUP	FORMATION	MEMBER	LITHOLOGY	COMMENT
<b>SWAKOP GROUP</b>	Damint Suite		Granite	Target Resource
	Kuiseb		<i>Schist &amp; minor amphibolite</i>	Widespread
	Karibib	Arises River	<i>Calc-silicate rock, calc marble</i>	
		Otjongeama	<i>Main marble member</i>	
	Karibib	Obserwasser	<i>Schist &amp; phyletic schist, metagreywacke</i>	
		Okawayo	<i>Discontinuous marble, biotite schist, calc-silicate rocks</i>	
		Spes Bona	<i>Calc-silicate rock, metagreywacke, schist, Marble</i>	

(Source: Muller, 2008)

The stratigraphic position of the Karibib marbles as seen in Table 6 above indicates that they belong to the Karibib Formation of the Swakop Group. The above subdivision indicates that in an area of normal stratigraphic development this formation would be underlain by the Chuos diamictite and overlain by schist of the Khomas Subgroup. On the northern part of the Mining Licence 194 along the boundary on farms ketelbank 66 and Granite 67 there are rocks from the Karibib formation. The upper part of the Mining Licence 19 has abundant surficial deposits and minor rocks. In the central parts of the Mining Licence 194 within the farm ketelbank there are Namibian to Cambrian pegmatites which are surrounded by abundant surficial deposits and minor rocks from the Karibib Formation. Further there is also some Diorite which covers most of the area. From a geochemistry point of view, the dominant rock type on the project site mainly consists of potassium/sodium aluminum silicate (Na-K (AlSi<sub>3</sub>O<sub>8</sub>) with minor calcium and manganese oxides. Whereas schist which is the host rock to the Marbles intrusion generally comprise of quartz (SiO<sub>4</sub>), mica (K(Mg, Fe)<sub>3</sub> Al<sub>2</sub>Si<sub>3</sub>O<sub>10</sub>(OH, F – biotite, KAl<sub>3</sub>Si<sub>3</sub>O<sub>10</sub>(OH)<sub>2</sub> - muscovite), Cordierite ((Mg, Fe)<sub>2</sub>Al<sub>3</sub>(AlSi<sub>5</sub>O<sub>18</sub>), sillimanite and Fe\_Ti oxides.



### **5.4.3. General hydrogeology**

The hydrogeological unity within which the project site is located is indicated by the hydrogeological map of Namibia (DWA, 20034) as an area of very limited groundwater potential (Figure 8). However, river bed (alluvial) deposits, local fractures, and granite contacts can contain significant amounts of groundwater for local/domestic use. Groundwater occurrence is therefore related to north-trending east fractures in the formation, contacts of intrusive linear rock masses (dikes and granite), and alluvial river beds, particularly where the latter attains thicknesses of more than 60 m. Information from boreholes situated 14 Km east of the site reveals shallow groundwater levels of between 25 to 45 m below ground. Outside the Omaruru River Bed, the Swakop Group in the absence of the Karibib Formation is not worth considering as an aquifer (Figure 9). The nearest productive aquifer is the Omaruru Delta (OMDEL) which is approximately 94 km west of the out boundary of the project area. From a pollution vulnerability point of view, OMDEL has been conceptualized as a double-layered aquifer with the top layer being clayish and the bottom/productive layer consisting of coarse fluvial lags. The current groundwater levels at OMDEL range from 30 to 50 m below ground level. Furthermore, a combination of both the terrain slope, fracture orientation, and the groundwater flow direction directs any liquid fluid (wastewater) from the site into the southwest direction. Considering the size of the project area, flow direction, nature of the envisioned Marble quarrying exploration exercise, the distance to OMDEL as well as the nature of OMDEL overburden, it can be said with a relatively high level of confidence that OMDEL won't be threatened by the exploration activities of the site under review. The same goes for the nearest private boreholes which are about 12 Km upstream of the project site.



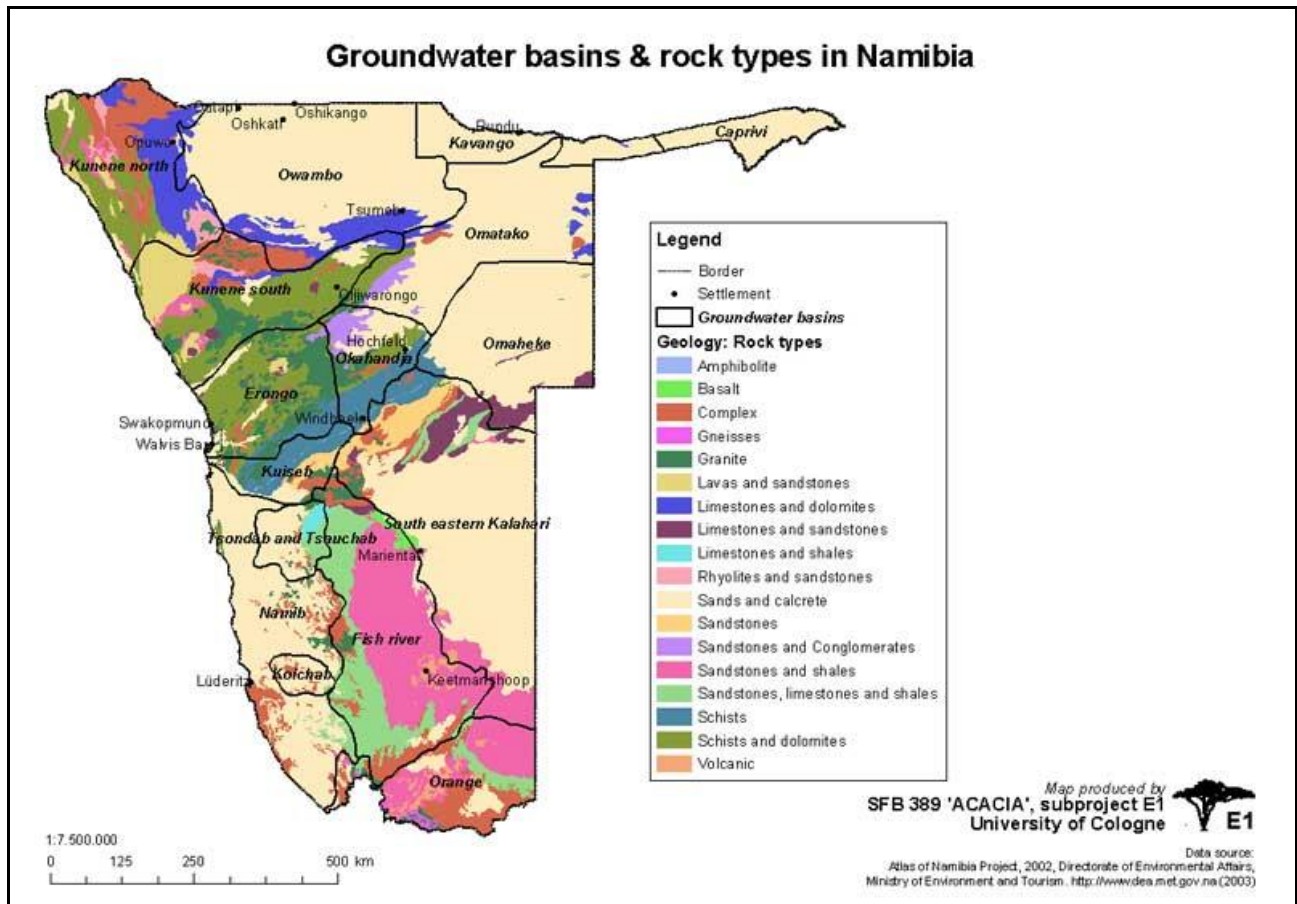


Figure 9: Groundwater basins & rock types in Namibia

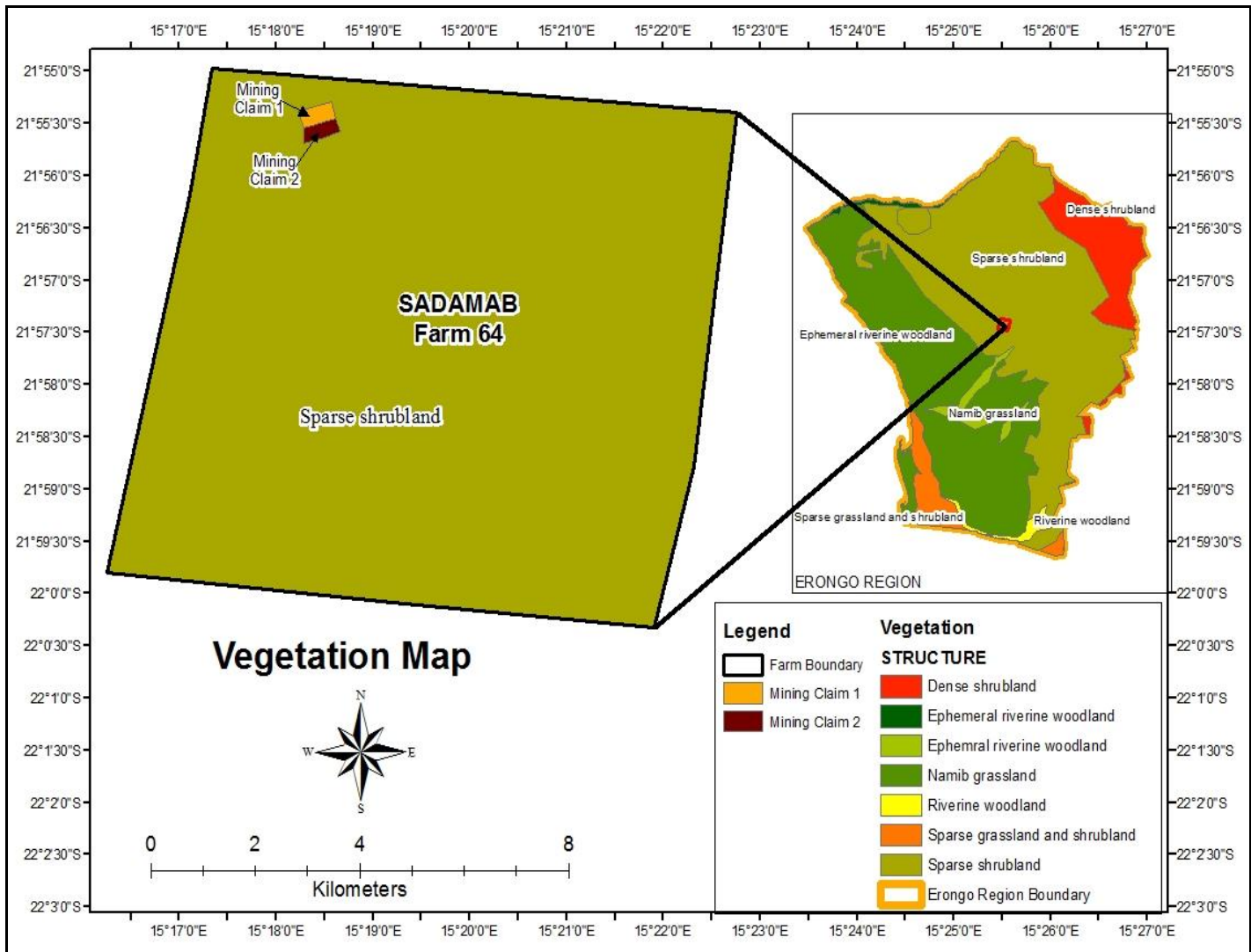
### 5.5. Biodiversity (fauna and flora)

The site is situated in the Namib Karoo and Western Highlands Savannah Biomes, characterized by less than 1% of both trees and grass cover (Figure 10), the trees which are mainly shrubs rarely attain 2 m in height (Figure 10 and 11). The dominant vegetation consists of lichens, psilicoulon salicomiodes and salsola species. In areas of the Namib where more conspicuous lichens do not dominate, a biological soil crust can most easily be seen underneath stones and rocks that harbour fensteralgen (green diatoms) and blue-green algae (cyanobacteria, appear black in their dry state) (Rumrich et al. 1989, 1992; Büdel & Wessels 1991; Belnap & Lange 2001). These organisms find a home under translucent quartz and Marble stones, and they can also grow as a near-surface ring around opaque or large stones (Warren-Rhodes et al. 2007). The plant resources of the area are of limited value and on a scale range of none, poor, low, moderate, good to excellent; they are classified in the None Value category (Mendelson, 2002). Regardless of their low value, due diligence to minimize vegetation disturbance will be exercised during the exploration process.

Species number for mammals in the project area is about 61 to 71 species and the area is ranked number 5 in terms of species sensitivity. The area has 75 species of biodiversity compare to Zambezi Region at 120 and the Namib Desert at 9 species. Bird's endemism is ranked number 5 with endemic species of 8 to 10.

#### **5.5.1. Flora**

Rainfall in the Erongo Region is usually both low and extremely variable which means that years of abundant rain often followed by extreme dry conditions (Mendelsohn, et al., 2002). Vegetation is generally sparse, with few trees and a thin variety of grass. Plant cover varies in relation to rainfall and so the eastern parts of Erongo have more grass and trees than the Western, coastal areas (Christian, 2005). The surrounding area is characterised by high botanical diversity. Based on the literature review, all the vegetation that are found within the vicinity of the area are of "medium" to "high" sensitivity against external conditions. The growing season is very short due to the semi-arid climate. Grass is dependable on rainfall, which in-turn causes livestock and other animals to suffer during periods of minimal rainfall (Burke, 2003). The quarrying area, which is semi-arid, contains diverse vegetation species which include several species endemic to Namibia (Figure 10 and 11).



**Figure 10: Vegetation of Erongo and the mining claims**

The density of vegetation in the vicinity of the quarrying site is sparse. Every effort will be made to protect the existing trees and shrubs, as these are very important to the ambience and visual appeal of the quarrying site. A vegetation expert will be consulted throughout the lifecycle of the quarrying program.

### 5.5.2. Fauna

The purpose of the Fauna literature review is to identify all potential amphibians, reptiles, and mammals expected on the project area and the surrounding farms in the vicinity of the quarrying area. The proposed quarrying area supports numerous faunal species but there are no species that are exclusive to the study area. Larger types of animals such as zebras, giraffes, lions, and elephants are very rare in this area. There are no species that are exclusively endemic to the quarrying area. Based on the literature review, the



development of a quarrying project in the area will not have a negative impact on any of the species in the project area. According to the literature review, there are generally 14 types of amphibian species that occur in project area. Some of the commonly observed species in the project area include: *Breviceps adspersus* (bushveld rain frog), *Bufo dombensis* (Dombe dwarf toad), *Bufo poweri* (Mottled toad), etc. There are generally about 68 species of mammals expected to occur within the immediate area. Some of the common sited mammals in the project area include: *Acinonyx jubatus* (Cheetah), *Antidorcas marsupialis* (Springbok), *Atelerix frontalis angolae*, (Southern African Hedgehog), *Canis mesomelas* (Black-backed Jackal), *Caracal caracal* (Caracal), *Crocuta crocuta* (Spotted Hyena) etc. Considering the relative size of the quarrying area, the mammal fauna will not be affected by the quarrying activities of the proponent. The literature review also showed that there are approximately 60 reptile species that are expected to occur in the site area. According to the Namibia Conservation Ordinance of 1975, there are four reptile species protected, namely: *Psammobates Oculiferus* (Kalahari Tent Tortoise), *Python Natalis* (Southern African Python), *Geochelone Pardalis* (Leopard Tortoise), *Varanus Albigularis* (Veld Leguaan).



**Figure 11:Types of vegetation and vegetation cover at Project Site**

### **5.6. Climate**

In the absence of site-specific metrological information, a general description of the climate of the Erongo region is presented. The Erongo Region is located in the central-western part of Namibia. Landmark features of its boundaries include the Atlantic Ocean in the west, the Ugab River in the north, and the Kuiseb River as part of the southern border. Much of the region is occupied by the Namib Desert which stretches parallel to the coast for the length of the country, to about 120-150 km inland. The climate of the Erongo Region is characterized by aridity. Prominent features of the climate include very low rainfall, averaging about 300 mm in the north-eastern parts and less than 15 mm at the coast with great variability in annually, coastal fog that brings moisture in frequent but small amounts, which moderates the heat and moisture extremes on the western side, wind regime which includes prominent southerly and south-westerly winds during the summer, and north-easterly winds in the winter.

It is generally known that the increase of the rainfall in Namibia is from south to north and from west to east: precipitation figures therefore increase from the coast towards the highlands. Precipitation range 200-450mm per annual from the east (Geyh and Ploethmer, 1995). The upper catchment receives more rainfall than the lower catchment leading to the coast. The climate of the study area is characterized by aridity. Prominent features of the climate include: Very low rainfall, averaging about 50 mm in the north-eastern parts and less than 15 mm at the coast (Figure 12). Very hot temperatures can occur in the inland areas during the day, cooling at night is due to outgoing solar radiation under typically clear skies. Very high rates of evaporation which has significant implications for water balance management.

Most rain in the Namib falls in late summer, between October and April (Etuhole, n.d). The decreasing frequency of high rainfall events in the past decade may be a reflection of climate change or may be a short-term fluctuation. The important point is that variability of rainfall is very high and all mine and infrastructure designs need to take this into account. Seasonality is not strongly developed in the Namib and the average temperature and humidity do not differ markedly in the course of the year. Average summer temperature in the middle zone of the Namib is 23.1°C, and in winter is 19.2 °C (Lancaster et. al., 1984).

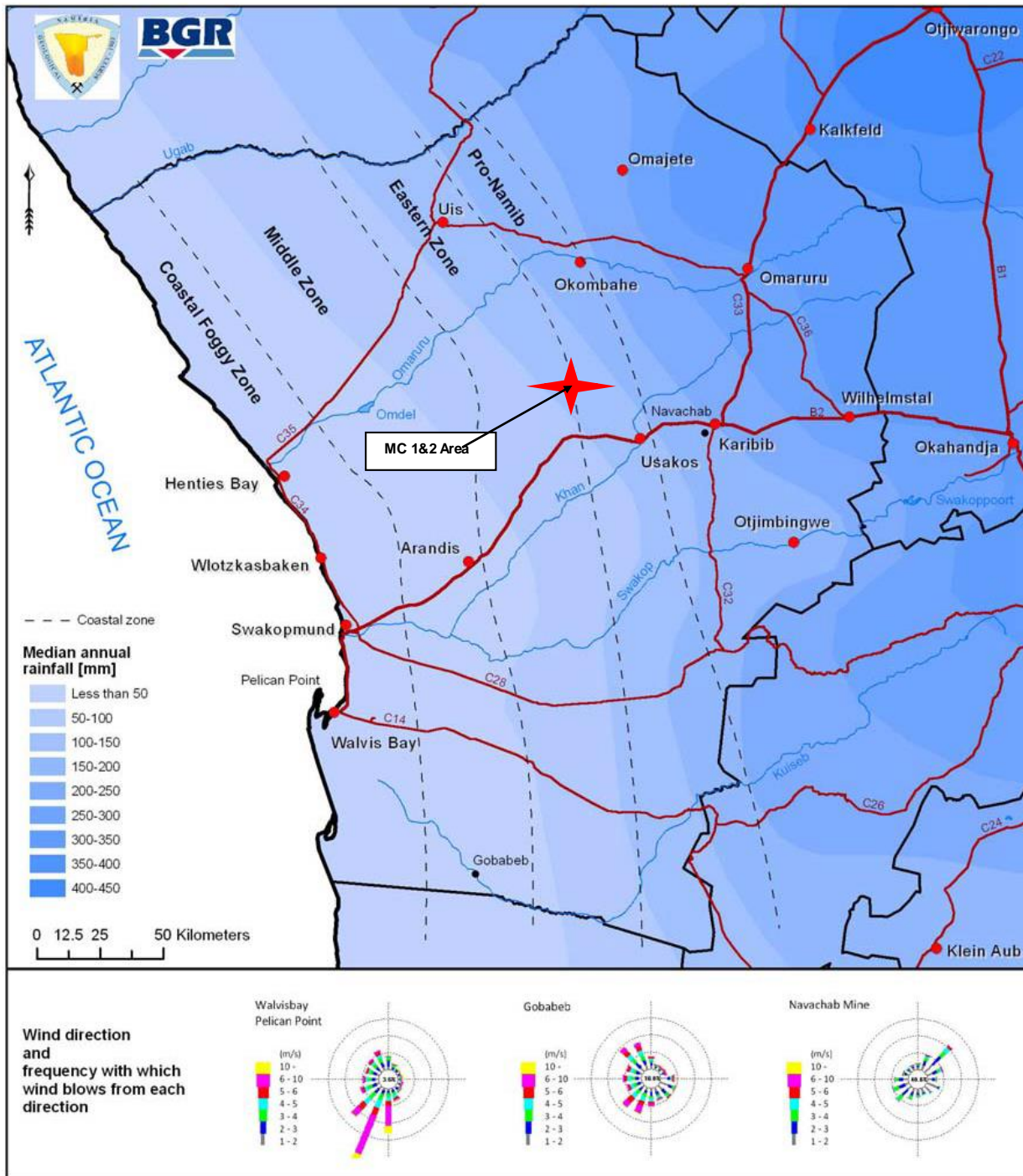


Figure 12: Rainfall of the study area

## **5.7. Potential impact identified**

### **5.7.1. Positive impacts**

- Employment creation
- Support to local retailers shops
- Export taxes and VAT payment
- Provision of infrastructure i.e roads
- increase the demands of goods and services in remote and impoverished towns

### **5.7.2. Negatives impacts**

- Liquid waste: oil spillage and wastewater
- Solid waste: wires, drill bits, and human waste
- Land and soil disturbance: on-site and the proposed 1 km stretch road
- Biodiversity: fauna and flora
- Air pollution
- Noise pollution
- Water resources

## **5.8. Concluding remark on this section**

In this section, the affected environment was described. The social and the biophysical environmental information were provided and also the potential positive and negative impacts of the project were identified.

## **6. Public consultation process**

---

### **6.1. Legal and policy requirement**

#### **6.1.1. Environmental management act (2007) and its EIA regulations (2012)**

Public consultation is a crucial part of the EIA process. This provides an opportunity to stakeholders or interested members of the public to find out more about what is being proposed, and to raise any issues or concerns. The Environmental Management Act 2007 and its EIA regulations of 2012 are the key documents governing environmental impact assessment in Namibia.

One of the key objectives of the Act is to prevent and mitigate the significant effects of activities on the environment by:

“Ensuring that there are opportunities for timeous participation of interested and affected parties throughout the assessment process; and ensuring that the findings of an assessment are taken into account before any decision is made in respect of activities.”

The key principle of the Environmental Management Act 2007 advocates for public participation. The principles states that *“the participation of all interested and affected parties must be promoted and decisions must take into account, the interest, needs and values of interested and affected parties”*.

Section 21 of the EIA Regulations outlines procedure on public participation process as follows:

“(2). The person conducting a public consultation process must give notice to all potential interested and affected parties of the application which is subjected to public consultation by:

- a) Fixing a notice board at a place conspicuous to the public at the boundary or on the fence of the site where the activity to which the application relates or is to be undertaken;
- b) Giving written notice to:
  - i. The owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site;
  - ii. The local authority council, regional council and traditional authority, as the case may be, in which the site or alternative site is situated;
  - iii. Any other organ of state having jurisdiction in respect of any aspect of the activity; and

c) Advertising the application once a week for two consecutive weeks in at least two newspapers circulated widely in Namibia.

(3) A notice, notice board or advertisement referred to in sub regulation (2) must -

a) Give details of the application which is subjected to public consultation; and

b) State:

i. That the application is to be submitted to the Environmental Commissioner in terms of these regulations;

ii. The nature and location of the activity to which the application relates;

iii. Where further information on the application or activity can be obtained; and

c) The manner in which and the person to whom representations in respect of the application may be made.

(6) When complying with this regulation, the person conducting the public consultation process must ensure that a) information containing all relevant facts in respect of the application is made available to potential interested and affected parties; and b) consultation by potential interested and affected parties is facilitated in such a manner that all potential interested and affected parties are provided with a reasonable opportunity to comment on the application.

28. For the purpose of the Act and these regulations a notice is given to a person or a person is informed of a decision, if a document to that effect is:

(a) Delivered personally to that person;

(b) Sent by registered post to the persons last known address;

(c) Left with an adult individual apparently residing at or occupying or employed at the person's last known address; or

(d) In the case of a business-

(i) Delivered to the public officer of the business;

(ii) Left with an adult individual apparently residing at or occupying or employed at its registered address;

(iii) Sent by registered post addressed to the business or its public officer at their last known addresses; or

(iv) Transmitted by means of a facsimile transmission to the person concerned at the registered office of the business."



## **6.2. Consultation approach**

The following activities were undertaken to facilitate stakeholder and community participation during this EIA process:

- The I&AP list was compiled by using GIS information on farm owners' names and addresses along the proposed route. The farmers' telephone numbers were searched in the telephone directory and with the assistance of Telecom's Directory Information service. General stakeholders such as regional and local councils, relevant ministries, NGO's, and institutions were incorporated from other databases.
- A Background Information Document (BID) was compiled, which was distributed via the Internet, NamPost and by Fax. The BID also served as an invitation to I&APs to register their concerns about the project. (See Appendix F).
- The BID invitation was followed up with telephone calls to all commercial farm owners.
- Advertisements to invite interested and affected parties to register their concerns and attend public meetings were placed in the Windhoek Observer and New Era newspaper for two consecutive weeks (Appendix D).

## **6.3. The interested and affected parties (I & AP's)**

The I&APs for this project were identified using information from the existing HJGeo-Enviro Consulting and Trading Cc stakeholder database. Notices were placed in various newspapers inviting the public to register as interested and affected parties. Organizations were also selected whom the consultant considered to be interested in or affected by this particular project. An I&APS can be defined as '(a) any person, group of persons or organization interested in or affected by activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity.

## **6.4. The outcome of the public consultation meeting**

Only one email was received requesting the BID document of the proposed project.

## **6.5. Concluding remark on this section**

In this section, issues on public participation process such steps or methods that were followed, process, the outcome of the public participation process, and key issues identified were presented. Moreover, the legality patterning to public participation was also presented.



## 7. Impact assessment

### 7.1. The methodology used or adopted for the impact assessment

The assessment process that was developed by **HJGeo-Enviro Consulting and Trading Cc** was formulated based on the collection and interpretation of the available literature pertaining to the dimension stone quarry. The process included the review of previous EIA's and EMP's done in the surrounding areas and those about dimension stone in Namibia. Other relevant documents were identified and collected including:

- Environmental regulations covering environment, water, energy, health, and safety as well as all the related policies and guidelines;
- Mining regulations and all the related introductory information obtained from the Office of the Mining Commissioner in the Ministry of Mines and Energy;
- Topographic maps, information and data sets about the location and characteristics of mining claim numbers 69059-69060.
- Information and data sets about the environmental regulation, biodiversity and natural environment around the mining claim numbers 69059-69060 obtained from the Directorate of Environmental Affairs in the Ministry of Environment, Forestry and Tourism;
- Information and data sets about the regional and local geology, geological maps and all the related data sets, published materials and open file documents have all been located in the Directorate of the Geological Survey in the Ministry of Mines and Energy;

**Table 7: Definition of criteria for assessing the significant impact**

Criteria	Description
<b>Nature</b>	Reviews the type of effect that the proposed activity will have on the relevant component of the environment and includes "what will be affected and how?"
<b>Extent</b>	Indicates whether the impact will be site-specific; local (limited to within 15 Km of the area); regional (limited to ~100 Km of the area); national (limited to the coastline of Namibia); or international (extending beyond Namibia's borders).
<b>Duration</b>	Reviews the lifetime of the impact, as being short (days, <1 month), medium (months, <1 year), long (years, <10 years), or permanent (generations, or >10 years).
<b>Intensity</b>	Establishes whether the magnitude of the impact is destructive or innocuous and whether or not it exceeds set standards, and is described as none (no impact); low (where natural/ social environmental functions and processes are negligibly affected); medium (where the environment continues to function but in a noticeably modified manner); or high (where environmental functions and processes are altered such that they temporarily or permanently cease and/or exceed legal standards/requirements).

Criteria	Description
<b>Probability</b>	Considers the likelihood of the impact occurring and is described as improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of prevention measures).
<b>Degree of Confidence in Predictions</b>	Is based on the availability of specialist knowledge and other information.

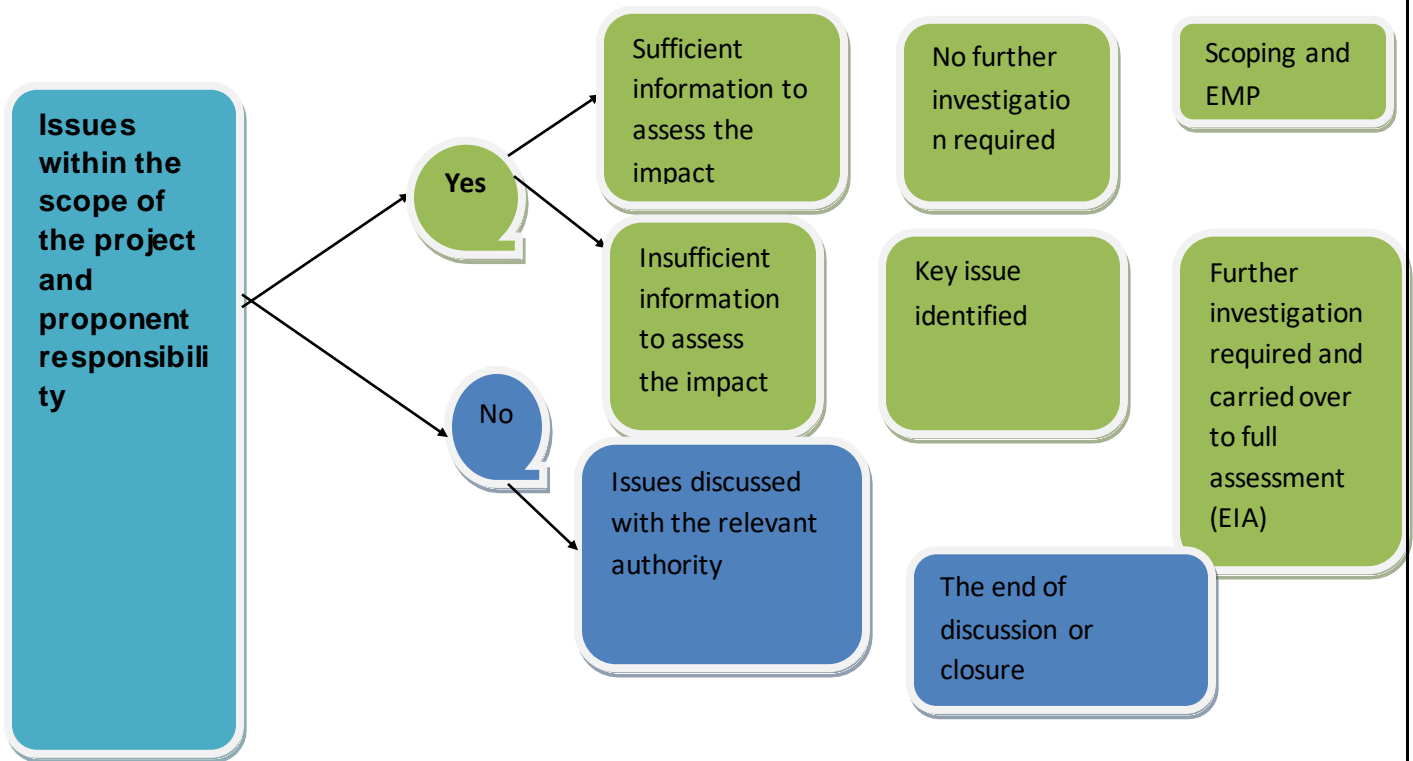
The application of the above criteria to determine the significance of potential impacts uses a balanced combination of nature, extent, duration, and intensity/magnitude, modified by probability, cumulative effects, and confidence. Significance is described as follows as shown in table 9:

**Table 8: Definitions of various significant rating**

SIGNIFICANCE RATING	CRITERIA
Low	Where the impact will have a negligible influence on the environment and no modifications or mitigations are necessary for the given development description. This would be allocated to impacts of any severity/ magnitude, if at a local scale/ extent and of temporary duration/time.
Medium	Where the impact could have an influence on the environment, which will require modification of the development design and/or alternative mitigation. This would be allocated to impacts of moderate severity/magnitude, locally to regionally, and in the short term.
High	Where the impact could have a significant influence on the environment and, in the event of a negative impact the activity(i.e.) causing it, should not be permitted (i.e. there could be a 'no-go' implication for the development, regardless of any possible mitigation). This would be allocated to impacts of high magnitude, locally for longer than a month, and/or of high magnitude regionally and beyond.

## 7.2. Identification of key issues

Potentially significant impact identified from the baseline conditions, legal requirement, and public participation process was screened to obtain issues that require further investigation or assessment and those that don't required further investigation. The process shown in the flow chart below was used for the screening of potential issues. Table 10, shows the screening of the identified impact using the flow chart.



**Table 9: Potential significant impact screening process**

Issues/Impact	Proponent Responsibility	Sufficient Info Yes/No	Mitigation Available	Full assessment required	Issues covered in:
Employment creation	Yes	Yes	Yes	No	Addressed in the EMP
Support to local retailers shops	No	Yes	Yes	No	Addressed in the EMP
Export taxes and VAT payment	Yes	Yes	Yes	No	Addressed in the EMP
Liquid waste: used oil and wastewater	Yes	Yes	Yes	No	Addressed in the EMP
Solid waste: wires, drill bits, and human waste	Yes	Yes	Yes	No	Addressed in the EMP

Issues/Impact	Proponent Responsibility	Sufficient Info Yes/No	Mitigation Available	Full assessment required	Issues covered in:
Land and soil disturbance: on-site and the proposed 8km stretch road	Yes	Yes	Yes	No	Addressed in the EMP
Impact on Biodiversity: fauna and flora	Yes	Yes	Yes	No	Addressed in the EMP

### **7.3. Social-economic implications**

#### **7.3.1. Background to the problem**

Unemployment is not only a responsibility of the Government, but it is also incumbent on citizens to create jobs for fellow Namibians. The proponent would like to carry out an exploratory study that would recruit 5 to 8 Namibians and more during the quarry phases if the exploration study is successful.

#### **7.3.2. The potential effect of the project**

During the six-month exploration study, 5 to 8 employees will be recruited by The proponent. Upon completion of the study, a decision will be made as to whether a quarry should be started or not. If the exploration study findings are positive more local Namibians within the vicinity of the project will be employed. In order to ensure positive economic impacts support local retailers will be recommended. Furthermore, export taxes and VAT payments will also impact positively on the National Economy.

#### **7.3.3. Significance**

By implementing the exploration study the socioeconomic significance of project can be summarized as follows:

**Table 10: The expected significance of the project on social-economic implications**

<b>Criteria</b>	<b>Social economics implications</b>
Extent	<i>local</i>
Duration	<i>short</i>
Intensity	<i>low</i>
Probability	<i>definite</i>
Significance before mitigation	<i>low</i>
Significance after mitigation	<i>low</i>
Degree of confidence in predictions	<i>high</i>

#### **7.3.4. Mitigation and enhancement measures**

- The proponent will ensure that locals will be employed in all casual labour and the process of employment will be gender sensitive.
- While not every local is ensured to be employed, the proponent will conduct pre-consultation with the locals to ensure that the elements of equity, transparency are included or put into account when hiring and recruiting

#### **7.3.5. Monitoring**

- It is recommended that the proponent should employ workers to be obtained from the potentially affected communities in particular Arandis and Karibib Town. The proponent in consultation with the Arandis and Karibib town Councilors, the town councilors will then be responsible to supervise the employment process when implementing this 'local's first' recommendation.

### **7.4. Liquid waste: used oil or oil spillage and wastewater**

#### **7.4.1. Background to the problem**

There are various waste disposal methods used worldwide in the mining industry. Management of used oil at a large scale is reported to be a challenge as more significant maintenance is required to minimize the losses of the oil into the environment (Richards, 2009). Used oil once it spills, it causes a detrimental effect on both living and none living things because its chemical constituents are poisonous. The oil coats and clings to every rock and grain of sand. Sometimes if the oil washes into coastal marshes, mangrove forests or other wetlands, fibrous plants and grasses absorb the oil, which can damage the plants and make the whole area unsuitable as wildlife habitat.

Water is used mainly for cooling for large or small mining activities. The wastewater that is generated is in most cases recycled. But the management of this wastewater sometimes poses a challenge as it requires effective maintenance of facilities holding the wastewater. Incident of wastewater pollution has been reported worldwide, caused by to lack of wastewater management program.

#### **7.4.2. Potential effect form liquid waste**

The spill of oil or used oil is associated with detrimental environmental effects. Potential spillages of drill fluid, lubrication etc. from exploration drilling can contaminate ground water in a sense that drilling could penetrate the groundwater table, and drill fluid could potentially enter the aquifer therefore causing pollution. There will be no storage of oils and fuel on site, however there is risk of spillage of hydrocarbons from vehicles and drilling machine which may result in environmental contamination. Used oil that will be generated on-site for this project during the exploration process will be minimal. But,

regardless of the quantity, management measures will be put in place to make sure that no incident of oil spill takes place.

Wastewater that will be generated during the exploration process will be minimal about less than a 25 liter a day. Therefore, it is assumed that most of this water will evaporate faster than it will infiltrate. The likelihood of surface and groundwater contamination happening will be unlikely if mitigation measures proposed in the EMP are implemented

### 7.4.3. Significance

The significance of the identified problem of the study can be summarized as follows:

**Table 11: The expected significance of the project on liquid waste**

Criteria	Liquid waste :
Extent	<i>local</i>
Duration	<i>short</i>
Intensity	<i>low</i>
Probability	<i>definite</i>
Significance before mitigation	<i>Medium for used oil and low for wastewater</i>
Significance after mitigation	<i>Low for both</i>
Degree of confidence in predictions	<i>high</i>

### 7.4.4. Mitigation measures

- Storage of oils and fuel on site shall not be allowed.
- Implement a maintenance programme to ensure all vehicles, machinery and equipment remain in proper working condition and maintenance should be conducted in designated areas only, preferably off-site.
- Waste oils and fuels from drip trays on stationery vehicles and machinery should be disposed of as hazardous waste at a licensed facility by a specialist hazardous waste handler.

•

### 7.4.5. Monitoring

- ENC should conduct regular inspection of vehicles and machineries to ensure that there is no oil leakages
- Weekly Inspection by ENC to ensure that operating machinery and vehicles are regularly maintained

## 7.5. Solid waste : wires, drill bits, and human waste

### 7.5.1. Background to the problem

Solid waste management is a national problem worldwide, and sometimes this problem extends beyond the mining industry scale. In the mining industry or exploration industry, different types of solid waste are generated and some of these wastes contain toxic substances that can affect living and non-living things. Therefore proper handling and management of these wastes are critical for the protection of the environment.



### 7.5.2. Potential effects from solid wastes

Solid waste that will be generated from this project if not managed will have an effect on the environment. The effect will mainly be at the project site. Human waste that will be generated during the exploration process, if not managed will have an effect on the environment although on a small scale.

### 7.5.3. Significance

The significance of the identified problem of the study can summarise as follows:

**Table 12: The expected significance of the project on solid waste**

Criteria	Solid waste :
Extent	<i>local</i>
Duration	<i>short</i>
Intensity	<i>low</i>
Probability	<i>definite</i>
Significance before mitigation	<i>Medium</i>
Significance after mitigation	<i>Low f</i>
Degree of confidence in predictions	<i>high</i>

### 7.5.4. Mitigation measures

- Contaminated wastes in the form of soil, litter and other material must be disposed of at an appropriate disposal site.
- Strictly, no burning of waste on the site or at the disposal site is allowed as it possess environmental and public health impacts
- Waste disposal sites should be established on-site were paper, plastic and wire should be kept during exploration and operation period.
- The collected solid waste should be disposed of at either the Karibib or Usakos Town Council solid waste disposal sites.
- For human waste, during the construction phase, the mobile toilet should be made available on-site for workers and once these facilities are full, the collected human waste should be disposed at the Karibib or Usakos Council human waste disposal site.
- After completion of exploration activities such as trenching, removed soil layers and rocks must be replaced and levelling must be done so that the original condition is restored.

### 7.5.5. Monitoring

- Daily site inspection by ENC Site inspection on housekeeping
- Weekly site inspection by ENC to ensure regular collection of waste

## **7.6. Land or soil disturbance: on-site and the proposed 1km stretch road from B2 road.**

### **7.6.1. Background to the problem**

The topography of the study area is mountainous with flat surfaces containing the Marble outcrops. During the exploration process, land or soil will be disturbed both on-site and along the proposed stretch road of about 1 km linking the project site to the B2 road. The soil will be removed on the surface rocks during the drilling to recover the slabs needed for testing.

### **7.6.2. The potential effect of land or soil disturbance**

The removed soil during drilling if not properly managed will affect the growth of vegetation and the development of biodiversity hiding or resting spots.

### **7.6.3. Significance**

The significance of the identified problem of the study can summarize as follows:

**Table 13: The expected significance of the project on soil or land disturbance**

<b>Criteria</b>	<b>Soil or land disturbance:</b>
Extent	<i>local</i>
Duration	<i>short</i>
Intensity	<i>low</i>
Probability	<i>definite</i>
Significance before mitigation	<i>Medium</i>
Significance after mitigation	<i>Low</i>
Degree of confidence in predictions	<i>high</i>

### **7.6.4. Mitigations and recommendation**

The top soil from 0 to 30cm to removed and stockpile and to be used during the rehabilitation process. The stockpile will seeded with seeds of grasses and shrubs to keep organic activity alive, as well as ensure a fertile seed bank in the topsoil when it is finally used. It is recommended that top soil to be removed down to the subsoil, where it is significantly thicker than 0.5m, as topsoil is always a scarce resource, and even if this lower material does not contain seed and is poorer in soil organisms, it has been found

to be useful in reclamation. Where top soil is less than 150mm thick the unconsolidated material beneath should also be removed and treated as topsoil.

**7.6.5. Monitoring**

- Daily inspection by ENC to ensure that top soil is removed and stock pile on site.
- Inspection by ENC on a quarterly basis to monitor moisture content & texture of soil.

**7.7. Impact on biodiversity: fauna and flora**

**7.7.1. Background to the problem**

Biodiversity (i.e. fauna and flora) is likely to be affected by the project during the exploration process. But due to the size of the project and duration, the impact is manageable.

**7.7.2. The potential effect of biodiversity impact**

The vegetation types that are found in this area are classified in the none value category. In addition to vegetation, various invertebrates also host the area. Regardless of the low value of the existing vegetation on-site and along the road, activities that will be undertaken during the exploration process is likely to have an effect on the vegetation and the invertebrates. Therefore, management measures will be considered to minimize the above impacts.

**7.7.3. Significance**

The significance of the identified problem of the study can summarize as follows:

**Table 14: The expected significance of the project on Biodiversity: fauna and flora**

<b>Criteria</b>	<b>Soil or land disturbance:</b>
Extent	<i>local</i>
Duration	<i>short</i>
Intensity	<i>low</i>
Probability	<i>definite</i>
Significance before mitigation	<i>Medium</i>
Significance after mitigation	<i>Low</i>
Degree of confidence in predictions	<i>high</i>

#### **7.7.4. Mitigations and recommendations**

- Protected plant species should not be removed but preserved and the activities should fit into the environment without affecting the protected trees.
- Massive clearing shall not be allowed
- Barriers/barricades confining driving trucks must be erected to avoid stray driving and trampling on habitat
- Rules pertaining to safeguarding against poaching and collection of plant and plant products must be established and enforced.
- Monitor the condition of the track before, during, and after use.
- Do not needlessly remove vegetation from either side of the roadway.

#### **7.7.5. Monitoring**

- Regular inspections and monitoring is encouraged and should be conducted by ENC throughout the Period of trenching and drilling.

### **7.8. Air quality onsite**

#### **7.8.1. Background to the problem**

During the quarrying process dust will be generated onsite by earth moving equipment and also on the gravel road by trucks and vehicles. On site, marble blocks will be cut into smaller blocks in order to give them the desired smooth shape. During the cutting process about 25% the original Marble mass is lost in the form of dust. In addition, processing of Marble results in the formation of Marble dust, which is suspended in the air and which could be inhaled by the workers.

#### **7.8.2. The potential effect of impact on air quality**

Epidemiological studies indicates that workers exposed to Marble dust stand an increased risk of suffering from asthma symptoms, chronic bronchitis, nasal inflammation and impairment of lung function (Camici et al., 1978; Angotzi et al., 2005; Leikin et al., 2009). In their study they found out that, the affected workers were having body problems like headache, backache and stressed due tounder- payment (Dagli et al., 2008). Individuals who were having papilloma have faced problem at work like noise, dust or fumes and poor maintenance of equipment (Dagli et al., 2008). Moreover, their data also demonstrated that long period of chronic exposure to dust induced progressive atrophic changes in the alveoli (Gammal et al, 2011). Therefore, there are some potential risk of dimension stone industry on the environmental, which requires attention, mitigations, and management to protect the existing human and animal health.

It is globally known that the generated dust during mining operations of quartzie may affect human, plant and animal growth at the surrounding environment (Kirjoitettu, 2014).

Exposure between 10 and 15 years is associated with the long term complication, while

the short term complication can cause difficulty in breathing” (Kirjoitettu, 2014). The reaction depends on the particle inhaled, as the lung is too exposed to expel particles beyond 10 micro meters (Haruna, 2014). With the inherent natural mechanism of its defence, the lung is supposed to be able to expel such amount of particles but sizes below one to 10 millimeter (mm) can go down to the terminal end of the lung and the macrophages may not be able to expel that (Haruna, 2014). To avoid respiratory or other problems caused by exposure to dust, engineering control methods such as those highlighted in the mitigation measures below and the use of tools that minimized the generation of dust should be introduced.

### 7.8.3. Significance

**Table 15: Expected significance of the project on dust generated on site**

<b>Criteria</b>	<b>Soil or land disturbance:</b>
Extent	<i>local</i>
Duration	<i>long to permanent</i>
Intensity	<i>medium</i>
Probability	<i>definite</i>
Significance before mitigation	<i>high</i>
Significance after mitigation	<i>medium</i>
Degree of confidence in predictions	<i>high</i>

### 7.8.4. Mitigations and recommendation

- Measures such as the use of wet processes enclosure of dust-producing processes under negative air pressure (slight vacuum compared to the air pressure outside the enclosure),
- Exhausting air containing dust through a collection system before emission to the atmosphere, and exhaust ventilation should be used in the workplace.
- Use of personal protective equipment for proper dust control for respiratory protection and should be used only where dust control methods are not yet effective or are inadequate.
- Direct skin contact should be prevented by gloves, wearing respiratory protection during cleanup,

- Educational awareness programs for workers should be instituted about hazard of exposure to marble dust and on the use and maintenance of exhaust ventilation systems, and the use and maintenance of personal protective equipment to avoid risk of dust and noise.
- All gravel roads in quarry areas should have a speed limit of 60km/h for light vehicles and 30km/h for heavy vehicles in order to minimise the amount of dust generated by vehicles.
- In addition, where available water allows, roads should be sprayed with water on a regular basis in order to prevent dust creation.

#### 7.8.4. Monitoring

- Daily inspection by the ENC of the gravel roads and quarry site on possible dust creation that requires attention.
- Daily inspection on site by the ENC to ensure that all workers are wearing their protective clothes at all time during the mining process and the dry skin contact with gloves is prevented.

### 7.9. Archaeological Impact

#### 7.9.1. Background to the problem

Heritage resources may be impacted through unintentional destruction or damage, during exploration activities. Furthermore, there was no information provided about known heritage or site of cultural values within the project site. Therefore, this impact can be rated medium to low, if there are no mitigation measures in place. At the sites, there are no known heritage areas or artefacts deemed to be impacted by the exploration activities. However, there might be unknown archaeological remains within the Mining Claims site hence the Proponent is required to follow the chance find procedures and consult the Heritage Council immediately. Upon implementation of the necessary measures, the impact will be low.

#### 7.8.5. Significance

Criteria	Soil or land disturbance:
Extent	<i>local</i>
Duration	<i>Long-term</i>
Intensity	<i>low</i>

<b>Criteria</b>	<b>Soil or land disturbance:</b>
Probability	<i>definite</i>
Significance before mitigation	<i>Medium</i>
Significance after mitigation	<i>Medium</i>
Degree of confidence in predictions	<i>high</i>

### **7.9.2. Mitigations and recommendation**

The Proponent should consider having a qualified and experience archaeologist on standby during exploration work and sampling phase and as required during the entire operational phase. This action will be to assist on the possibility of uncovering sub-surface graves or other cultural/heritage objects and advice the Proponent accordingly. Identified graves or any archaeological significant objects on the site should not be disturbed, but are to be reported to the project Environmental officer or National Heritage Council offices.

If discovery of unearthed archaeological remains to be uncovered, the following measures (chance find procedure) shall be applied:

- Works to cease, area to be demarcated with appropriate tape by the site supervisor, and the Site Manger to be informed
- Site Manager to visit the site and determine whether work can proceed without damage to findings, mark exclusions boundary
- If work cannot proceed without damage to findings, Site Manager is to inform the Environmental Manager who will get in touch with an archaeologist for advice
- Archaeological specialist is to evaluate the significance of the remains and identify appropriate action, for example, record and remove; relocate or leave in situ (depending on the nature and value of the remains) - Inform the police if the remains are human, and
- Obtain appropriate clearance or approval from the competent authority, if required, and recover and remove the remains to the National Museum or National Forensic Laboratory as appropriate.

### **7.9.3. Monitoring**

- ENC should conduct constant inspections on such sites throughout the exploration duration

## **7.10. Noise on site**

### **7.10.1. Background to the problem**

Noise pollution on site is most likely to be generated by drilling machines, earthmoving equipment, breaking, crushing, and transport of equipment during the exploration activities. Excessive noise can be a nuisance to people, also potentially causing hearing problems to workers on the site.

### **7.10.2. Potential effects of noise**

Noise generated might affect employees working at the site hence posing a risk of ear damage. The normal levels of 55 decibels recommended by World Health Organization (WHO) might be surpassed during the exploration phase. Noise generated might affect animals and result in some animals changing their habitat. Prolonged noise might cause annoyance to passers-by. Villagers are unlikely to be affected given that the villages are far away from the sites. Drilling machines can produce noise of 95- 100 decibels. However, the impact of noise will remain of low environmental significance if mitigation measures are implemented.

### **7.10.3. Significance**

<b>Criteria</b>	<b>Soil or land disturbance:</b>
Extent	<i>local</i>
Duration	<i>Short</i>
Intensity	<i>medium</i>
Probability	<i>definite</i>
Significance before mitigation	<i>Medium</i>
Significance after mitigation	<i>low</i>
Degree of confidence in predictions	<i>high</i>

### **7.10.4. Mitigations and recommendation**

- Noise from operations vehicles and equipment on site should be reduced to acceptable levels.
- The exploration operational times should be set such that, no exploration activity is carried out during the night or very early in the mornings.
- Exploration hours should be restricted to between 08h00 and 17h00 to avoid noise generated by exploration equipment and the movement of vehicles before or after hours.
- When operating the drilling machinery onsite, workers should be equipped with personal protective equipment (PPE) such as earplugs to reduce noise exposure.



- Installation of proper sound barriers and (or) noise containments, with enclosures and curtains at or near the source equipment.
- Use of rubber-lined or soundproof surfaces on processing equipment (e.g. screens, chutes, transfer points, and buckets);
- Use of rubber-belt transport and conveyors;
- Installation of natural barriers at facility boundaries (e.g. Vegetation curtains or soil berms);
- Optimization of internal-traffic routing, particularly to minimize vehicle-reversing needs (reducing noise from reversing alarms) and to maximize distances to the closest sensitive receptors

#### **7.10.5. Monitoring**

- ENC should constant conduct daily noise monitoring and ensure that employees are complying to measures recommended for reduction of noise impacts .

### **7.11. Decommissioning phase**

#### **7.11.1. Background**

Impacts pertaining to the closure of the exploration program have been identified. The impacts are; loss of employment by workers at the exploration site and contribution to the national economy (revenue and royalties' payments). Another concern that stems from exploration program closure is the rehabilitation of the sites.

#### **7.11.2. Impact on Employment Opportunities and Economic Contribution**

Should the exploration program come to an end, workers that are employed by the exploration company will lose their jobs and source of income. This will also mean that there will be no more revenue and royalties paid to the government. This impact can be rated as of medium significance and given that the program has defined timeframe, only so much can be done by the Proponent to assist the workers in this regard. Regarding the national revenue and royalties' payment, there will be unfortunately nothing that the Proponent would do to mitigate this. The impact significance of unemployment can be reduced from medium to low, by implementing mitigation measures.

##### **7.11.2.1. Mitigations and recommendation to minimize joblessness**

- The Proponent should inform the employees on time, of its intentions to cease the exploration works and the expected date of such closure. This will provide the employees with enough time to search for work elsewhere.
- The Proponent should raise awareness of the possibilities for work in industrial sectors.

### **7.11.3. Impact on site**

In the context of the proposed project, rehabilitation refers to the process of returning disturbed land and soil to some degree of its pristine state. The scope of the proponent site rehabilitation emphasizes the backfilling of sampling/drilling holes and cover with topsoil in areas that will be disturbed by mining/ quarrying activities. These will be but not limited to the access road, vehicle tracks around the site, removal, and restoration of areas covered by stockpile and rock piles. Furthermore, this section outlines rehabilitation objectives and proposes rehabilitation commitments which the proponent shall adhere to.

#### **7.11.3.1. Mitigations and recommendation**

- A site inspection will be held after completion of the mining process to determine the nature and scope of the rehabilitation work to be undertaken. The rehabilitation will be done to the satisfaction of both the proponent and MEFT.
- The rehabilitation work should commence soon after the end of the active mining period.
- The access road and all vehicle tracks should be rehabilitated by raking or dragging with tyres or tree branches (other suitable methods) behind a vehicle.
- With regard to both biological productivity and erosion, topsoil is arguably the most important resource in the project area, for that reason, the recovered topsoil and subsoil should be utilized to reconstruct the original soil profile.
- All waste shall be removed, and potential hazards particularly pits closed and left in a safe disposition.
- All rehabilitated areas shall be considered no go areas and the environmental coordinator shall ensure that none of the staff members enters the area after rehabilitation.

### **7.12. Concluding remark on this section**

In this section, the identified impact was screened and assessed. The mitigation measures of the identified impact will be addressed in the Environmental Management Plan (EMP) report.

## **8. Conclusion and recommendations**

---

### **8.1. Conclusion**

The Mining claim numbers **69059-69060** are in the Karibib district area of the Erongo Region. The implementation of the proposed exploration study by the proponent will be undertaken with provisions of the EIA regulation of 2012. Based on the assessment of both negative and positive impacts undertaken for the proposed exploration study activities, a number of high positive and negative impacts have been identified. Overall, positive impacts of the proposed exploration study and possible testing of quarry mining activities outweigh the negative ones at local, regional, national and global levels.

Based on the findings of this Environmental Assessment Study, the proposed exploration activities can be implemented in accordance with the provisions of the EMP. Once the exploration study prove that the project is economically viable, a separate full Environmental Impact Assessment (EIA) and an Environmental Management Plan (EMP) will be developed and implemented in order to support the application of a Quarrying (Mining) License (ML) and then start with the full-scale quarrying (mining) project development covering preconstruction, quarry construction, operation, rehabilitation, closure, and aftercare stages.

### **8.2. Recommendations**

It is hereby recommended that the proponent take all the necessary steps to implement all the recommendations of the EMP for the successful implementation and completion of the proposed exploration study for the Mining claim number 69059-69060, located in the Karibib Area in the Erongo Region. Recommended actions to be implemented by the proponent as part of the management of the likely impacts through implementation of the EMP are as follows:

- Contract an Environmental Coordinator / Consultant / suitable in-house resources person to lead and further develop, implement and promote environmental culture through awareness-raising of the workforce, contractors and sub-contractors in the field during the whole duration of the proposed exploration study and testing of a quarry mining program period;
- Provide all other necessary support, human and financial resources, for the implementation of the proposed mitigations and effective environmental management during the planned exploration and possible testing of quarry mining activities;

- Develop a simplified environmental induction and awareness program for all the workforce, contractors and subcontractors;
- Where contracted service providers are likely to cause environmental impacts, these will need to be identified and contract agreements need to be developed with costing provisions for environmental liabilities;
- Implement internal and external monitoring of the actions and management strategies developed during the mineral exploration and possible mining duration and a final Environmental Monitoring report be prepared by the Environmental Coordinator / Consultant / Suitable in-house resource person and to be submitted to the regulators and to end the proposed mineral exploration;
- Develop and implement a monitoring program that will fit into the overall company's Environmental Management Systems (EMS) as well as for any future EIA for possible mining projects.

## 9. References

---

- Ashmole, I. (2004). "Dimension Stone: The Small Scale Mining Potential in South Africa", Paper presented at Small Scale Mining, Johannesburg.
- Barnard, P. (1998). Under protected habitats. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Bester, B. (1996). Bush encroachment – A thorny problem. *Namibia Environment* 1: 175-177.
- Bethune, S., Shaw, D. & Roberts, K.S. (2007). *Wetlands of Namibia*. John Meinert Printing, Windhoek.
- Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Boycott, R.C. & Bourquin, O. (2000). *The Southern African Tortoise Book*. O Bourquin, Hilton, RSA.
- Branch, B. (1998). *Field guide to snakes and other reptiles of southern Africa*. Struik Publishers, Cape Town, RSA.
- Branch, B. (2008). *Tortoises, terrapins & turtles of Africa*. Struik Publishers, Cape Town RSA.
- Broadley, D.G. (1983). *Fitzsimons' Snakes of southern Africa*. Jonathan Ball & AD. Donker Publishers, Parklands, RSA.
- Brown, C.J., Jarvis, A., Robertson, T. & Simmons, R. (1998). Bird diversity. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Burke, A. (1998). Vegetation zones. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Burke, A. (2003). *Wild flowers of the Central Namib*. Namibia Scientific Society, Windhoek.
- Buys, P.J. & Buys, P.J.C. (1983). *Snakes of Namibia*. Gamsberg Macmillan Publishers, Windhoek, Namibia.
- Carruthers, V.C. (2001). *Frogs and frogging in southern Africa*. Struik Publishers, Cape Town, RSA.
- Carvalho, J.F., Henriques, P., Fale, P., Luis, G., (2008). "Decision criteria for the exploration of ornamental-stone deposits: Application to the marbles of the Portuguese Estremoz Anticline", *International Journal of Rock Mechanics and Mining Sciences*.
- Channing, A. & Griffin, M. (1993). An annotated checklist of the frogs of Namibia. *Madoqua* 18(2): 101-116.
- Channing, A. (2001). *Amphibians of Central and Southern Africa*. Protea Bookhouse, Pretoria, RSA.
- Coats Palgrave, K. (1983). *Trees of Southern Africa*. Struik Publishers, Cape Town, RSA.
- Curtis, B. & Barnard, P. (1998). Sites and species of biological, economic or archaeological importance. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Curtis, B. & Mannheimer, C. (2005). *Tree Atlas of Namibia*. National Botanical Research Institute, Windhoek, Namibia.
- De Graaff, G. (1981). *The rodents of southern Africa*. Buterworths, RSA.
- De Lukas, M, Janss, G.F.E., Whitfield, D.P. & Ferrer, M. (2008). Collision fatality of raptors in wind farms does not depend on raptor abundance. *Journal of Applied Ecology* 45(6): 1695-1703.

- Department of Water Affairs (DWA). (2002). The hydrogeological map of Namibia
- Du Preez, L. & Carruthers, V. (2009). A complete guide to the frogs of southern Africa. Struik Publishers, Cape Town, RSA.
- IUCN, (1996). IUCN red list of threatened animals, IUCN, Gland, Switzerland.
- IUCN. (2004). IUCN, Gland, Switzerland. In: Griffin, M. 2005. Annotated checklist and provisional national conservation status of Namibian mammals. Ministry of Environment, Forestry and Tourism, Windhoek.
- Joubert, E. & Mostert, P.M.K. 1975. Distribution patterns and status of some mammals in South West Africa. *Madoqua* 9(1): 5-44.
- Kisting, J., 2008. Opportunities in the renewable energy sector in Namibia, Baobab Equity Management (Pty) Ltd, Windhoek, Namibia
- Mendelson, J., Jarvis, A., Roberts, C., and Robertson, T. (2002). Atlas of Namibia: A portrait of the land and its people. Windhoek, Namibia: Ministry of Environment, Forestry and Tourism.
- Miller, R. (2008). The geology of Namibia, neoproterozoic to lower palaeozoic
- Miller, R. McG. (1983a). The Pan – African Damara Orogen of S.W.A. / Namibia, Special Publication of the Geological Society of South Africa, 11, 431 - 515.
- Miller, R. McG. (1983b). Economic implications of plate tectonic models of the Damara Orogen, Special Publication of the Geological Society of South Africa, 11, 115 -138.
- Miller, R. McG. (1992). Stratigraphy. The mineral resource of Namibia, Geological Survey of Namibia, Ministry of Mines and Energy, Windhoek, 1.2 .1 - 1.2.13.
- Ministry of Environment, Forestry and Tourism. Republic of Namibia. (2008). Guide to the Environmental Management Act No. 7 of 2007. 56 pp
- Ministry of Environment, Forestry and Tourism. Republic of Namibia. (2012). Environmental Impact Assessment Regulation: Environmental Management Act, 2007. Government Gazette No.4878.
- Ransom, A. H., (1981). Interim Report on Prospecting Grant No. M46/3/758 – Tumas Project No. 53 - Namib Desert Park – Namibia, Period April 1978 - April 1981, Falconbridge of S.W.A. (PTY) LTD, Bulletin No. 2267 (Annex 4).
- Republic of Namibia. (2005). Namibia's Environmental Assessment Policy for Sustainable Development and Environmental Conservation.
- Republic of Namibia. (2007). Environmental Management Act No. 7 of 2007. Government Gazette No. 3966.
- Richards, J.P. (2009). Mining society and a sustainable world. Springer, New York.
- Risk Based Solution. (2011). Final EIA and EMP for the proposed exploration and possible testing a mine for the EPL no-4458, Karas Region. Swedish Exploration.
- SARDB, 2004. CBSG Southern Africa. In: Griffin, M.( 2005). Annotated checklist and provisional national conservation status of Namibian mammals. Ministry of Environment, Forestry and Tourism, Windhoek.
- Shadmon, A. (1993). "Dimension Stone - its Impact on environment and constructional applications the role of engineering geology", Bulletin of the International Association of Engineering Geology, No 48, pp 119-122.
- Simmons R.E. & Brown C.J. (2009). Birds to watch in Namibia: red, rare and endemic species. National Biodiversity Programme, Windhoek.
- Simmons, R.E. (1998a). Important Bird Areas (IBA's) in Namibia. In: Barnard, P. (ed.).

- Simmons, R.E. (1998b). Areas of high species endemism. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Simmons, R.E. (1998c). Flamingos: declining in southern Africa. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Skinner, J.D. & Smithers, R.H.N. (1990). The mammals of the southern African subregion. University of Pretoria, RSA.
- Steven, N. M., (1993). A study of epigenetic mineralization in the Central Zone of the Damara Orogen, Namibia, with special reference to gold, tungsten, tin, and rare earth element. Geological Survey of Namibia, Memoir 16, 166 pp.
- Tapscott, C., (1999). An overview of the socio-economics of some key maritime industries in the Benguela Current region. A Report Prepared on Behalf of the Benguela Current Large Marine Ecosystem Project, Windhoek, October 1999

## **10. Appendices: List of appendices**

---

- Appendix A: Abridge CV's
- Appendix B: Issue and responses trail
- Appendix C: Access Agreement between the farm owner with the proponent mining contractor
- Appendix D: Newspaper adverts
- Appendix E: Endorsement of Non-Exclusive Prospecting Licences
- Appendix F: Background Information Document (BID)



**Appendix A: Abridge CV**