



**ENVIRONMENTAL IMPACT ASSESSMENT  
FOR THE ESTABLISHMENT AND MINING OF  
DIMENSION STONE (GRANITE) ON MINING  
CLAIM 71620 AT FARM KOMPANENO 104,  
OMARURU CONSTITUENCY, ERONGO  
REGION.**

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**Proponent:**

**Mr. Otniel Kuojo  
P.O. Box 61397,  
Katutura,  
Windhoek  
Namibia**

**Contact Person:**

**Otniel Kuojo**

**Contact Number: +264 81 249 1104**

**Email: [greatkunene@gmail.com](mailto:greatkunene@gmail.com)**

**Environmental Practitioner:**

**Healthy Earth Environmental Consultants CC  
P.O. Box 70436,  
Komasdal, Windhoek,  
Namibia**

**Contact Person: David S. Aiyambo**

**Contact Number: +264 (81) 205 0902**


**Email: [askheec@gmail.com](mailto:askheec@gmail.com)**



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**PROJECT DETAILS: APP-001322**

<b>Title</b>	ENVIRONMENTAL SCOPING REPORT FOR THE ESTABLISHMENT AND MINING OF DIMENSION STONE (GRANITE) ON MINING CLAIM 71620 AT FARM KOMPANENO 104, OMARURU CONSTITUENCY, ERONGO REGION.		
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<b>Proponent</b>	Mr. Otniel Kuojo P.O. Box 61397, Katutura, Windhoek Namibia Contact Person: Otniel Kuojo Contact Number: +264 81 249 1104 Email: <a href="mailto:greatkunene@gmail.com">greatkunene@gmail.com</a>		
<b>Environmental Practitioner</b>	Healthy Earth Environmental Consultants CC P.O. Box 70436, Komasdal, Windhoek, Namibia Contact Person: David S. Aiyambo Contact Number: +264 (81) 205 0902 Email: <a href="mailto:askheec@gmail.com">askheec@gmail.com</a>		
<b>Report date</b>	March 2020		
	<b>Name</b>	<b>Signature</b>	<b>Date</b>
<b>Author</b>	David S. Aiyambo		

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## LIST OF ACRONYMS

AIDS	Acquired immune deficiency syndrome
CRR	Comments and response report
dB	Decibels
DEAR	Draft Environmental Assessment Report
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
EAR	Environmental Assessment Report
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
EPL	Exclusive Prospecting Licence
FEAR	Final Environmental Assessment Report
GTZ	Gesellschaft für Technische Zusammenarbeit
HEEC	Healthy Earth Environmental Consultants CC
HIV	Human immunodeficiency virus
I&AP	Interested and Affected Party
IUCN	International Union for Conservation of Nature
MEFT	Ministry of Environment, Forestry and Tourism
MEFT: DEA	Ministry of Environment, Forestry and Tourism: Department of Environmental Affairs
MME	Ministry of Mines and Energy
PPP	Public participation process
PHC	Public health and safety
SADC	Southern African Development Community
USAID	United States Agency for International Development
VMMC	Voluntary Medical Male Circumcision

# 1 INTRODUCTION

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## 1.1 PROJECT BACKGROUND

Granite is a common and widely occurring type of intrusive, felsic, igneous rock. Granites are usually medium to coarsely crystalline, occasionally with some individual crystals larger than the groundmass forming a rock known as porphyry. Granites can be pink to dark gray or even black, depending on their chemistry and mineralogy. Outcrops of granite tend to form tors, and rounded massifs. Granites sometimes occur in circular depressions surrounded by a range of hills, formed by the metamorphic aureole or hornfels.

Granite is nearly always massive, hard and tough, and it is for this reason it has gained widespread use as a construction stone. The average density of granite is  $2.75 \text{ g}\cdot\text{cm}^3$  with a range of  $1.74 \text{ g}\cdot\text{cm}^3$  to  $2.80 \text{ g}\cdot\text{cm}^3$ . The word granite comes from the Latin granum, a grain, in reference to the coarse-grained structure of such a crystalline rock.

There are, four operations that are involved in the processing of granite. They are: Dressing, Cutting/Sawing, Surface Grinding and Polishing and Edge-Cutting-Trimming. Mining for granite is done manually. For drilling and channeling hand chisels and hammers are used. Mining machinery, such as compressors and drilling machines for drilling and blasting will be used, cranes for lifting big blocks, and dampers and trucks for transport.

Granite has been extensively used as a dimension stone and as flooring tiles in public and commercial buildings and monuments. With increasing amounts of acid rain in parts of the world, granite has begun to supplant marble as a monument material, since it is much more durable. Polished granite is also a popular choice for kitchen countertops due to its high durability and aesthetic qualities. Currently 33% of the kitchen countertops being made are of granite.

The Government of Namibia recognises that the exploration and development of its mineral wealth could best be undertaken by the private sector. Government therefore focuses on creating an enabling environment through appropriate competitive policy and regulatory frameworks for the promotion of private sector investment coupled with the provision of national geo-scientific data bases essential for attracting competitive exploration and mining (Draft Minerals Policy of Namibia, MME).

It is with this background that Mr. Otniel Koujo has decided to mine granite for export purposes to China via the Walvis Bay Port and derive the monetary benefits associated with the extraction of these natural resources as he is a holder of an application for mining claims from the Ministry of

Mines and Energy after following all the necessary procedures to satisfy the relevant Authorities enabling them to mine the granite from the allocated portions on the state owned farm.

However uncontrolled natural resource mining/ excavation has resulted in negative environmental effects in some areas in the country. This has been largely attributed to the fact that people were under no obligation to rehabilitate the affected areas and thus left behind large open pits/quarries which pose a danger to both humans and animals. From the point of view of the environmental impact created, granite mining is a relatively benign industry. There are no emissions besides those of the diesel powered earthmoving equipment utilised in its extraction and a small amount of blasting gases. Contamination of water resources is only likely in the event of petrochemical spillages from storage facilities and equipment, and these can largely be either prevented or cleaned up effectively. The major environmental impacts are of a visual nature, while in sensitive areas, sense of change of place and habitat destruction may become significant impacts.

Mr. Otniel Koujo, hereinafter referred to as the proponent intends to carry out the following activity:

- **Environmental Impact Assessment (EIA) for the establishment and mining of dimension stone (granite) on mining claim 71620 at Farm Kompaneno 104, Omaruru Constituency, Erongo Region.**

The objective of the intended Environmental Assessment is thus needed in order to assess the potential social and environmental impacts associated with the intended mining activities of granite, mining claim 71620 at Farm Kompaneno 104, Omaruru Constituency, Erongo Region and also to formulate methods of rehabilitation of the quarries once the granite have been excavated.

The above is a listed activity in terms of the Environmental Management Act (No. 7 of 2007) and Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012).

In terms of the Environmental Management Act (No. 7 of 2007) and Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012), the following listed activities in **Table 1** were triggered by the proposed project:



**Table 1:** List of triggered activities identified in the EIA Regulations which apply to the proposed project

Activity description and No(s):	Description of relevant Activity	The portion of the development as per the project description that relates to the applicable listed activity
<b>Activity 3.1</b> (Mining and Quarrying Activities)	The construction of facilities for any process or activities which requires a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation, in terms of the Minerals (Prospecting and Mining Act), 1992.	The proposed project includes the mining of granite for export purposes.
<b>Activity 3.2</b> (Mining and Quarrying Activities)	Other forms of mining or extraction of any natural resources whether regulated by law or not.	The proposed project includes the mining of granite for export purposes.
<b>Activity 3.3</b> (Mining and Quarrying Activities)	Resource extraction, manipulation, conservation and related activities.	The proposed project includes the mining of granite for export purposes.

The above activities will be discussed in more detail in Chapter 4. Healthy Earth Environmental Consultants CC (HEEC) intends to undertake an independent Environmental Assessment (EA) in order to obtain an Environmental Clearance Certificate (ECC) for the above activities on behalf of the proponent. The competent authority is the Ministry of Environment, Forestry and Tourism: Department of Environmental Affairs (MEFT: DEA).

The EA process will be undertaken in terms of the gazetted Namibian Government Notice No. 30 Environmental Impact Assessment Regulations (herein referred to as EIA Regulations) and the Environmental Management Act (No 7 of 2007) (herein referred to as the EMA). The EA process will investigate if there are any potential significant bio-physical and socio-economic impacts associated with the intended activities. The EIA process would also serve to provide an opportunity for the public and key stakeholders to provide comments and participate in the process, i.e. Integrated Environmental Principles will be adhered to.

## 1.2 PROJECT LOCATION

The proponent intends to mine granite on the mining claim 71620 at Farm Kompaneno 104, Omaruru Constituency, Erongo Region, located about 23 km off the C36 road onto the D2344 road from Omaruru to Omatjete. Refer to the locality map of Farm Kompaneno 104 (-21.2513889°, 15.74777778°) in Figure 1 and Figure 2 for the locality of the mining claims for the granite.



**Figure 1:** Locality map of the Farm Kompaneno 104 (red pin) (Google 2020).



**Figure 2:** Locality map of showing the mining site on mining claim 71620 at Farm Kompaneno 104, Omaruru Constituency (MME Portal, 2020).

### 1.3 TERMS OF REFERENCE AND SCOPE OF PROJECT

The scope of this project is limited to conducting an Environmental Impact Assessment (EIA) for the establishment and mining of granite mining claims 71620 at Farm Kompaneno 104, Omaruru Constituency, Erongo Region and applying for an Environmental Clearance Certificate as indicated in **section 1.1** above.

### 1.4 ASSUMPTIONS AND LIMITATIONS

In undertaking this investigation and compiling the Environmental Assessment Report, the following assumptions and limitations apply:

- Assumes the information provided by the proponent (Mr. Otniel Koujo) is accurate and discloses all information available.
- The unique character and appeal of the surrounding area of the Farm Kompaneno 104 will be taken into consideration with the design & operational perspective for the intended mining activities. Various layout alternatives will be considered by the proponent, also taking terrain and environmental constraints into account, thus only adopting the most economically feasible & environmentally friendly result.

### 1.5 CONTENT OF ENVIRONMENTAL ASSESSMENT REPORT

Section 8 of the gazetted EIA Regulations requires specific content to be addressed in a Scoping / Environmental Assessment Report. **Table 2** below is an extract from EMA and highlights the required contents of a Scoping / Environmental Assessment Report whilst assisting the reader to find the relevant section in the report.

**Table 2:** Contents of the Scoping / Environmental Assessment Report

Section	Description	Section of FESR/ Annexure
8 (a)	The curriculum vitae of the EAPs who prepared the report;	Refer to <b>Annexure F</b>
8 (b)	A description of the proposed activity;	Refer to Chapter 4
8 (c)	A description of the site on which the activity is to be undertaken and the location of the activity on the site;	Refer to Chapter 3
8 (d)		Refer to Chapter 3

Section	Description	Section of FESR/ Annexure
	A description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed listed activity;	
8 (e)	An identification of laws and guidelines that have been considered in the preparation of the scoping report;	Refer to Chapter 2
8 (f)	Details of the public consultation process conducted in terms of regulation 7(1) in connection with the application, including	Refer to Chapter 5
	(i) the steps that were taken to notify potentially interested and affected parties of the proposed application	Refer to Chapter 5
	(ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given;	Refer to <b>Annexures A and B</b> for site notices and advertisements respectively.
	(iii) a list of all persons, organisations and organs of state that were registered in terms of regulation 22 as interested and affected parties in relation to the application;	Refer to <b>Annexure D</b>
	(iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;	Refer to <b>Annexure D</b>

Section	Description	Section of FESR/ Annexure
8 (g)	A description of the need and desirability of the proposed listed activity and any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives have on the environment and on the community that may be affected by the activity;	Refer to Chapter 4
8 (h)	A description and assessment of the significance of any significant effects, including cumulative effects, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any mining, construction, erection or decommissioning associated with the undertaking of the proposed listed activity;	Refer to Chapter 7
8 (i)	Terms of reference for the detailed assessment;	NA – Assessment of impacts are included in this EA Report
8 (j)	An Environmental Management Plan(EMP)	Refer to <b>Annexure G</b>

## 2 LEGAL FRAMEWORK

There are multiple legal instruments that regulate and have a bearing on good environmental management in Namibia. **Table 3** below provides a summary of the legal instruments considered to be relevant to this development and the environmental assessment process.

**Table 3:** Legislation applicable to the establishment and mining of dimension stone (granite) on mining claim 71620 at Farm Kompaneno 104, Omaruru Constituency, Erongo Region..

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
The Constitution of the Republic of Namibia as Amended	<p>Article 91 (c) provides for duty to guard against “the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia.”</p> <p>Article 95(l) deals with the “maintenance of ecosystems, essential ecological processes and biological diversity” and sustainable use of the country’s natural resources.</p>	Sustainable development should be at the forefront of management of the intended mining activities.
Environmental Management Act No. 7 of 2007 (EMA)	<p>Section 2 outlines the objective of the Act and the means to achieve that.</p> <p>Section 3 details the principles of Environmental Management</p>	The management of this project should be informed by the EMA.
EIA Regulations GN 28, 29, and 30 of EMA (2012)	<p>GN 29 Identifies and lists certain activities that cannot be undertaken without an environmental clearance certificate.</p> <p>GN 30 provides the regulations governing the environmental assessment (EA) process.</p>	<b>Activity 3.1 (Mining and Quarrying Activities)</b> The construction of facilities for any process or activities which requires a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation, in terms of the Minerals (Prospecting and Mining Act), 1992.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
		<p><b>Activity 3.2 (Mining and Quarrying Activities)</b> Other forms of mining or extraction of any natural resources whether regulated by law or not.</p> <p><b>Activity 3.3 (Mining and Quarrying Activities)</b> Resource extraction, manipulation, conservation and related activities.</p>
Convention on Biological Diversity (1992)	Article 1 lists the conservation of biological diversity amongst the objectives of the convention.	The granite mining activities should consider the impact it will have on the biodiversity of the area.
Draft Procedures and Guidelines for conducting EIAs and compiling EMPs (2008)	Part 1, Stage 8 of the guidelines states that if a proposal is likely to affect people, certain guidelines should be considered by the proponent in the scoping process.	The EA process should incorporate the aspects outlined in the guidelines.
Namibia Vision 2030	Vision 2030 states that the solitude, silence and natural beauty that many areas in Namibia provide are becoming sought after commodities and must be regarded as valuable natural assets.	Care should be taken that the granite mining activities do not lead to the degradation of the natural beauty of the area.
Water Act No. 54 of 1956	Section 23(1) deals with the prohibition of pollution of underground and surface water bodies.	The pollution of water resources should be avoided during the granite mining activities.
The Ministry of Environment, Forestry and Tourism (MEFT) Policy on HIV & AIDS	MEFT has recently developed a policy on HIV and AIDS. In addition it has also initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments.	The proponent and its contractor have to adhere to the guidelines provided to manage the aspects of HIV/AIDS. Experience with similar projects has shown that a significant health risk is created when migrant mine workers/labourers interact with local communities.



LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
Labour Act No. 11 of 2007	Chapter 2 details the fundamental rights and protections. Chapter 3 deals with the basic conditions of employment.	Given the employment opportunities presented by the granite mining activities, compliance with the law is essential.
Public and Environmental Health Act of 2015	This Act (GG 5740) provides a framework for a structured uniform public and environmental health system in Namibia. It covers notification, prevention and control of diseases and sexually-transmitted infections; maternal, ante-natal and neo-natal care; water and food supplies; infant nutrition; waste management; health nuisances; public and environmental health planning and reporting. It repeals the Public Health Act 36 of 1919 (SA GG 979).	The granite mining activities are to comply with these legal requirements.
Nature Conservation Ordinance No. 4 of 1975	Chapter 6 provides for legislation regarding the protection of indigenous plants.	Indigenous and protected plants have to be managed within the legal confines.
Environmental Assessment Policy of Namibia (1995)	The Policy seeks to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process, and that the term ENVIRONMENT is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.	This EIA considers this term of Environment.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
Minerals (Prospecting and Mining) Act, 1992 (Act 33 1 of 1992)	To provide for the reconnaissance, prospecting and mining for, and disposal of, and the exercise of control over, minerals in Namibia; and to provide for matters incidental thereto. “mineral” means any substance, whether in solid, liquid or gaseous form, occurring naturally in, on or under any land and having been formed by, or subjected to, a geological process, excluding -(c) subject to the provisions of subsection (2), soil, sand, clay, gravel or stone (other than rock material specified in Part 2 of Schedule 1) if they are bona fide required for purposes of - (i) agriculture, building works, fencing or road making; (ii) the manufacture of bricks and tiles;	The intended activity involves the mining of granite for export purposes.
Soil Conservation Act 6 of 1969 Ministry of Agriculture, Water and Forestry	This Act covers the prevention and combating of soil erosion; the conservation, improvement and manner of use of the soil and vegetation; and the protection of water sources	Quarries left behind after granite mining should not be polluted or left un-rehabilitated.

This EIA process will be undertaken in accordance with the EIA Regulations. A Flow Diagram (refer to **Figure 3**) provides an outline of the EIA process to be followed.

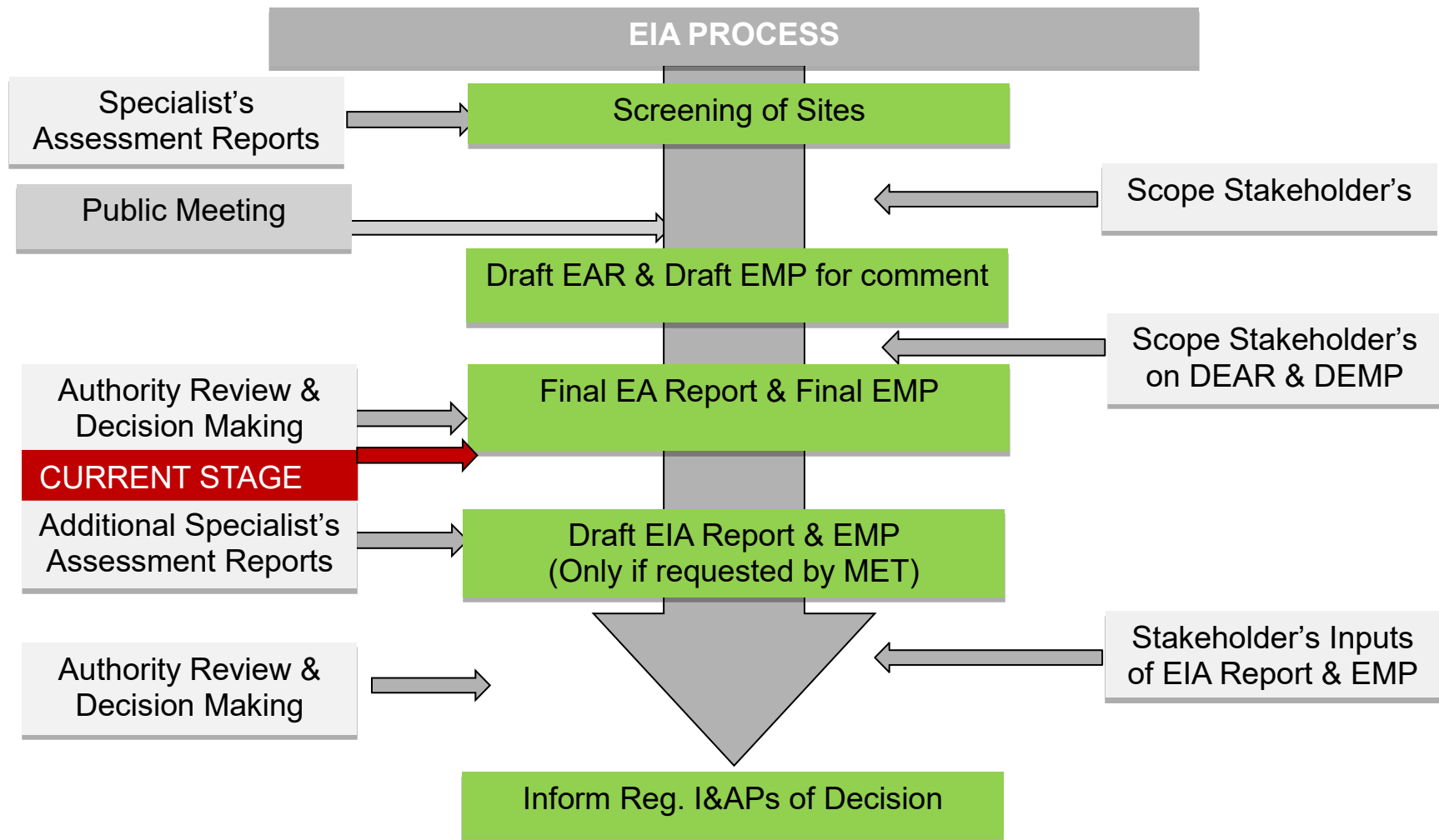


Figure 3: EIA flow Diagram

#### 3.1 SOCIAL ENVIRONMENT

##### 3.1.1 Socio-Economic Context

Erongo Region comprises of seven (7) constituencies, namely: Arandis, Daures, Omaruru (in which the granite mining claim 71620 is located) & Karibib, Swakopmund, Walvis Bay Rural and Walvis Bay Urban. According to the 2011 Census, the total population enumerated in Erongo Region is estimated at 150,809. Of these, 70,986 are females and 79,823 are males. Approximately 87% of the total population is located in urban parts and 13% in rural parts of the region. The total population of Omaruru to be specific is about 8,500. (NPC, 2011).

In the Erongo Region the population under 5 years of age is 11%. The population ranging from the age of 5 to 14 years of age comprise 17% of the region's population. The working age population, 15 to 59 years, makes up 69% of the whole population in the region. A relatively low percentage, 6% of the population, was above 60 years of age. For every 100 females in Erongo Region there are 112 males, whereas the Khomas Region supports a 100:98 ratio, females to males, respectively. In Erongo Region the literacy rate of the age group 15 years and up, is 97%. Of the children aged 6 to 15 years, 89% are girls and 86% are boys. 6% of all people above the age of 15 have never attended school, 9% are currently attending school and 83% left school at the time.

The main languages spoken at home in the Erongo Region are the Oshiwambo language at 39%; Afrikaans language at 20%; Nama/Damara at 19% and Otjiherero language at 10% as compared to the Khomas Region where 41% communicates in Oshiwambo language, 19% in Afrikaans, 12% in Nama/Damara and 10% in Otjiherero. Approximately 79% of the population aged 15 years and up belong to the labour force (i.e. economically active) in the Erongo Region. 70% of the population is employed while 30% are unemployed. The inactive group, which consists of homemakers, 11%, students 46% and the severely disabled, retired or old age income recipients 35% makes up of the regions' population.

The main source of income in this region is from wages and salaries at 73%, business and non-farming activities at 9% and farming at 3%. Cash remittance makes up 5% respectively. The older age group makes up 8% of the regions income.

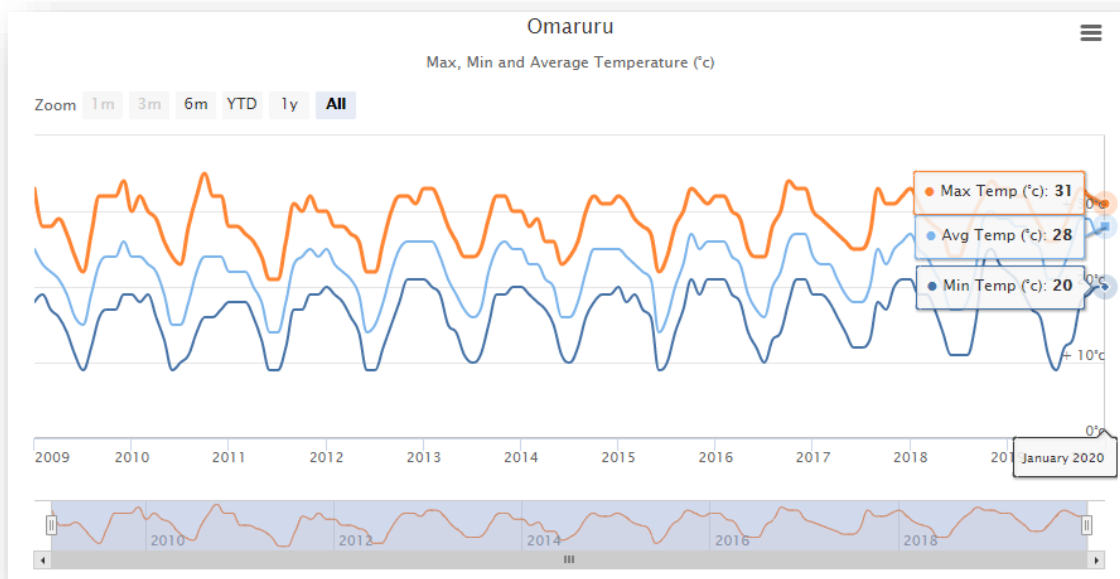
### 3.1.2 Archaeological and Heritage Context

While there are no declared heritage sites by the National Heritage Council of Namibia mining claim 71620 at Farm Kompaneno 104, Omaruru Constituency, Erongo Region., an accidental find procedure at the subject site may be required.

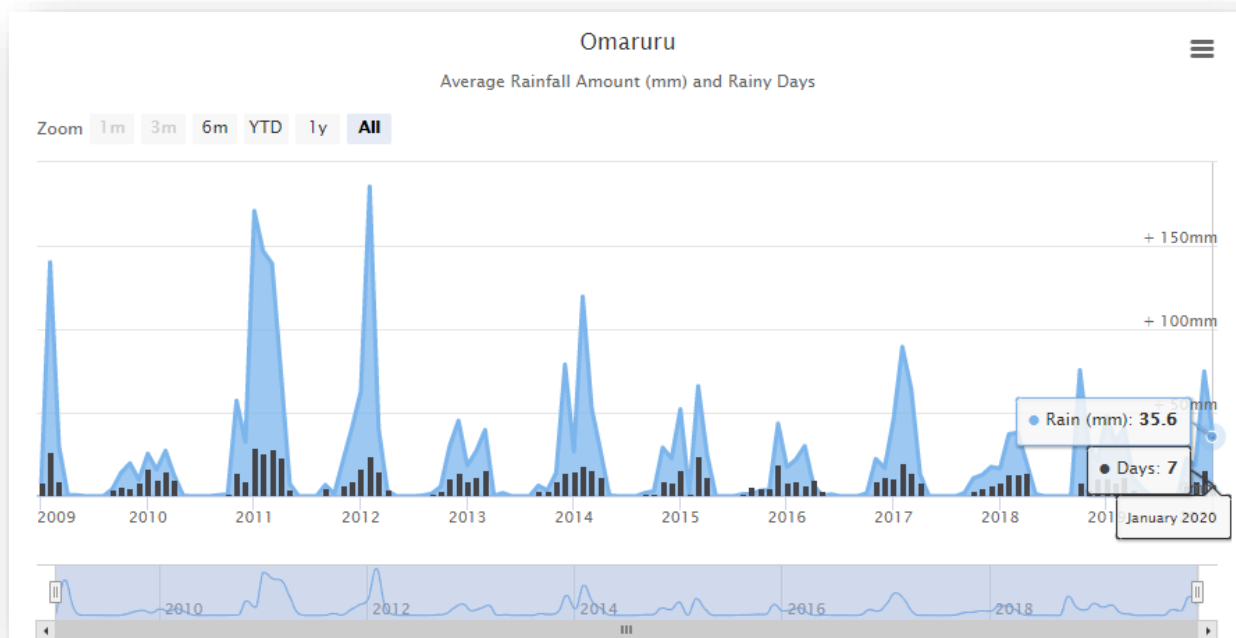
## 3.2 BIO-PHYSICAL ENVIRONMENT

### 3.2.1 Climate

The climate at the farm where the granite mining claim 71620 is located is mostly semi-arid to arid, analogous to a desert climate where annual rainfall rarely exceeds 300 mm. The greatest amount of precipitation occurs in February, whereas the least amount of rainfall occurs in July. The area is subject and generally buffeted by strong winds from the Atlantic Ocean. The area is characterized by hot dry summers with day time temperature in excess of 30°C and an average of 28°C whereas the night time temperatures can go as low as 10°C, due to the desert climate (worldweatheronline, 2020) as indicated in **Figure 4**.



**Figure 4:** Temperature Graph for Omaruru (worldweatheronline, 2020).



**Figure 5:** Rainfall Graph for Omaruru (worldweatheronline, 2020).

An understanding of climatic conditions, in particular rainfall, is important in determining the risk of flooding and erosion, which for this project is mostly of concern during the extraction phase. The area may be subject to summer rains in the months of December to March. The total rainfall during this period rarely exceeds 150 mm. There is little rainfall throughout the year in the area, with the highest rainfall recorded in the current rainy season in January 2020 recording about 36 mm over 7 rainy days as depicted in **Figure 5** above. Rainfall occurs mostly in the summer months from January to March, with the highest rainfall expected in the month of February.

### 3.2.2 Topography, Geology and Hydrogeology

The granite mining claims area falls in the northern central zone of the Damara belt (Miller, 2008). On a regional scale the stratigraphy can be divided as follows:

1. Nosib Group (Tsaun Formation and possibly deformed Khan Formation)
2. Swakop Group (Karibib Formation and Kuiseb Formation)
3. Zerrissene Group (Amis River Formation, Brandberg West)

4. Damaran Granites
5. Karoo Dykes
6. Karoo Sediments (Omingonde Formation)
7. Cretaceous Dykes

The Nosib Group is dominated by the metamorphosed equivalents of the Etusis, which is known as the Tsaun Formation in the area and comprises of the gneisses, quartzites and conglomerates. The possible Khan Formation equivalents are metamorphosed pyroxenites and magnetite quartzites. These metasedimentary rocks were intruded by granites of Damaran age and Cretaceous age. The Damaran granites vary from fine to medium-grained two mica tourmaline bearing granites. These granites are associated with rare metal pegmatites of the Uis-Cape Cross swarm. This mining claim lies within the Sandamap-Erongo pegmatite tin belt. These granites and pegmatites are also associated with niobium and tantalite as well as semi-precious stones. The Karoo mafic dykes are rare but present in the area. Generally, they trend to the northeast-southwest. On a much larger scale are present Cretaceous mafic dykes associated with the opening of the Atlantic Ocean and are coeval with the Messum Complex. These are mostly vertical and trend in a north-south direction and northwest-southeast.

On a local scale, within the mining claims area, the undifferentiated Damara intrusives primarily granites and pegmatites occupies most of the mining claim area. To the south western part of the mining claim is present the Kuiseb Formation metasediments, mainly schists and quartzite, whereas to the north western part of the mining claim occurs the Otjongeama Member marbles and minor calc-silicate of the Karibib Formation. The eastern half of the study area is covered by Omingonde Formation rocks and dolerite dykes of Karoo age. The metasediments of both the Karibib and Kuiseb Formation are deformed by the Damara Orogeny. In addition, the undifferentiated Damara intrusives comprises the post-tectonic granitoids and intruded the Karibib and Kuiseb Formation extensively. The Otjongeama Member marbles and calc-silicates are interlayered with the Omingonde Formation sedimentary rocks. The Kuiseb Formation can be subdivided into a lower schistose and an upper quartzitic/phyllitic unit. The quartzitic/phyllitic unit is restricted within the Sandamap and Omaruru tin belts. The Sandamap tin belt extends towards the mining claim area. These granitoids also host industrial minerals such as fluorite veins and replacement types in the mining claims area.

There is no bulk water supply from NamWater to the mining claims area and water for human consumption is to be fetched at the borehole to be drilled near the workers campsite. For operation purposes of the mine machinery to cool it off when cutting and smashing the granite water will be sourced at another borehole near the mining claim.

### 3.2.3 Terrestrial Ecology

#### 3.2.3.1 Land use patterns and impact on vegetation

The establishment and mining of granite on mining claims 71620 at Farm Kompaneno 104, Omaruru Constituency, Erongo Region. The actual mining activities of the dimensions will commence on the slope of the mountain ridge. The vicinity of the area proposed for this project is vegetated and it is characterized by tree and shrub savanna which contain heterogeneous plant species, predominated mainly by *Catophractes alexandrii*, *Acacia hebeclada*, and *Croton grastissimus*, with species such as *Commiphora grandulosa*, *Boscia albitrunca*, *Parksonia africana*, *Peltoporum africanum*, *Terminalia prunioides*, *Zizphus mucronata*, *Cyphostemma juttae*, *Myrothamnus flambellifolius*, *Asparagus spp*, *Acacia spp.* and *Ximenia spp* quite conspicuous in the area. The most visible shrubs in the proposed area are *Monechma spp* and *Blepharis spp*. Since the botanical assessment was carried out when the area received very limited rainfall, the veld condition was not in a good state and it was dominated by grass species such as *Stipagrostis uniplumis* and *Figurehuthia africana*.



### 3.2.4 Methodology and Approach

The impact of the proposed development on vegetation was carried out during the site visits, conducted in April 2019, with a follow-up site visit in March 2020, and a thorough botanical assessment was carried out within the mining claim 71620 area by means of field observations, recording and collecting where it was deemed necessary. The assessment was further amplified with the use of a species lists of plants occurring within the quarter degree squares (2115BD) which was extracted from the database, Botanical Research and Herbarium Management System (BRAHMS) which is housed at the National Botanical Research Institute, (NBRI) in Windhoek. The protection status and conservation categories of the plants were extracted from A Checklist of Namibian Indigenous and Naturalised Plants, Occasional Contribution No. 5, field guide by Mannheimer, C. & Curtis, B. A. (eds) 2009; Le Roux and Müllers Field Guide to Trees and Shrubs of Namibia. Windhoek: Macmillan.

### 3.2.5 Impacts on flora

The establishment and mining of dimension stones on mining claim 71620 will take place at Farm Kompaneno 104, Omaruru Constituency in Erongo Region. The Farm is situated approximately 30 km northwest of Omaruru, when using the C36 road from Omaruru to Uis and turn-off to the right at the T-junction to Omatjete and proceed with the D 2344 gravel road for approximately 23 km, the farm is located on the right. The actual mining activity of the dimensions stones will take place on an intrusion located approximately 800 meters from the farm gate. The surrounding area proposed for this project is well vegetated and it is characterized by tree and shrub savanna which harbour distinct plant species, predominated by *Acacia hebeclada*, *Dichrostachys cinerea*, *Catophractes alexandrii*, *Acacia erubescens*, *Combretum imberbe*, *Croton grastissimus* and *Mundulea sericea*. While species such as *Commiphora grandulosa*, *Boscia albitrunca*, *Parksonia africana*, *Peltoporum africanum*, *Terminalia prunioides*, *Zizphus mucronata*, *Sterculia quinqueloba*, and *Ximenia spp.* are conspicuous in the area. The most visible shrubs in the proposed area are *Barleria spp.*, *Monechma spp.* and *Blepharis spp.* Grass species such as *Eragrostis* and *Stipagrostis* species were recorded in the area. During the initial site visit the area received limited rainfall, and the veld condition was not in a good state. However during

the follow-up site visit in March 2020, the veld condition had improved and the surrounding area had received substantial rainfall which resulted in a higher recruitment of herbs and grass species.

Farm Kompaneno 104 in which the mining claim 71620 is situated, falls within the semi-desert and savanna transition (escarpment). The area is dominated by trees and shrub; however there will be minimal impacts on the vegetation, since the intrusion (rock formation) on which mining activities is expected to take is fairly bare, with patches of shrub found on the crest and on the verge of the intrusion.



Figure 6: General area of the targeted intrusion (bed-rock) on mining claims 71620 (HEEC, 2020)

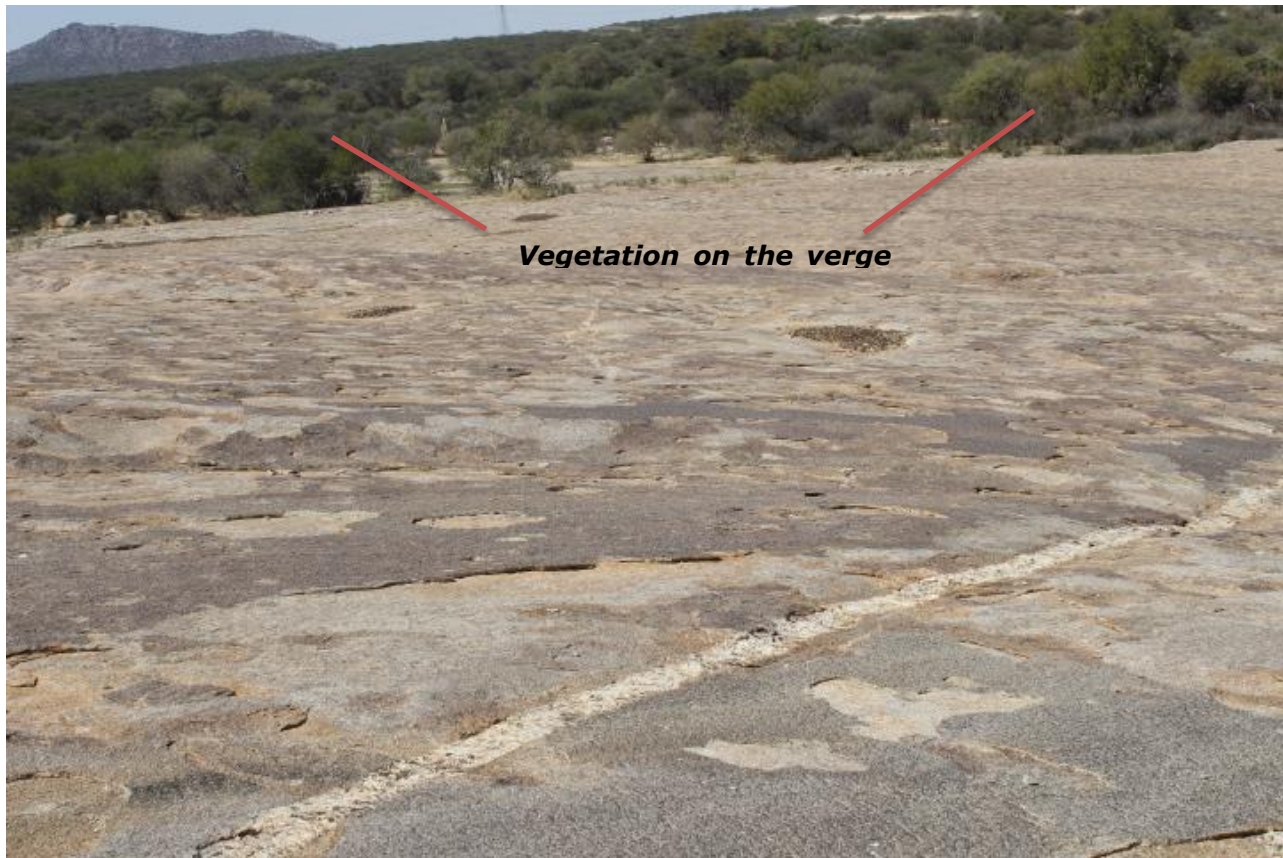


Figure 7: Vegetation surrounding the targeted intrusion (bed-rock) (HEEC, 2020)

Plant species encountered during the botanical assessment; augmented with a plant list extracted from the WIND Herbarium database in Windhoek.

Species	Occurrences	Protection Status	Conservation Categories
<i>Catophractes alexandrii</i>	Abundant	LC	-
<i>Dichrostachys cinerea</i>	Abundant	LC	-
<i>Mundulea sericea</i>	Abundant	-	-
<i>Acacia hebeclada subsp.hebeclada</i>	Abundant	-	-
<i>Parksonia africana</i>	Common	-	F
<i>Croton gratissimus</i>	Common	-	-
<i>Sterculia quinqueloba</i>	Common	-	-
<i>Boscia albitrunca</i>	Common	LC	F

<i>Acacia senegal. var. rostrata</i>	Occasional	LC	-
<i>Abutilon angulatum. var. angulatum</i>	Occasional	-	-
<i>Acalypha segetalis</i>	Occasional	-	-
<i>Adenolobus pechuelii subsp. mossamedensis</i>	Common	-	-
<i>Amphiasma merenskyanum</i>	Occasional	LC	NE
<i>Antiphonia fragrans</i>	Occasional	LC	E
<i>Blepharis gigantea</i>	Common	LC	E
<i>Cadaba schroepelii</i>	Occasional	LC	-
<i>Camptoloma rotundifolium</i>	Occasional	-	-
<i>Cleome foliosa var. lutea</i>	Occasional	-	-
<i>Combretum imberbe</i>	Common	-	F
<i>Commiphora glaucescens</i>	Common	LC	NE
<i>Commiphora tenuipetiolata</i>	Common	LC	-
<i>Commiphora virgata</i>	Common	LC	-
<i>Corchorus merxmuelleri</i>	Common	LC	E
<i>Crotalaria heidmannii</i>	Common	-	-
<i>Cucumis sagittatus</i>	Common	-	-
<i>Cucumis rigidus</i>	Occasional	-	-
<i>Cyamopsis senegalensis</i>	Occasional	-	-
<i>Dicoma capensis</i>	Occasional	-	-
<i>Dipcadi bakerianum</i>	Common	-	-
<i>Dyerophytum africanum</i>	Common	-	-
<i>Eragrostis porosa</i>	Common	LC	-
<i>Heliotropium giessii</i>	Common	-	-
<i>Heliotropium tubulosum</i>	Common	-	-
<i>Heliotropium zeylanicum</i>	Occasional	-	-

<i>Hermbstaedtia odorata var. odorata</i>	Occasional	-	-
<i>Kohautia aspera</i>	Common	-	-
<i>Litogyne gariepina</i>	Common	-	-
<i>Monechma cleomoides</i>	Common	LC	-
<i>Orbivestus cinerascens</i>	Common	-	-
<i>Oxygonum alatum. var. alatum</i>	Common	-	-
<i>Petalidium canescens</i>	Common	LC	E
<i>Petalidium lanatum</i>	Common	LC	E
<i>Rogeria adenophylla</i>	Common	-	-
<i>Ruellia marlothii</i>	Common	-	-
<i>Seddera schizantha</i>	Common	LC	-
<i>Sesamothamnus guerichii</i>	Common	LC	NE
<i>Sesamum capense</i>	Common	LC	-
<i>Sesamum marlothii</i>	Common	LC	E
<i>Sida ovata</i>	Common	-	-
<i>Solanum capense</i>	Common	-	-
<i>Solanum rigescentoides</i>	Common	-	-
<i>Stipagrostis spp.</i>	Common	-	-
<i>Tapinanthus mollissimu</i>	Occasional	-	-
<i>Tapinanthus oleifolius</i>	Common	LC	-
<i>Tinnea rhodesiana</i>	Common	-	-
<i>Triaspis hypericoides subsp. nelsonii</i>	Occasional	-	-
<i>Vernonia obionifolia subsp. dentata</i>	Occasional	LC	-
<i>Vernonia obionifolia subsp. obionifolia</i>	Occasional	LC	-

**KEY:** LC – Least Concern; E- Endemic; NE- Near - Endemic; P-Protected, F – Forestry; protected under Forestry Act (Act 12 of 2001).



The surrounding area of the proposed mining site for the dimension stones is well-vegetated and has a relatively higher species diversity. Three (3) of the plant species recorded in the area namely; *Boscia albitrunca*, *Parksonia africana* and *Combretum imberbe* are protected under the Forest Act 12 of 2001. *Boscia albitrunca* is adaptable to many habitats and has immense usages and it is among the most common plant species in the area which is protected under the forestry legislation. Although it is protected under the forest act, this species is considered to be least concern; nevertheless any removals will require a permit from the Ministry of Environment, Forestry and Tourism. *Parkinsonia africana* is conspicuous in the surrounding area of the mining claim, this species prefers the dry parts of the country such as the south and western part. *Combretum imberbe* is notably one of the forestry protected plant species recorded in the area which has cultural value. This plant species is considered by the Herero community to have spiritual properties. In Kunene Region in particular the poles for this species are planted in the graves during the course of a burial ceremony. Six (6) of the plant species recorded in the proposed areas are endemic, whereas three (3) plant species recorded in the area are near-endemic. The rest of the plant species occurring in the surrounding area of the mining claim have no conservation concern.



Figure 8: *Combretum imberbe* (forestry-protected species) recorded in the surrounding area of the mining claims (HEEC, 2020).

Some of the trees and shrub species falling within the family; *Euphorbiaceae* have been recorded in the surrounding area of the mining claim. Some of these plant species are known to have toxic properties; hence any contact with these species should be avoided or precautionary measures should be practiced.



Figure 9: *Croton gratissimus* (which have toxicity properties) recorded in the surrounding area of the mining claims (HEEC, 2020).

### 3.2.5.1 Mitigation

The actual targeted site for the mining of dimension stones will have limited impact on vegetation, since it is a bare rock with patches of vegetation; however the immediate surrounding area, has a high species diversity. The impacts will not be significant, due to the fact that, numerous plant species occurring in the immediate surrounding area have wide-ranging distribution in the region and the country at large. The impact will be localized, however special conservation approaches should be taken to preserve the protected plants species. All the protected plant and endemic species in the surrounding area proposed for the purpose of mining dimension should be identified and avoided during site establishment and mining operations. An

environmental sound vegetation management plan should be formulated and local nurseries in the region and neighbouring region such as the forestry nursery in Okahandja, within the Otjozondjupa region, should be approached to source indigenous plants to compensate for the vegetation lost.

### **Monitoring**

Stringent vegetation monitoring during site establishment and mining operations should be implemented to ensure that protected and endemic species are not destroyed. The re-introduced indigenous plants in the surrounding area as compensation for the lost plants species should be mapped and their co-ordinates recorded to ensure that they are in good health. If there will be any difficulties in vegetation growth, professional assistance should be sourced from the expertise to ensure effective replacement of such plants species. The local people should be afforded with an opportunity to establish a nursery for indigenous plants species, this can be done by rendering training to the local community and engage them at all levels of the restoration program.

### **3.2.6 Alien Plants Assessments**

The alien plants were taken into consideration during the botanical assessment. It was found that there are no alien plants in the proposed area and its immediate surrounding area.

### **Mitigation**

The proponent should implement an alien plants awareness campaign to educate and sensitize the employees and the local community on the menace of planting alien vegetation in the area. Educational materials should be disseminated and made accessible at all the schools in the nearby town such as Omaruru.

### **Monitoring**

There should be an unremitting monitoring program of the alien plants in the area. If possible the proponent and local community should establish an alien plant task force to ensure that there is



no planting of alien plants species in the area. The proponent should adopt and support the implementation of an annual alien plants clearing campaign.

### **3.2.7 Fauna Diversity**

There were no wild animals recorded during the two site visits conducted, however it is assumed that there might be some wild animals present in the vicinity of the mining claim. Since the proposed project falls within a farm and its surrounding area have the best habitats for wild-animals such as kudu, leopard and springboks. The presences of wild-animals can induce employees to engage in illegal hunting, therefore rigorous measures should be in place to dismay such practices.

#### **Mitigation**

Illegal hunting of game animals is a criminal offence which can results in imprisonment, hence any crime related to illegal hunting should be reported to the law-enforcement unit in the area and legal action should be taken against the perpetrators. The proponent should ensure that there are no dogs permitted on site, because dogs can chase and frighten the game animals. If there are water points in the area the proponent should ensure that boreholes are functional, to make water available to wild-animals and avoid them to be drawn closer to the camp to search for water.

#### **Monitoring**

The proponent and the farm owner in conjunction with the line ministry should implement well-coordinated game counts in the area on annual basis to determine wild-animals population and explore scientific measures that best suit the co-existence of mining operation and wildlife management.

### **3.2.8 Avian Diversity**

It is projected that about 676 species of birds have been recorded in Namibia; which make up about 30% of bird population in Africa and 6% of the global avian fauna. The following are the birds that were observed or encountered in the area during the field reconnaissance survey in April 2019 and March 2020. This was augmented with the use of Kenneth Newman, 2000. Newmans Birds By Colour, Southern Africa Common Birds. Arranged by Colour, Struik New Holland Publishing (Pty) Ltd 2000. Since birds have no trans-boundaries this list is not exhaustive;

Table 1: Birds recorded in the vicinity

Scientific name	Common name	Namibia Status
<i>Agapornis roseicollis</i>	Rosy-faced Lovebird	Endemic
<i>Apus bradfieldi</i>	Bradfield's Swift	-
<i>Cypsiurus parvus</i>	African Palm Swift	-
<i>Streptopelia senegalensis</i>	Laughing Dove	-
<i>Oena capensis</i>	Namaqua Dove	-
<i>Ardeotis kori</i>	Kori Bustard	Near Threaten
<i>Pterocles namaqua</i>	Namaqua Sandgrouse	-
<i>Falco rupicolus</i>	Rock Kestrel	-
<i>Falco chicquera</i>	Red-necked Falcon	-
<i>Corvus albus</i>	Pied Crow	-
<i>Hirundo albigularis</i>	White-throated Swallow	-
<i>Hirundo dimidiata</i>	Pearl-breasted Swallow	-
<i>Hirundo cucullata</i>	Greater Stiped Swallow	-
<i>Hirundo semirufa</i>	Red-breasted Swallow	-
<i>Pycnonotus nigricans</i>	African Red-eyed Bulbul	-
<i>Eremomela icteropygialis</i>	Yellow-bellied Eremomela	-
<i>Prinia flavicans</i>	Black-chested Prinia	-
<i>Mirafrapasserina</i>	Monotonous Lark	-
<i>Mirafrapficana</i>	Rufous-naped Lark	-
<i>Mirafrafasciolata</i>	Eastern Clapper Lark	-
<i>Mirafrasabota</i>	Sabota Lark	-
<i>Calendulauda africanoides</i>	Fawn-coloured Lark	-
<i>Ammomanopsis grayi</i>	Gray's Lark	Endemic
<i>Chersomanes albofasciata</i>	Spike-heeled Lark	-
<i>Certhilauda benguelensis</i>	Benguela Long-billed Lark	-
<i>Eremopterix leucotis</i>	Chestnut-backed Sparrowlark	-
<i>Eremopterix verticalis</i>	Grey-backed Sparrowlark	-
<i>Calandrella cinerea</i>	Red-capped Lark	-
<i>Alauda starki</i>	Stark's Lark	-
<i>Bradornis infuscatus</i>	Chat Flycatcher	-
<i>Namibornis herero</i>	Herero Chat	-

<i>Nectarinia fusca</i>	Dusky Sunbird	-
<i>Bualornis niger</i>	Red-billed Buffalo-Weaver	-
<i>Philetairus socius</i>	Sociable Weaver	-
<i>Ploceus rubiginosus</i>	Chestnut Weaver	-
<i>Quelea quelea</i>	Red-billed Quelea	-
<i>Estrilda astrild</i>	Common Waxbill	-
<i>Vidua paradisaea</i>	Long-tailed Paradise -Whydah	-
<i>Vidua regia</i>	Shaft-tailed Whydah	-
<i>Passer domesticus</i>	House Sparrow	-
<i>Passer motitensis</i>	Great Sparrow	-
<i>Passer melanurus</i>	Cape Sparrow	-
<i>Passer griseus</i>	Southern Grey-headed Sparrow	-
<i>Anthus similes</i>	Long-billed Pipit	-
<i>Serinus alario</i>	Black-headed Canary	-
<i>Crithagra atrogularis</i>	Black-throated Canary	-
<i>Serinus flaviventris</i>	Yellow Canary	-
<i>Serinus albogularis</i>	White-throated Canary	-
<i>Emberiza capensis</i>	Cape Bunting	-
<i>Emberiza flaviventris</i>	Golden-breasted Bunting	-

Two of the bird species known to occur in the area; *Agapornis roseicollis* (Rosy-faced Lovebird) and *Ammomanopsis grayi* (Gray's Lark) are endemic species to Namibia. While *Ardeotis kori* (Kori Bustard) recorded in the area is near-endemic. The reminders of the bird species known to occur in the area have no conservation concerns. The proposed project will have minimal impact on the bird's life; provided that there are no clearing of vegetation in the surrounding area. The likely negative impacts associated with this project towards the birds is presumably the disturbance on their daily activities. Since the targeted intrusion (bed-rock) to be mined, is probably the most preferred site for sun-bathing and busking during cold winter when it is cold; such activities could potential be lost. Vibration that will emanate from the movement of heavy machineries and noise that will be possibly emitted from the mining equipment will potential disturb the breeding of birds and force the birds to migrate elsewhere.

### 3.2.8.1 Likely impacts and key impacts identified

#### Indirect impacts

#### Physical disturbances of birds and destruction of bird habitats

There will be limited disturbances to bird’s habitats during the establishment and operation of the proposed project, on condition that the proponent only focuses on the targeted area and avoid the destruction of vegetation occurring around the targeted geological intrusion. The birds in the proposed areas will be exposed to interference while carrying out their daily activities for instance feeding, roosting, nesting and even breeding due to vibration and excessive noise emitted by machineries and mining equipment.

**Mitigation**

There should be limited movement of heavy duty machinery and mining equipment in the area to avoid interference on the daily activities of the birds. Mining equipment which emits excessive noise should be limited and confined to certain hours only and should not be performed throughout the day. No operation of any kind should be allowed after dusk. The environmental control officer should be actively on-site to avoid accidental and thoughtful interruption on the daily activities of birds and other animals.

**Monitoring**

Any bird mortality should be recorded by the environmental control officer (s) on-site or the project manager. If possible encountered bird kills and nest removal should be registered in a biodiversity data-base and information should be made available to the general public.

**3.2.9 Reptiles Diversity**

According to Griffin (1998a), about 261 species of reptiles are known to occur in Namibia. The proposed area and its surrounding have a relatively diverse species of reptile and some of the species are endemic to the country. The following are the reptiles likely to occur in the general area of the mining claim.

Table 2: Reptile known to occur in the area

<i>Scientific name</i>	<i>Common name</i>	<i>Occurrence (v)</i>	<i>Conservation Status</i>
<i>Snakes</i>			

<i>Rhinotyphlop schlegelii</i>	<i>Schlegel's Beaked Blind Snake</i>	✓	-
<i>Leptotyphlops scutifrons</i>	<i>Peter's Thread Snake</i>	✓	-
<i>Leptotyphlops labialis</i>	<i>Damara Thread Snake</i>	✓	-
<i>Leptotyphlops pungwensis</i>	<i>Pungwe Thread Snake</i>	✓	Endemic
<i>Python anchietae</i>	<i>Anchieta's Dwarf Python</i>	✓	-
<i>Python natalensis</i>	<i>Southern African Python</i>	✓	-
<i>Atractapis bibronii</i>	<i>Southern or Bibron's Burrowing Asp</i>	✓	-
<i>Lamprophis fuliginosus</i>	<i>Brown House Snake</i>	✓	-
<i>Lycophidion capense</i>	<i>Cape Wolf Snake</i>	✓	-
<i>Pseudapsis cana</i>	<i>Mole Snake</i>	✓	-
<i>Psammophylax tritaeniatus</i>	<i>Stripd Skaapsteker</i>	✓	-
<i>Psammophis trigrammus</i>	<i>Western Sand Snake</i>	✓	Endemic
<i>Philothamnus semivariegatus</i>	<i>Spotted Bush Snake</i>	✓	
<i>Dasypeltis scabra</i>	<i>Common or Rhombic Egg Eater</i>	✓	-
<i>Telescopus polystictus</i>	<i>Eastern Tiger Snake</i>	✓	-
<i>Diospholidus typus</i>	<i>Boomslang</i>	✓	-
<i>Aspidelaps infuscatus</i>	<i>Coral Snake</i>	✓	Endemic
<i>Aspidelaps scutatus</i>	<i>Shield –nose Snake</i>	✓	-
<i>Elapsoidea sunderwallii</i>	<i>Sunndevall's Garter Snake</i>	✓	-
<i>Naja annulifera</i>	<i>Snouted Cobra</i>	✓	-
<i>Bitis arietans</i>	<i>Puff Adder</i>	✓	-
<i>Bitis caudalis</i>	<i>Horned Adder</i>	✓	-
<b>Tortoises (<i>Geochelone</i>)</b>			

<i>Geochelone pardalis</i>	<i>Leopard Tortoise</i>	✓	-
<i>Psammobates oculiferus</i>	<i>Serrated or Kalahari Tortoise</i>	✓	-
<b><i>Terrapins (Pelomedusidae)</i></b>			
<i>Pelomedusa subrufa</i>	<i>Marsh or Helmented Terrapin</i>	✓	-
<b><i>Lizards</i></b>			
<i>Heliobolus lugubris</i>	<i>Bushveld Lizard</i>	✓	-
<i>Nucras intertexta</i>	<i>Spotted Sandveld Lizard</i>		
<i>Pedioplanis namaquensis</i>	<i>Namaqua Sand Lizards</i>	✓	-
<i>Pedioplanis undata</i>	<i>Western Sand Lizard</i>	✓	-
<i>Cordylosaurus subtessellatus</i>	<i>Dwarf Plated Lizard</i>	✓	-
<i>Gerrhosaurus multilineatus</i>	<i>Kalahari Plated Lizard</i>	✓	-
<i>Gerrhosaurus maltzahni</i>	<i>Giant Plated Lizard</i>	✓	<i>Endemic</i>
<b><i>Skinks (Scincidae)</i></b>			
<i>Lygosoma sundevallii</i>	<i>Sudevall's Writhing Skink</i>	✓	
<i>Mabuya capensis</i>	<i>Cape Skink</i>	✓	-
<i>Mabuya hoeschi</i>	<i>Hoesch's Skink</i>	✓	<i>Endemic</i>
<i>Mabuya occidentalis</i>	<i>Western Three-Striped Skink</i>	✓	-
<i>Mabuya spilogaster</i>	<i>Kalahari Tree skink</i>	✓	-
<i>Mabuya wahlbergii</i>	<i>Striped Skink</i>	✓	-
<i>Mabuya walbergii</i>	<i>Striped Skink</i>	✓	-
<i>Mabuya sulcata</i>	<i>Western Rock Skink</i>	✓	-
<i>Mabuya variegata</i>	<i>Variegated Skink</i>	✓	-

<b>Monitors (Varanidae)</b>			
<i>Varanus albigularis</i>	Rock or White-throated monitor	✓	-
<b>Agamas (Agamidae)</b>			
<i>Agama aculeata</i>	Ground Agama		
<i>Agama anchietae</i>	Anchietae Agama	✓	-
<i>Agama planiceps</i>	Namibian Rock Agama	✓	Endemic
<b>Chameleons (Chamaeleonidae)</b>			
<i>Chamaeleo namaquensis</i>	Namaqua Chameleon	✓	-
<i>Lygodactylus bradfieldi</i>	Bradfield's Dwarf Gecko	✓	Near - Endemic
<i>Pachydactylus bicolor</i>	Velvety Thick-toed Gecko	✓	Endemic
<i>Pachydactylus capensis</i>	Cape Thick-toed Gecko	✓	-
<i>Pachydactylus turneri</i>	Turner's Thick-toed Gecko	✓	-
<i>Pachydactylus punctatus</i>	Speckled Thick-toed Gecko	✓	-

Many of the reptile species in Namibia are associated with the rockery environment and crevices which made the proposed area an appropriate habitat. The proposed area has a relatively high species diversity of reptile which will be negatively affected by the project. The possibility of vibration caused by the movement of mining equipment's and during excavation and cutting process will be detrimental to reptiles in the proposed area. Some of the reptile species occurring in the general area of the mining claim such as; *Python natalensis*, is vulnerable and it should be noteworthy that they are non-venomous and must be protected. They cause death to their prey (usually *dassies*, cane rats, hares, monkeys, small antelopes and game birds) by constriction. A significant number of species known to occur in the area are endemic to Namibia. Only one

species is near-endemic, while the rest of the species occurring in the area have no conservation concern.

### **3.2.10 Conclusion and Recommendation**

The proposed project will have a low impact to the biodiversity in the area, because it is site specific. The proposed development is localized in nature and the impacts will be entirely confined to the site. However it imperative to note that the surrounding area of the targeted site has a relatively high species diversity of both fauna and flora. These species play vital ecological roles in the ecosystem. Some of the species occurring in the proposed area are endemic while some are protected. Many of the plant species recorded in the area are least concern, due to their wide-ranging distribution around the country. The impact of the project on vegetation in the area can be rated low and localized to the granite intrusion and its immediate surrounding area. The major concern on the impact of vegetation at the site and its surrounding area, is the trampling of plant in particular the protected, endemic plant species and sapling. To ensure that this is mitigated there should be stringent supervision accompanied by a sound vegetation management. The operation should entirely be confined to the intrusion (bedrock) targeted for mining. The proponent should adopt a restoration program and re-introduce lost plants in the area. The proposed site is free of alien plant species, therefore measures should be in place to continue maintaining the status quo and avoid any introduction of alien plants at the site and its surrounding area. Local nurseries in Erongo region and the state forestry nursery in Okahandja should be approached to source indigenous trees for restoration purposes. If the demand for indigenous plant prevails, Namib Trees CC a privately owned nursery in Windhoek should be approached. There is fear that illegal hunting might occur due to the presence of wild-animals. Illegal hunting should be avoided at all costs and any suspicious attempt should be reported to the Namibian Police at Omaruru and the anti-poaching unit within the Ministry of Environment, Forestry and Tourism.





## 4 PROJECT DESCRIPTION

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### 4.1 PROJECT COMPONENTS

As previously outlined in Section 1.1, the proposed project involves conducting an EIA for the establishment and mining of dimension stone (granite) on mining claim 71620 at Farm Kompaneno 104, Omaruru Constituency, Erongo Region..

### 4.2 GRANITE MINING

#### 4.2.1 Surface Excavation of granite

Granites and marbles are stones formed inside the earth through the cooling of the magma. Inside the earth, after the mantle, is located a deep layer of melted stone composed by reactions of radioactive elements, which ends up suffering a process of decomposition. The decaying material releases an intense heat wave that merges the stones around. The geological events, as the movement of plates or pressure, make the stones be pushed to the surface. When the rocks reach the surface occurs a cooling that originates igneous rocks, as granite and marble.

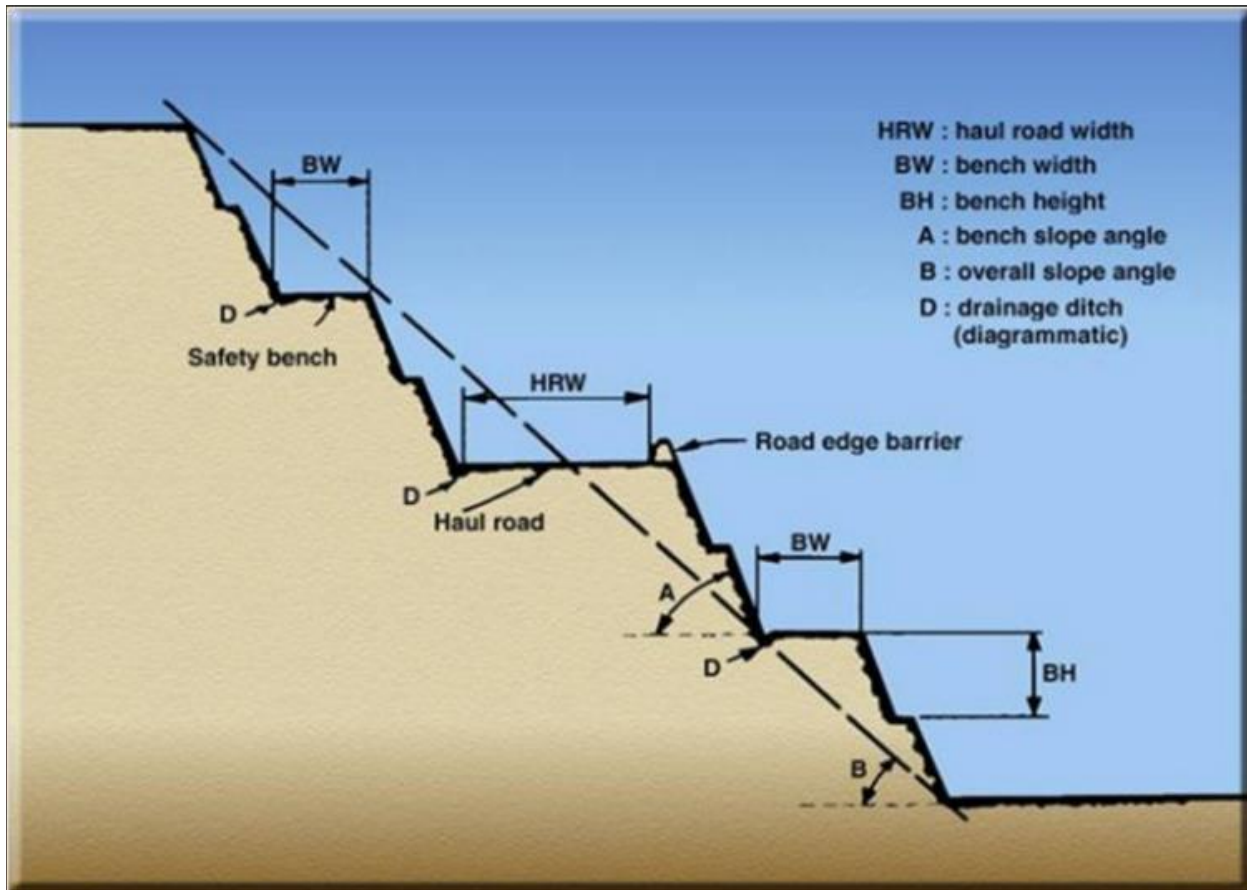
The extraction process of granite and marble starts in quarries. Quarries are natural reserves in rocky mountains, a place where the stones are in their natural aspect. For a successful extraction, a professional team and appropriate equipment are required, because it is a delicate activity and requires safety and preservation of the stones at the time of extraction.

To slice a stone in a smaller size, a variety of tools are used, between them: diamond wire machine, hidrobags, stone crusher, diamond drill, among others. The first piece of the stone is called stand or board, which has an approximate measure of 39" 4.44' x 19" 8.22' x 5" 10.86'. After the removal of the stand, it will be analyzed by a trained professional that will delimit this stone in many areas for a new clipping, where it will be produced blocks (small cubes of stones with an approximate measure of 9" 10.1' x 5" 10,8' x 5" 10,8'). To move the blocks inside de quarries, from the place of extraction to the storage yard, big tractors as loader machines are used.

After this stage, the materials are stored in big trucks adapted for heavy loads and transported with destination to the industry where the blocks are transformed into sheets.

The sheets can be produced in the following finishes: polished (with brightness), levigate (without brightness) and plastered (without brightness). After the process of extraction and industrialization, the granite and marble will be ready to be market by stores that will execute projects of sinks, stairs, countertops, columns, fireplaces and as far as the creativity goes.

This mining operation can be classified as quarrying the open or surface excavation of granite. Quarrying starts from the earth's surface and maintains exposure to the surface throughout the extraction period. For both access and safety, the excavation usually has stepped or benched side slopes as shown in Illustration 1 below.



**Illustration 1: A simple diagram showing different design parameters**

Quarrying methods depend mainly on the desired size and shape of the stone and its physical characteristics and the main equipment used are diamond saws (Rotary saws).

- Diamond saws are large diamond impregnated circular blades up to 2 m in diameter that are used to form vertical cuts in the rock by moving the machine along a guideline or rail. Extremely accurate cuts can be made in this way.
- Wire saws are also used. These consist of several pulleys over which pass endless carborundum or diamond-impregnated steel wire.

It must be noted that the market requires solid blocks of a specific minimum dimension and any blocks smaller than such or exhibiting any cracks or blemishes are not exported but dumped on site for sale to the local market. In this case, the feasibility study conducted as part of the Exploration

studies in the area has calculated that recovery will be at between 20% and 30% for the purposes of all calculations. It is perhaps worth noting that the mining method using circular diamond saws employed here maximises recovery. Wire saw sites have recovery rate in the range of only 10%.

The efficiency in respect of a granite mine is related to the actual mining of the material and is a result of many factors such as:

- Structural integrity of the material
- Efficiency of the mining method
- Operator experience
- Dressing success.

There will be no processing plant at this site. There will be only the dressing of the cut blocks to make them square. The production (extraction) rate for the different quarries depends on their state of development. The first 5 years provides for production build up or development of the new quarry and thereafter production stays constant per annum. The granite mining activities entail the cutting of granite by making use of automated diamond wire cutting machines, see **Figure 7**. The stones will be cut as per the dimensions that have been preloaded into the machine and thereafter these stones are loaded with a heavy duty front-end forklift into a flatbed truck which transport the granite to Walvis Bay port for export to China.

The proposed development provides employment for 25 people who are involved in the mining, cutting & on/off-loading of the stones and also contributes to the local economy of the Omaruru area. The intended Environmental Assessment is needed in order to assess the potential social and environmental impacts associated with the intended granite mining activities and also to provide methods of rehabilitation of the quarries once the granite have been excavated.

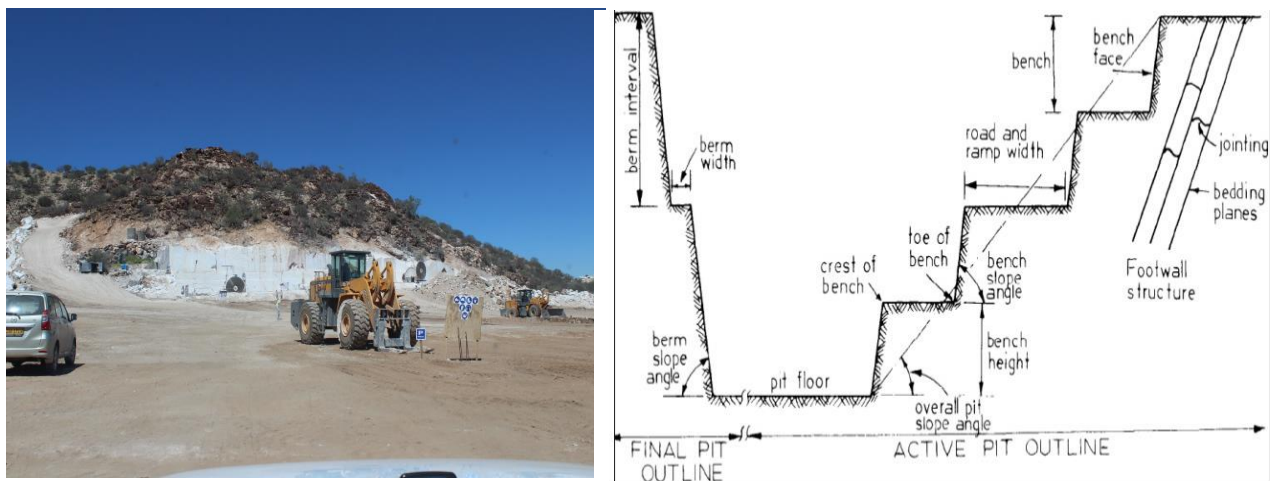


Figure 10: Granite will be cut out using an automated machine to produce the cubes and aggregate for use in the construction industry as illustrated (HEEC, 2020).

The granite industries involved in cutting, polishing and finishing have some common problems. Most problematic of them are related to stains on the finished products arising out of various factors such as contamination, use of steel pellets, treatments for the machinery, water quality, the quality of granite itself, the environmental factors and many others related to them. The stains on the finished products have a profound effect on production cost and as a whole on the financial side as the stained products cannot be marketed or has to be disposed of at a lower price. Sometimes the pile up of such non-marketable stained products becomes a problem to the company. The company sometimes incur heavy losses due to the same.

The main soil type in the area is arenosol, which is a soil type consisting mainly of sand, with little humus or clay, found typically in deserts and arid tropical regions. Efforts of rehabilitation in terms of the provided Environmental Management Plan has to be made to ensure that the ground attains the surrounding topography of contour levels after the activities cease thus reducing these negative impacts.

The proponent is in possession of valid mining registration applications from the Ministry of Mines & Energy enabling them to excavate the natural granite from the allocated portion after obtaining an Environmental Clearance Certificate. Efforts will be made to revegetate these quarries once they are no longer in use and the land can be reclaimed for other purposes, such as small stock farming as detailed in the environmental management plan (**Annexure G**).

### **4.3 ALTERNATIVES**

As pointed out in Section 1.4 above various mining claim alternatives were initially considered by the proponent, ultimately resulting in the final development of the most financially viable claims.

#### **4.3.1 No – Go Alternative**

The no-go alternative is the baseline against which all alternatives are assessed. The no-go alternative would essentially entail maintaining the current situation, whereby the granite mining activities will not go on. Additionally the granite mining activities may cease to take place which would have a negative social impact as the residence of the area would forfeit the economic benefits associated with the development. In addition, if the intended development does not commence, the residents will also not be able to benefit from the employment opportunities created from the mining activities and they will be no supply of the much needed granite to the construction industry locally and internationally.

#### **4.4 SURROUNDING LAND USE**

The mining claim 71620 is located on a flat terrain not near any human settlements or the farm homestead so the surrounding land is made up of vast tracts of land endowed with desert vegetation typical of the savanna. Livestock grazing occurs in the surrounding land parcels on Farm 104 Okampaneno.

#### **4.5 ENGINEERING SERVICES**

The mining claims are located about 23 km off the C36 road onto the D2344 road from Omaruru to Omatjete. A borehole is to be drilled near the mining claim site for the provision of water however electricity on the site is not connected to the national grid via the regional distributor Erongo Red as yet and use will be made of diesel & solar power at the Pre-fabricated buildings and mobile containers for site office and secure storage area; Pre-fabricated buildings for personnel accommodation and amenities for the 20 to 25 people staying on site. Sewage is to be removed from the site mobile toilets by means of sewer removal vehicle at regular intervals for disposal at the Omaruru sewerage ponds.

**5.1 PUBLIC PARTICIPATION REQUIREMENTS**

In terms of Section 21 of the EIA Regulations a call for open consultation with all I&APs at defined stages of the EIA process is required. This entails participatory consultation with members of the public by providing an opportunity to comment on the proposed project. Public Participation has thus incorporated the requirements of Namibia’s legislation, but also takes account of international guidelines, including Southern African Development Community (SADC) guidelines and the Namibian EIA Regulations. Public participation in this project has been undertaken to meet the specific requirements in accordance with the international best practice. Please see **Table 4** below for the activities undertaken as part of the public participation process. The public was given time to comment from **23 January 2020 to 8 February 2020**.

**Table 4:** Table of Public Participation Activities

ACTIVITY	REMARKS
Placement of site notices/posters in Omaruru & at the mining claim site.	See <b>Annexure A</b>
Placing advertisements in two newspapers namely the Windhoek Observer & Confidante	See <b>Annexure B</b>
Written Background Information Document for interested & affected parties	See <b>Annexure D</b>
Written notice to Interested and Affected Parties via Email	See <b>Annexure D</b>

Comments received during the first phase of the public participation process are summarised in the Annexure D.

**5.1.1 Environmental Assessment Phase 2**

The second phase of the PPP involved the lodging of the Draft Environmental Scoping Report (DESR) to all registered I&AP for comment. Registered and potential I&APs were informed of the DESR availability for public comment *via* a letter/email dated **17<sup>th</sup> February 2020**. An Executive Summary of the DESR was also included in the communication to the registered I&APs. I&APs had until **24<sup>th</sup> February 2020** to submit comments or raise any issues or concerns they may have with regard to the proposed project.

*The purpose of this chapter is to describe the assessment methodology utilized in determining the significance of the management, location and operational impacts of the granite mining, and where applicable the possible alternatives, on the biophysical and socio-economic environment.*

Assessment of predicted significance of impacts for granite mining activities that are already operational is by its nature, inherently uncertain – environmental assessment is thus an imprecise science. To deal with such uncertainty in a comparable manner, a standardised and internationally recognised methodology has been developed. Such accepted methodology is applied in this study to assess the significance of the potential environmental impacts of the proposed development, outlined as follows in **Table 5**.

**Table 5:** Impact Assessment Criteria



CRITERIA	CATEGORY
<b>Impact</b>	<b>Description of the expected impact</b>
<b>Nature</b> Describe type of effect	<p><b>Positive:</b> The activity will have a social / economical / environmental benefit.</p> <p><b>Neutral:</b> The activity will have no effect</p> <p><b>Negative:</b> The activity will have a social / economical / environmental harmful effect</p>
<b>Extent</b> Describe the scale of the impact	<p><b>Site Specific:</b> Expanding only as far as the activity itself (onsite)</p> <p><b>Small:</b> restricted to the site's immediate environment within 1 km of the site (limited)</p> <p><b>Medium:</b> Within 5 km of the site (local)</p> <p><b>Large:</b> Beyond 5 km of the site (regional)</p>
<b>Duration</b> Predicts the lifetime of the impact.	<p><b>Temporary:</b> &lt; 1 year (not including construction)</p> <p><b>Short-term:</b> 1 – 5 years</p> <p><b>Medium term:</b> 5 – 15 years</p> <p><b>Long-term:</b> &gt;15 years (Impact will stop after the operational or running life of the activity, either due to natural course or by human interference)</p> <p><b>Permanent:</b> Impact will be where mitigation or moderation by natural course or by human interference will not occur in a particular means or in a particular time period that the impact can be considered temporary</p>
<b>Intensity</b> Describe the magnitude (scale/size) of the Impact	<p><b>Zero:</b> Social and/or natural functions and/ or processes remain unaltered</p> <p><b>Very low:</b> Affects the environment in such a way that natural and/or social functions/processes are not affected</p> <p><b>Low:</b> Natural and/or social functions/processes are slightly altered</p> <p><b>Medium:</b> Natural and/or social functions/processes are notably altered in a modified way</p> <p><b>High:</b> Natural and/or social functions/processes are severely altered and may temporarily or permanently cease</p>
<b>Probability of occurrence</b> Describe the probability of the Impact <u>actually</u> occurring	<p><b>Improbable:</b> Not at all likely</p> <p><b>Probable:</b> Distinctive possibility</p> <p><b>Highly probable:</b> Most likely to happen</p> <p><b>Definite:</b> Impact will occur regardless of any prevention measures</p>

<p><b>Degree of Confidence in predictions</b></p> <p>State the degree of confidence in predictions based on availability of information and specialist knowledge</p>	<p><b>Unsure/Low:</b> Little confidence regarding information available (&lt;40%)</p> <p><b>Probable/Med:</b> Moderate confidence regarding information available (40-80%)</p> <p><b>Definite/High:</b> Great confidence regarding information available (&gt;80%)</p>
<p><b>Significance Rating</b></p> <p>The impact on each component is determined by a combination of the above criteria.</p>	<p><b>Neutral:</b> A potential concern which was found to have no impact when evaluated</p> <p><b>Very low:</b> Impacts will be site specific and temporary with no mitigation necessary.</p> <p><b>Low:</b> The impacts will have a minor influence on the proposed development and/or environment. These impacts require some thought to adjustment of the project design where achievable, or alternative mitigation measures</p> <p><b>Medium:</b> Impacts will be experienced in the local and surrounding areas for the life span of the development and may result in long term changes. The impact can be lessened or improved by an amendment in the project design or implementation of effective mitigation measures.</p> <p><b>High:</b> Impacts have a high magnitude and will be experienced regionally for at least the life span of the development, or will be irreversible. The impacts could have the no-go proposition on portions of the development in spite of any mitigation measures that could be implemented.</p>

\*NOTE: Where applicable, the magnitude of the impact has to be related to the relevant standard (threshold value specified and source referenced). The magnitude of impact is based on specialist knowledge of that particular field.

For each impact, the EXTENT (spatial scale), MAGNITUDE (size or degree scale) and DURATION (time scale) are described. These criteria are used to ascertain the SIGNIFICANCE of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The decision as to which combination of alternatives and mitigation measures to apply lies with Mr. Otniel Koujo as the proponent, and their acceptance and approval ultimately with the relevant environmental authority.

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. Such significance is also informed by the context of the impact, i.e. the character and identity of the receptor of the impact.

## 6.1 MITIGATION MEASURES

There is a mitigation hierarchy of actions which can be undertaken to respond to any proposed project or activity (See **Figure 11** below). These cover avoidance, minimization, restoration and compensation. It is possible and considered sought after to enhance the environment by ensuring that positive gains are included in the proposed activity or project. If negative impacts occur then the hierarchy indicates further steps.

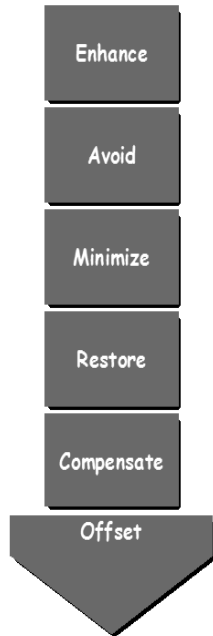


Figure 11: Mitigation Hierarchy

**Impact avoidance:** This step is most effective when applied at an early stage of project planning. It can be achieved by:

- not undertaking certain projects or elements that could result in adverse impacts;
- avoiding areas that are environmentally sensitive; and
- putting in place preventative measures to stop adverse impacts from occurring.

**Impact minimization:** This step is usually taken during impact identification and prediction to limit or reduce the degree, extent, magnitude, or duration of adverse impacts. It can be achieved by:

- scaling down or relocating the proposal;
  - redesigning elements of the project; and
- taking supplementary measures to manage the impacts.

**Restoration:** This step is taken to improve degraded or removed ecosystems following exposure to impacts that cannot be completely avoided or minimised. Restoration tries to return an area to the original ecosystem that occurred before impacts. Restoration is frequently needed towards the end of a project’s life-cycle, but may be possible in some areas during operation.

**Impact compensation:** This step is usually applied to remedy unavoidable residual adverse impacts. It can be achieved by:

- **rehabilitation** of the affected site or environment, for example, by habitat enhancement;
- **restoration** of the affected site or environment to its previous state or better; and
- **replacement** of the same resource values at another location (off-set), for example, by wetland engineering to provide an equivalent area to that lost to drainage or infill.
- **offsets** are often complex and expensive; it is therefore preferable to pay attention to earlier steps in the mitigation hierarchy.

### 7.1 INTRODUCTION

This Chapter describes the potential impacts on the biophysical and socio-economic environments, which may occur due to the operational activities described in Chapter 4. These include potential impacts, which may arise during the operation of the granite mine (i.e. long-term impacts) as well as the potential related impacts (i.e. short to medium term) during the internal road construction to access the granite with ease on the quarry. The assessment of potential impacts will help to inform and provide a clear picture to MEFT: DEA regarding the management of environmental aspects considered. In turn, MEFT: DEA's decision on the environmental acceptability of the operation of the granite mining activities at the mining claim 71620 and the setting of conditions of authorisation (should the operation be authorised) will be informed by this chapter, amongst other information contained in this EA Report.

The baseline and potential impacts that could result from the operation of the granite mining activities are described and assessed with potential mitigation measures recommended. Finally, comment is provided on the potential cumulative impacts which could result should this mining operation be approved.

### 7.2 IMPACTS DURING DIMENSION STONE MINING

During the granite mining phase a considerable area of land on the mining claim 71620 will be transformed to make way for the mining/quarrying operations in the subject area. There is need to prepare dressing areas, dispatch yards for the cut granite, accommodation and logistics areas. As mentioned earlier, there is no processing plant at this site. There is only the dressing of the cut blocks to make them square.

Note:

- The dispatch yard is an existing disturbed area.
- The dressing yard will require clearing of vegetation.
- Accommodation and logistics will require clearance of vegetation.

#### 7.2.1 Surface and Ground Water Impacts

The risk of polluting water resources may be created if excavations are not covered after granite mining has ceased. Open pits which become filled with water from rain may become contaminated or polluted which may seep into the underground water table thus polluting it. Otherwise these standing water bodies can be death traps for both humans and animals that may fall and drown in the uncovered quarries. These may also be breeding grounds for waterborne disease vectors such as the malaria larvae or if the contaminated water (by human/livestock fecal matter) is used for consumption it can spread waterborne diseases such as cholera/dysentery to the immediate communities.

### **7.2.2 Visual and Sense of Place Impacts**

The creation of large open quarries results when granite are mined in an area. This often leaves the landscape in a visually unpleasant state/compromised aesthetic state. There is thus very likely to be a change in visual characteristics of the site due to the fact that the site will now have a different landscape due to the granite being excavated. Piles of waste rock and pits where granite have been excavated will result. The extent of this disturbance will depend on how highly the interested and affected parties valued the initial aesthetic quality of the site.

### **7.2.3 Noise Impacts**

The operation of various types of machinery utilised during granite mining activities will result in associated noise impacts of normally more than the recommended 85dB exposure to employees during working hours for extended periods, therefore employees are to be provided for with ear protecting gear and given sufficient breaks to protect their hearing ability. The loading and off-loading of granite cubes onto the flatbed trucks and operation of machinery such as the diamond wire stone cutter, heavy duty fork lift, excavator, grader and air compressor may result in associated noise being generated.

### **7.2.4 Dust and Emission Impacts**

The air quality in the area is considered to be fairly good within the mining claims area. Dust may result during the granite mining activities when the excavations are dug out with the automatic diamond wire stone cutting machinery. Additional dust and emissions associated with the granite mining activities will mostly be generated by vehicle movement of the excavator and heavy duty fork lift to and from the granite cutting areas on the mining claims. The entire activity needs to be controlled and managed as required by the Public Health Act of 2015 and Atmospheric Pollution Prevention Ordinance (**No. 11 of 1976**).

### **7.2.5 Impacts on biodiversity**

The mining claim sites have not been disturbed by human activity from the excavation of granite since the mining claim 71620 is a greenfield site and thus has been left in its natural environmental state. However at the claim the removal of granite during the operational phase will thus ultimately result in the limited removal of vegetation in the subject mining claim areas. This in turn will have an impact on the habitats of the fauna located within the subject areas. Particularly for birds as the granite mining operations may result in disturbance on bird nesting.

Quarries that are left open become hazardous sites for animals that frequent the area, especially during the good rainy seasons when these can become filled with water in which they can drown. Thus there is need to erect a perimeter fence around the active quarries to avoid such risks. Hence it is very necessary for the quarries to be rehabilitated (phytoremediation) once excavation has ceased at a particular mining claim site.

## **7.2.6 Heritage impacts**

There are no declared heritage sites by the National Heritage Council of Namibia on the subject site. An accidental find procedure should however be provided for.

## **7.2.7 Impacts of Flooding**

Groundwater inflow in surface mining operations can flood the lower sections of the pit – provided that the pit has surpassed the depth to the water table. High pore pressures in side walls can trigger collapse, leading to catastrophic events. However, most rocks mined for granite are aquitards/karsts and this situation is therefore highly unlikely especially for granite mining. Flooding may also occur as a result of water accumulating in the quarries after heavy rains in a good season. Thus it is essential to ensure that the trenches are refilled with soil and rubble after excavation has occurred as the open pits/quarries pose a threat to animals and humans in terms of health and safety. Rainwater in the area also triggers serious erosion problems in the mountainous areas and some sediment deposits were observed to have naturally run down the mountain slopes to the base.

## **7.2.8 Social Impacts**

Unemployment is widely experienced across the country including in the Omaruru Constituency. There is an increased demand for job opportunities due to the rapid population growth. The granite mining activities contributes towards addressing this need, by providing employment to the local people in the area. In total Mr. Otniel Koujo will employ about 25 people on either permanent or casual basis for the mining operations. Additionally mining granite produce stone offcuts/aggregate which can be used as affordable building materials by the local people and thus they can construct decent houses with strong and solid walls in comparison to the option of using corrugated iron sheets or mud and poles. The intended activity also contributes towards the national economy and thereby attracts more investors into the country.

## **7.3 IMPACTS DURING DIMENSION STONE TRANSPORTATION TO THE PORT**

### **7.3.1 Traffic Impacts**

Traffic is not expected to increase significantly during the granite mining activities however it may be slightly impacted due to the types of vehicles (i.e. heavy duty trucks) being utilised for the transportation of the granite to the port of Walvis Bay for export. However if the excavation and transportation is done according to a schedule and the vehicles strictly abide to using the demarcated right of ways the impact is expected to be of very low significance as the loads are done on a scheduled basis which do not conflict with peak periods. Peak periods are to be avoided as the passenger/commercial vehicles bringing supplies to the Omatjete area also make use of this D2344 road. Impacts on soil may result from vehicle traffic, drilling and materials storage resulting in soil erosion; impacts on soil structure (mainly compaction) and soil chemistry (as a result of petrochemical spills).

### **7.3.2 Existing Service Infrastructure Impacts**

The subject area intended for the associated granite mining activities is isolated and will therefore need to be provided for with underground borehole water to be drilled and a diesel generator for electricity.

### **7.3.3 Surface and Ground Water Impacts**

The heavy vehicles operating at the mining site should be regularly monitored for leaking hydrocarbon fuels (petrol or diesel) and must be fitted with drip trays while they are parked to avoid contamination of surface and groundwater. If a refuel station (fuel containers) is on site it must either be a tank mounted on stilts so that any leaks are easily detectable and if it is underground it should be lined with heavy duty geomembranes such as polyvinyl chloride (PVC) or high density polyethylene (HDPE) to prevent groundwater contamination.

### **7.3.4 Health, Safety and Security Impacts**

Due to a relatively high demand of employment during the granite mining activities, this may involve the establishment of a temporary workforce at the mining camp within the state Farm. Experience with other projects in a developing-world context has shown that, where migrant workers have the opportunity to interact with the local community, a significant risk is created for the development of social conditions and sexual behaviors that contribute to the spread of HIV and AIDS.

In response to the threat the pandemic poses, MEFT has recently developed a policy on HIV and AIDS. This policy, which was developed with support from USAID, GTZ and the German Development Fund, provides for a non-discriminatory work environment and for workplace programs managed by a Ministry-wide committee. The MEFT has also recently initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments.

In addition the workers should be provided for with Protective Personal Equipment such as overalls, hard boots, gloves, goggles, dust masks and sun hats to be protected from the weather elements and associated work hazards. A fully stocked first aid kit with unexpired medicines must always be on site.

### **7.3.5 Noise Impacts**

The granite mining activities may result in associated noise impacts. These noise impacts will mainly be associated with use of the automatic diamond wire granite cutting machine, excavators, graders and noise from the heavy duty fork lift transporting the stones to the nearby (<1.5km) loading site. The residents of the nearby settlements/farms and those that frequent the existing area will be impacted however only minimally as the mining claims are located at a distance from any human settlements within the boundaries of state resettlement farm. The impact is very low and is limited to the excavation period only that utilises heavy duty tools.

### **7.3.6 Municipal Service Impacts**



The granite mining activities will result in additional people on-site, who will require provision of the following services:

- Potable water for domestic (ablution and drinking) purposes.
- Temporary toilets during the mining operations.
- Solid waste management (domestic waste).

Workers will be housed on an identified land parcel for the mining camp to be allocated by the farm owner so as to build temporary houses and provide the necessary amenities for the employees including a renewable source of energy in the form of solar panels to ensure a reasonable standard of living.

### **7.3.7 Storage and Utilisation of Hazardous Substances**

Hazardous substances are regarded by the Hazardous Substance Ordinance (No. 14 of 1974) as those 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 or the generation of pressure thereby in certain circumstances. It covers manufacture, sale, use, disposal and dumping as well as import and export. During the mining operations, the use; storage and disposal of these types of hazardous substances, such as explosives, shutter oil, curing compounds, types of solvents, primers and adhesives and diesel, on-site could have negative impacts on the surrounding environment, if these substances spill and enter the environment therefore these should be put in a lockable bunded store room.

## **7.4 ENVIRONMENTAL MANAGEMENT PLAN**

An Environmental Management Plan (EMP) is contained in **Annexure G** of this report. The purpose of the EMP is to outline the type and range of mitigation measures that should be implemented during the granite mining activities and decommissioning phases of the project to ensure that negative impacts associated with the granite mining are avoided or mitigated.

## **7.5 CUMULATIVE IMPACTS**

The cumulative impact of the mining operations of granite are not yet known and therefore are very difficult to rate. If all proposed mitigation measures and suggestions brought forward are however in place to minimise the overall impacts then the cumulative impact can be expected to be rated as **Medium-Low (negative)** for the operation and management of the mining activities.

## **7.6 SUMMARY OF POTENTIAL IMPACTS**

A summary of the significance of the potential impacts from the granite mining activities assessed above is included in **Table 6**. The **Tables 7 – 8** provide a summary of the mitigation measures proposed

for the impacts. While some difference in magnitude of the potential impacts would result from the proposed alternatives this difference was not considered to be significant for any of the potential impacts. As such, the table below applies to all proposed alternatives.

**Table 6:** Summary of the significance of the potential impacts

Description of potential impact	Project alternative	No mitigation / mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Cumulative impact
<b>DIMENSION STONE MINING IMPACTS</b>										
<b>1. Surface and Ground Water Impacts</b>	Granite mining activities	No mitigation	Local	Very-High	Medium term	Medium	Probable	Certain	Reversible	Medium (-ve)
		Mitigation	Local	Medium-Low	Medium term	Medium-Low	Probable	Certain	Reversible	Medium-Low
	No go	No mitigation	Local	Low	Medium term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Low	Medium term	Neutral	Probable	Certain	Reversible	Neutral
<b>2. Visual Sense of Place Impacts</b>	Granite mining activities	No mitigation	Local	Medium-Low	Medium term	Medium	Probable	Certain	Reversible	Medium-Low (-ve)
		Mitigation	Local	Low	Medium term	Medium - Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
<b>3. Noise Impacts</b>	Granite mining activities	No mitigation	Local	Medium-Low	Medium term	Medium-Low	Probable	Certain	Reversible	Medium-Low (-ve)
		Mitigation	Local	Low	Medium term	Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral

Description of potential impact	Project alternative	No mitigation / mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Cumulative impact
		Mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
<b>4. Dust and Emission Impacts</b>	Granite mining activities	No mitigation	Local	Medium-Low	Short term	Medium	Probable	Certain	Reversible	Medium (-ve)
		Mitigation	Local	Low	Short term	Medium-Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
<b>5. Biodiversity (Fauna and Flora)</b>	Granite mining activities	No mitigation	Local	Low	Short term	High	Probable	Certain	Reversible	Low (-ve)
		Mitigation	Local	Very low	Short term	Medium-Low	Probable	Certain	Reversible	Very low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
<b>6. Heritage Impacts</b>	Granite mining activities	No mitigation	Local	Medium	Short term	Medium	Probable	Certain	Reversible	Medium (-ve)
		Mitigation	Local	Low	Short term	Low	Probable	Certain	Reversible	Medium - Low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral

Description of potential impact	Project alternative	No mitigation / mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Cumulative impact
<b>7. Impacts of Flooding</b>	Granite mining activities	No mitigation	Local	Medium	Short term	Medium	Probable	Certain	Reversible	Medium – low (-ve)
		Mitigation	Local	Low	Short term	Medium-Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
<b>8. Social Impacts</b>	Granite mining activities	No mitigation	Local	Very low	Short term	High++	Probable	Certain	Irreversible	Very low(-ve)
		Mitigation	Local	Negligible	Short term	High++	Probable	Certain	Irreversible	Negligible (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	<b>Probable</b>	Certain	Reversible	Neutral
<b>TRANSPORTATION &amp; GENERAL OPERATION IMPACTS</b>										
<b>1. Traffic Impacts</b>	Granite mining activities	No mitigation	Local	Medium-Low	Short term	Low	Probable	Certain	Reversible	Medium-Low (-ve)
		Mitigation	Local	Low	Short term	Very Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral

Description of potential impact	Project alternative	No mitigation / mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Cumulative impact
<b>2. Existing Service Infrastructure Impacts</b>	Granite mining activities	No mitigation	Local	Low	Short term	Low	Probable	Certain	Reversible	Low (-ve)
		Mitigation	Local	Very low	Short term	Very low	Probable	Certain	Reversible	Very low
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
<b>3. Surface and Ground Water Impacts</b>	Granite mining activities	No mitigation	Local	Medium	Short term	Medium - low	Probable	Certain	Reversible	Medium - Low (-ve)
		Mitigation	Local	Low	Short term	Low	Probable	Certain	Reversible	Very low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
<b>4. Health, Safety and Security Impacts</b>	Granite mining activities	No mitigation	Local	Medium	Short term	Medium	Probable	Certain	Reversible	Medium - Low (-ve)
		Mitigation	Local	Low	Short term	Medium-Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
<b>5. Noise Impacts</b>		No mitigation	Local	Medium	Medium term	Medium	Probable	Certain	Reversible	Medium (-ve)

Description of potential impact	Project alternative	No mitigation / mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Cumulative impact
	Granite mining activities	Mitigation	Local	Low	Medium term	Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
<b>6. Municipal Service</b>	Granite mining activities	No mitigation	Local	Medium	Medium term	Medium	Probable	Certain	Reversible	Medium (-ve)
		Mitigation	Local	Low	Medium term	Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
<b>7. Storage and Utilisation of Hazardous Substances</b>	Granite mining activities	No mitigation	Local	Low	Short term	Medium	Probable	Certain	Reversible	Low (-ve)
		Mitigation	Local	Very low	Short term	Low	Probable	Certain	Reversible	Very low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral

**Table 7:** Proposed mitigation measures for the granite mining activities

<b>DIMENSION STONE MINING IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
<p>Surface and Ground Water-Storm water and Erosion Control</p>	<ul style="list-style-type: none"> <li>• Ensure that surface water accumulating on-site are channelled and captured through a proper storm drainage trench.</li> <li>• Disposal of waste at the mining claim sites should be regulated and properly managed.</li> <li>• Regular preventative maintenance should be carried out on the quarry infrastructure. Earth embankments to prevent erosion will be established where appropriate.</li> <li>• The surface water accumulated in the open trenches must be channelled along the natural tributaries of area.</li> <li>• It is recommended that granite mining takes place outside of the rainy season in order to limit flooding on site and surface water pollution.</li> <li>• Storm water Management Plans should be developed for each quarry/claim site and should include the management of storm water during excavation, as well as the installation of storm water and erosion control infrastructure and management thereof after completion of mining.</li> <li>• Storm water management systems will be installed to prevent storm water from entering or exiting the quarry, which could result in silt laden surface water from draining into any ephemeral river systems that may be in proximity to the mining claim site.</li> <li>• Quarry slopes should be profiled to ensure that they are not subjected to excessive erosion but capable of drainage run-off with minimum risk of scour (maximum 1:3 gradient).</li> <li>• If necessary, diversion channels should be constructed ahead of the open cuts as well as above emplacement areas and stockpiles to intercept clean run-off and divert it around disturbed areas into the natural drainage system downstream of the quarry.</li> <li>• All mined areas (where works will take place) will be rehabilitated to control erosion and sedimentation.</li> <li>• Existing vegetation must be retained as far as possible to minimise erosion problems.</li> </ul>



DIMENSION STONE MINING IMPACTS	
IMPACT	MITIGATION MEASURES
	<ul style="list-style-type: none"> <li>• Rehabilitation of quarries shall be planned and completed on a continuous basis in such a way that the run-off water (if any) will not cause erosion.</li> <li>• Visual inspections shall be done on a regular basis with regard to the stability of water control structures, erosion and siltation (if required).</li> </ul>
Soil Aspects	<ul style="list-style-type: none"> <li>• Topsoil shall be removed from all areas where physical disturbance of the surface will occur, prior to the disturbance occurring. Topsoil refers to that layer of soil covering the earth and which provides a suitable environment for the germination of seeds, allows the penetration of water, and is a source of micro-organisms, plant nutrients and in some cases seed.</li> <li>• The topsoil shall be stored so that it can be placed on the exposed subsoil as soon as the mining of the excavation or the relevant section of it has been completed and its slopes have been finished off to the acceptable gradient as part of the rehabilitation process.</li> <li>• Topsoil shall be stockpiled only in the areas dedicated for only that purpose, even if the topsoil is only partially cleared.</li> <li>• The topsoil removed, shall be stored in a bund wall on the high ground side of the quarry and in such a way that it will not cause damming up of water or washaways, or wash / blow away itself. Stockpiles will not exceed a height of <b>two</b> meters.</li> <li>• Stockpiles shall be managed so as to maintain the regrowth potential of the topsoil. Should the stockpiles stand for too long (greater than 12 months) it can be considered barren from a seed bank point of view. In this case reseeding may be required. Stockpiles should ideally be stored for no longer than six months.</li> <li>• The overburden, i.e., that layer of soil immediately beneath the topsoil, will be removed and stored separately from the topsoil.</li> <li>• Transport waste to waste rock dump.</li> <li>• No chemical pollution shall be allowed to contaminate the soils; any plant equipment found to be attributing to this shall be removed from the site and repaired.</li> </ul>

<b>DIMENSION STONE MINING IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
	<ul style="list-style-type: none"> <li>• In the event of a petrochemical (diesel, oil, fuels, etc.) spill, the Proponent must take suitable measures to contain the pollution and prevent it from spreading or seepage. Once the spill has been contained, contaminated material (soil, etc.) shall be removed and disposed of at a registered hazardous waste disposal site.</li> </ul>
Visual and Sense of Place	<ul style="list-style-type: none"> <li>• Visual pollutants can further be prevented through mitigations (i.e. keep existing trees, introduce tall indigenous trees).</li> <li>• Quarries should be levelled once granite mining activities cease so as to restore the visual sense of place of the area to its natural state.</li> <li>• The remains of all structures that may have been erected at the quarry shall be demolished and removed on completion of the project.</li> <li>• Care must be taken to ensure that all rehabilitated areas are similar to the immediate environment in terms of visual character, vegetation cover and topography and any negative visual impacts will be rectified to the satisfaction of the environmental consultant (HEEC CC) or MEFT officials.</li> <li>• Overburden will be placed back into excavation as part of the rehabilitation programme</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• Continuous monitoring of noise levels should be conducted to make sure the noise levels at the granite mining site does not exceed acceptable limits.</li> <li>• No activity having a potential noise impact should be allowed after 18:00 hours if possible.</li> <li>• In the event that activities continue outside the stipulated hours the contractor will communicate such occurrences to potentially affected communities prior to commencing such activities.</li> </ul>
Dust and Emission	<ul style="list-style-type: none"> <li>• It is recommended that dust suppressants such as Dustex be applied to all the dimension mining activities to ensure at least 50 % control efficiency on all the unpaved roads.</li> <li>• Vehicles used on site to only use designated roads.</li> <li>• The speed of haul trucks and other vehicles must be strictly controlled to avoid dangerous conditions, excessive dust or excessive deterioration of the road being used.</li> <li>• During high wind conditions the proponent must make the decision to cease works until the wind has calmed down.</li> </ul>

<b>DIMENSION STONE MINING IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
	<ul style="list-style-type: none"> <li>• Cover any stockpiles with plastic to minimise windblown dust.</li> <li>• Provide workers with dust masks and other necessary PPE (gloves, work suits, sun hats etc.).</li> <li>• Maintenance of the road leading to the mining claim sites so as to minimise the dust released when heavy trucks are travelling on the road.</li> </ul>
Fauna and Flora	<ul style="list-style-type: none"> <li>• Prevent the destruction of protected tree species.</li> <li>• Encourage the regeneration and regrowth of trees with exposed roots in the area.</li> <li>• Do not clear cut the entire mining claim sites, but rather keep the few individuals and/or clumps of trees/shrubs as part of the landscaping especially important for shade in the hot climate.</li> <li>• The trees that are to be kept should be clearly marked with “danger tape” to prevent accidental removal. Regular inspection of the marking tool should be carried out.</li> <li>• The very important trees should be “camped off” to prevent the unintended removal or damage to these trees.</li> <li>• Recommend the planting of local indigenous species of flora as part of the landscaping as these species would require less maintenance than exotic species and have important ecological functions in terms of carbon sequestration from decomposing materials at the site.</li> <li>• Transplant removed trees where possible, or plant new trees in lieu of those that have been removed.</li> <li>• Prevent contractors who will be doing the mining from collecting wood and veld food such as amphibians, migrating birds, etc. during the granite mining phase.</li> <li>• Prevent contractors from fishing in the local ephemeral rivers or catching aquatic species.</li> <li>• No workers will be allowed to collect any plant or snare, hunt or otherwise capture any wild animal. All animal life, vegetation, firewood etc., will remain the property of the Ministry of Environment &amp; Tourism or the custodian thereof and will not be disturbed, upset or used without their express consent.</li> <li>• No domestic animals will be permitted on the quarry sites by means of erecting a perimeter fence, small stock should graze at designated areas.</li> </ul>

<b>DIMENSION STONE MINING IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
	<ul style="list-style-type: none"> <li>• No animals shall be harmed during the course of granite mining. Should snakes or dangerous wildlife be encountered, an expert must be called out to safely relocate them.</li> </ul>
Access roads to the site	<ul style="list-style-type: none"> <li>• Roads shall be ripped or ploughed, and if necessary, appropriately fertilised (based on a soil analysis) to ensure the regrowth of vegetation. Imported road construction materials which may hamper regrowth of vegetation must be removed and disposed of in an approved manner prior to rehabilitation.</li> <li>• If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the ECO may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation, be corrected and the area be seeded with a seed mix to the suitable specifications.</li> </ul>
Heritage	<ul style="list-style-type: none"> <li>• The project management should be made aware of the provisions of the National Heritage Act regarding the prompt reporting of archaeological finds (e.g., remnants of stone-made structures, indigenous ceramics, bones, stone artifacts, ostrich eggshell fragments, marine shell and charcoal/ash concentrations), unmarked human burials or other categories of heritage resources are found during mining activities.</li> <li>• In the event of such finds, mining must stop and the project management or contractors should notify the National Heritage Council of Namibia immediately.</li> </ul>
Flooding	<ul style="list-style-type: none"> <li>• Granite mining activities should be minimised during the rainy season to reduce the impacts of flooding at the mining site.</li> </ul>
Existing Service Infrastructure	<ul style="list-style-type: none"> <li>• It is recommended that alternative and renewable sources of energy be explored and introduced into the employees' housing development to reduce dependency on the grid.</li> <li>• Solar geysers and panels should be considered to provide for general lighting and heating of water and buildings.</li> <li>• Water saving mechanisms should be incorporated within the granite cutting design and plans in order to further reduce water demands.</li> </ul>

<b>DIMENSION STONE MINING IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
	<ul style="list-style-type: none"> <li>• Re-use of treated waste water should be considered wherever possible to reduce the consumption of potable water.</li> </ul>
Social Impacts	No specific mitigation measures are required, only that the local community be consulted in terms of possible job creation opportunities and must be given first priority if unspecialised job vacancies are available.

**Table 8:** Proposed mitigation measures for the transportation and operational phase

<b>TRANSPORTATION &amp; GENERAL OPERATION IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
Traffic & Equipment	<ul style="list-style-type: none"> <li>• Limit and control the number of access points to the quarry sites.</li> <li>• Ensure that road junctions have good sightlines.</li> <li>• Vehicles' need to be in a road worthy condition and maintained throughout the granite mining phase.</li> <li>• Transport the materials in the least amount of trips as possible.</li> <li>• Adhere to the speed limit.</li> <li>• Implement traffic control measures where necessary.</li> <li>• All rotary saws used for the stone cutters must be securely stored on rails when not in use.</li> </ul>
Surface and Ground Water Impacts	<ul style="list-style-type: none"> <li>• No dumping of waste products of any kind in or in close proximity to surface water bodies.</li> <li>• Heavy mining vehicles should be kept out of any surface water bodies and the movement of vehicles should be limited where possible to the existing roads and tracks.</li> <li>• Ensure that oil/ fuel spillages from vehicles transporting the stones and machinery are minimised and that where these occur, that they are appropriately dealt with.</li> <li>• Drip trays must be placed underneath vehicles when not in use to contain all oil that might be leaking from these vehicles.</li> </ul>

<b>TRANSPORTATION &amp; GENERAL OPERATION IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
	<ul style="list-style-type: none"> <li>• Contaminated runoff from the mining claim sites should be prevented from entering the surface and ground water bodies.</li> <li>• All materials on the site should be properly stored.</li> <li>• Disposal of waste from the sites should be properly managed and taken to the designated spaces for each particular type.</li> <li>• Workers should be given ablution facilities at the sites that are located at least 30 m away from any surface water and they should be regularly serviced.</li> <li>• Washing of personnel or any equipment should not be allowed on the mining claim site. Should it be necessary to wash equipment these should be done at an area properly suited and prepared to receive and contain polluted waters.</li> </ul>
Health, Safety and Security	<ul style="list-style-type: none"> <li>• All vehicular equipment operators must have valid licences for that particular vehicle class.</li> <li>• Personnel should not overnight at the mining claim site, except the security personnel.</li> <li>• Ensure that all mining personnel are properly trained depending on the nature of their work.</li> <li>• Provide for a first aid kit and a properly trained person to apply first aid when necessary.</li> <li>• A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases as described above.</li> <li>• Provide free condoms in the workplace and to local community throughout the granite mining period and promote their usage.</li> <li>• Facilitate access to Antiretroviral (ARV) medication.</li> <li>• Encourage HIV counselling and testing.</li> <li>• Encourage Voluntary Medical Male Circumcision (VMMC).</li> <li>• Provide awareness on the prevention of mother to child HIV Transmission.</li> <li>• Restrict unauthorised access to the mining claim site and implement access control measures.</li> <li>• Clearly demarcate the mining claim site boundaries along with signage of “no unauthorised access”.</li> </ul>

<b>TRANSPORTATION &amp; GENERAL OPERATION IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
	<ul style="list-style-type: none"> <li>• Clearly demarcate dangerous areas and no go areas on site.</li> <li>• Staff and visitors to the mining claim site must be fully aware of all health and safety measures and emergency procedures.</li> <li>• The contractor must comply with all applicable occupational health and safety requirements. The workforce should be provided with all necessary Personal Protective Equipment where appropriate.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• Install technology such as silencers on the excavation machinery.</li> <li>• Do not allow the use of horns as a general communication tool, but use it only where necessary as a safety measure.</li> <li>• No amplified music should be allowed on site.</li> <li>• Inform immediate residents of the nearby village/farm/settlement about the dimension mining activities to commence and provide for continuous communication between the residents and contractor.</li> <li>• Limit mining times to acceptable daylight hours.</li> </ul>
Municipal Services	<ul style="list-style-type: none"> <li>• Poor waste management practices at this stage are particularly extensive due to a lack of established waste disposal facilities, ignorance of how to dispose of certain waste streams and failure to train the mining workforce in appropriate waste disposal. <ul style="list-style-type: none"> <li>➤ The types of waste that need to be disposed of at this point are waste rock, packaging material, oils and greases from mining fleet/plant, tyres and domestic refuse (since there will be camps near the mining claim sites).</li> </ul> </li> <li>• It is recommended that waste from the temporary toilets be pumped out and disposed of at the designated waste treatment site in Omaruru.</li> <li>• A sufficient number of waste bins should be placed around the quarry site for the soft refuse.</li> </ul>

<b>TRANSPORTATION &amp; GENERAL OPERATION IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
	<ul style="list-style-type: none"> <li>• The overburden and waste rock should be deposited at designated spaces at quarry to allow for easy access by people who would want to reuse this waste rock in other projects such as refilling pits/selling it to small scale stone carvers on the local market.</li> <li>• Solid waste will be collected and disposed of on a regular basis at the designated spaces.</li> </ul>
Hazardous Substances	<ul style="list-style-type: none"> <li>• Storage of the hazardous substances in a bunded area, with a volume of 120 % of the largest single storage container or 25 % of the total storage containers whichever is greater.</li> <li>• Refuel vehicles at a designated area that has a protective surface covering/geomembrane lining and utilise drip trays for stationary plant.</li> </ul>
Social Impacts	No specific mitigation measures are required, only that the local community be consulted in terms of possible job creation opportunities and must be given first priority if unspecialised job vacancies are available.



## 8 CONCLUSION AND RECOMMENDATIONS

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*The purpose of this Chapter is to briefly summarise and conclude the FESR and describe the way forward.*

### 8.1 DIMENSION STONE MINING PHASE IMPACTS

With reference to **Table 6**, only one of the negative mining phase impacts was deemed to have a high significant impact on the environment i.e. impact on biodiversity. This impact was assessed to a **Medium to Low (negative)** with mitigation. The cumulative granite mining impacts were assessed to a **Medium to Low (negative)** significance, without mitigation measures. With the implementation of the recommended mitigation measures in Chapter 7 as well as in the EMP, the significance of the granite mining phase impacts is likely to be reduced to a **Low (negative)**.

The most significant impact **high (positive)** is the social impact directly associated with the increasing provision of job opportunities and the social upliftment accompanied by economic development through investing in the town of Omaruru through supporting the local economy since the people will have an increased disposable income and buying power. The intended activity further aims to promote local economic development through attracting more investors that want to import granite for various uses.

### 8.2 LEVEL OF CONFIDENCE IN ASSESSMENT

With reference to the information available at the project planning cycle, the confidence in the environmental assessment undertaken is regarded as being acceptable for the decision-making, specifically in terms of the environmental impacts and risks. The Environmental Assessment Practitioner believes that the information contained within this FESR is adequate to allow MEFT: DEA to be able to determine the environmental acceptability of the proposed project.

It is acknowledged that the operational details will evolve during the detailed mining operations. However, these are unlikely to change the overall environmental acceptability of the operation of the granite mining activities as dimension stones and aggregate and any significant deviation from what was assessed in this FESR should be subject to further assessment. If this was to occur, an amendment to the Environmental Authorisation may be required in which case the prescribed process would be followed.

### 8.3 MITIGATION MEASURES

With the implementation of the recommended mitigation measures in Chapter 7 as well as in the EMP, the significance of the granite mining phase impacts is likely to be reduced to a **Low (negative)**. **It is further extremely important to include an Environmental Control Officer (ECO)**

**on site during the relevant phases of the intended activity to ensure that all the mitigation measures discussed in this report and the EMP are enforced.**

The granite extraction process is considered to be a relatively benign type of mining. Rehabilitation back to the natural state is a key component and will be undertaken in a phased manner as the mining activities progress. It is advised that the proponent strictly engages the guidelines outlined within the EMP with regards to the rehabilitation of the quarries once granite excavation at the mining claim sites has ceased so as to restore the area to its near natural state and to reduce the associated negative environmental impacts.

It is noted that where appropriate, these mitigation measures and any others identified by MEFT: DEA could be enforced as Conditions of Approval in the Environmental Authorisation, should MEFT: DEA issue a positive Environmental Authorisation.

#### **8.4 OPINION WITH RESPECT TO THE ENVIRONMENTAL AUTHORISATION**

Regulation 15(j) of the EMA, requires *that the EAP include an opinion as to whether the listed activity must be authorised and is the opinion is that it must be authorised, any condition that must be made in respect of that authorisation.*

It is recommended that the granite mining operations be authorised, as the activities provide employment for the local people and contribute to local & national economic development through attracting more investors to the nearby town of Omaruru and surrounding settlements/farms and additionally increasing people's livelihoods through job creation.

The significance of the social impact on the residents of Omaruru constituency was deemed to be **High (positive)**. The significance of negative impacts can be reduced with effective and appropriate mitigation provided in this Report and the EMP attached in **Annexure G**. If authorised, the implementation of an EMP should be included as a condition of approval.

#### **8.5 WAY FORWARD**

The Final Environmental Scoping Report will be submitted to MEFT: DEA for consideration and decision making. If MEFT: DEA approves or requests additional information / studies all registered I& APs and stakeholders will be kept informed of progress throughout the assessment process.

## 9 REFERENCES

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G&K Environmental Consultants, 2014. The Environmental Impact Assessment for New Quarrying, Karibib Windhoek: Report.

Mendelsohn, J., Jarvis, A., Roberts, C. & Robertson, T., 2009. Atlas of Namibia. 3rd ed. Cape Town: Sunbird Publishers.

Mendelsohn, J. & Roberts, C., 1997. An Environmental Profile and Atlas of Erongo Region.

Namibia Statistics Agency (NSA), 2011. Namibia 2011 Population and Housing Census Main Report. Available at: <http://nsa.org.na/page/publications>.

Nicole Grünert: Namibia Fascination of Geology (2003), Gabi Schneider: The Roadside Geology of Namibia (2004).

World Weather online, 2020. Available at: [https://www.worldweatheronline.com/omaruruweather/erongo/na.aspx?wwo\\_r=srch](https://www.worldweatheronline.com/omaruruweather/erongo/na.aspx?wwo_r=srch) [Accessed on 18/02/2020].

World Weather online, 2020 a. Available at: [https://www.worldweatheronline.com/omaruruweather/erongo/na.aspx?wwo\\_r=srch](https://www.worldweatheronline.com/omaruruweather/erongo/na.aspx?wwo_r=srch) [Accessed on 18/02/2020].

<http://prgrupoparana.com/en/how-the-granite-and-marble-extraction-is-done/> [Accessed 18/02/2020]