ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT (ESIA) REPORT

CONSTRUCTION AND OPERATION OF DREAMLAND MARBLE STONES MINE IN KARIBIB, ERONGO REGION, NAMIBIA

Environmental Impact Assessment Consultant

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PROPONENT	DREAMLAND INVESTMENT CC
PROJECT TITLE	CONSTRUCTION AND OPERATION OF DREAMLAND MARBLE STONES MINE IN KARIBIB, ERONGO REGION, NAMIBIA
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1. INTRODUCTION

Namland Consultants has been appointed by Dreamland Investment cc (the Proponent) to conducting and prepare the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) report for marble mining. The proponent intends to construction and operate mining and quarry for the dimension stones (marble), approximately 7 km south of Karibib in a Erongo Region.

EIA, can be defined as the anticipation of various impacts a project will have on the environment and the local community. It is a decision-making tool, which guides decision makers in taking appropriate decisions prior to issuing an Environmental Clearance Certificate (ECC), as per Environmental Management Act No.7 of 2007 and its associated regulations. EIA aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers. By using EIA both environmental and economic benefits can be achieved, such as reduced cost and time of project implementation and design, avoided treatment/clean-up costs and impacts of laws and regulations.

Marble stone is an important building material used worldwide, and therefore a valuable natural resource. Namibia has numerous deposits of good quality marble stone displaying a variety of attractive colours, patterns and textures. Marble stone is one of the main rock types quarried in Namibia, which provides high-quality products for both the local and international market.

1.1 PURPOSE OF THE REPORT

The project involves the development and operation of marble mining and quarry activities, which triggers an EIA to be conducted in order to obtain the Environmental Clearance Certificate as per the Environmental Management Act, No7. of 2007 and its associated regulations. An Environmental and Social Impact Assessment (ESIA) has commenced in compliance with the Environmental Management Act No.7 of 2007 and its associated regulations. The ESIA report presents the findings of the scoping assessment. The report describes the baseline biophysical and socioeconomic environments, provides a project description, outlines the terms of reference for the assessment phase, and presents the (EMP).

The scoping report and appendices will be submitted to the public for review and input on the impacts assessment study. Thereafter, the report will be submitted to the Ministry of Mines and Energy (MME) as the competent authority and to the Ministry of Environment, Forestry and
Tourism (MEFT) for a record of decision.

1.2 MARBLE STONES MINING INDUSTRY IN NAMIBIA

Marble stone mining today have become an important building material used worldwide, and therefore a valuable natural resource. Marble stone is one of the main rock types quarried in Namibia, which provides high-quality products for both the local and international market, as such, it does contribute the Gross Domestic Product (GDP). According to the Namibia Statistics Agency (NSA) (2016), distribution of marble stones products shows that the majority (72.1%) of the building materials in urban areas (83.1%) compared to rural areas (58.6%).

The Namibian marble stones industry is divided into organized and unorganized sector. The organized sector comprises of a handful of local players (NCCI, 2018). The unorganized sector accounts for nearly 60% of the total industry bearing testimony of the growth potential of this sector.

Furthermore, with regards the materials used for construction for the floor of the housing units, the result showed that 35.8 percent of all households lived in housing units where the floors were made of cement, followed by sand or earth (32.2%). Marble stones were used in the 17.7 percent of the households. Marble stones were particularly common in urban areas (37.4% and 29.4%) while building materials are more common in rural areas accounting for 42.2 percent of the households.

Namibia ranks in the top three (3) list of countries in terms of marble stones imports in the SACU (Southern African Customs Union, 2017). With proper planning and better-quality control, that can be reversed and the country emerges as one of the biggest exporters of marble stones in Southern African Development Country (SADC).

1.3 PROJECT IDENTIFICATION AND DESCRIPTION

Dreamland Investment cc is a private owned company legally registered in Namibia, and wholly owned by Namibians. Dreamland Investment has pioneered industrialization of the Karibib Region and Namibia which established the marble stones factory project, which is currently in operation. Dreamland Investment cc has pioneered constructed an exclusive marble stones factory facility, which is currently in operation. The total land area of the marble stones mining is about 100Ha, located 7 km south of Karibib town. Karibib district boasts of abundant marble stones and other minerals, hence the strategic location of the marble manufacturing development. Dreamland Investment cc will provide basic infrastructure facilities such as, establishment of access roads, power and water supply among others as summarised below.

Table 1 – Dreamland marble stone information

S.No.	Particulars	Details
01	Project	Marble stones mining, Karibib, Erongo Region
02	Location	7 km south of Karibib, Erongo Region, Namibia
03	Coordinates	-21.5826, -15.5316
04	Total Plot Area	100ha
05	Type of Land	Farm land
06	Topography	Mountainous with generally steep sides that show significant exposed bedrock.
07	Total water requirements	Industrial water demand: as per estimation, approximately water requirement for Tear sheets the operation is 1000 litter per day. Water containers will be brought on site and utilised whenever necessary. The water will mostly be used for general consumption and cleaning. The water used for granite drilling or wire-saw cutting will be recycled.
08	Total power requirement	Currently, electricity requirements for the project are minimal. The bulk of the power supply to the quarrying site will be sourced from the generator. The power requirements for the project are minimal as it will only be required for the following activities: • Emergency lighting • Powering small machinery during the mineral quarrying process

S.No.	Particulars	Details
		• Power supply for temporary office block or container if necessary
09	Fuel requirement	Consumables and lubricants will be stored in a designated area within a container with the secondary containment or bund wall. Hydrocarbons (including diesel) will be delivered to a small temporary on-site fuel storage facility by road transport.
10	Total employment Generation	Approximately 100 workers will be employed for the marble stones mining.
11	Ecological sensitive	No ecological sensitive area like National Park, Wild Life sanctuaries are present within 10 Km radius of the development.
12	Archaeological important place	None identified during the site visit
13	Nearest towns	Usakos and Omaruru
14	Nearest railway Station	Karibib and Usakos
15	Nearest national Highway	B2 to Windhoek / Swakopmund

1.4 COMPLIANCE OF TERMS OF REFERENCE

The terms of reference for compliance are summarised below:

Table 2 – Terms of Reference for compliance

SN	Points mentioned in ToR	Response
01	Complete description of the marble stones mining.	The development and operation of the marble stones mining are elaborated in EIA/EMP report
02	Details of the elements of development, highlighting the areas to be reversed for construction, waste management should be provided.	The detailed impact due to the project on the land and soil has been elaborated. Dreamland Investment will be responsible for the marble stones mining.
03	Identification of the major environmental issues of concern though the presentation of baseline data, which will include physical, biological, and socio-economic considerations should be under taken.	The detailed baseline has been generated to assess the present environmental condition in the assessment study, also elaborated in of EIA/EMP report.
04	Outline of the legislations and Regulations relevant to the project should be given.	The list of applicable legislations and regulations are provided.

1.5 ENVIRONMENT CLEARENCE PROCESS

The project involves the construction and operation of marble stones; therefore, the project may be appraised under Environmental Management Act No.7 of 2007.

Mining and quarrying activities are a listed activity under the Environmental Management Act No.7 of 2007 which requires an EIA for the project of this magnitude. Because the nature of the project, Namland Consultants has been appointed by the Proponent to conduct and facilitate an Environmental Assessment (EA) process in order to obtain an ECC for the envisaged development.

1.5.1 Purpose of the EA Process

Initially the envisaged Environmental Assessment process would have been presented in the form of a National Environmental Assessment.

The approach for the national EA was aligned with the requirements of the Environmental Management Act No.7 of 2007 to include three phases, namely:

- **Phase 1: Screening**
- **Phase 2: Scoping**
- **Phase 3: Detailed Assessment (EA)**

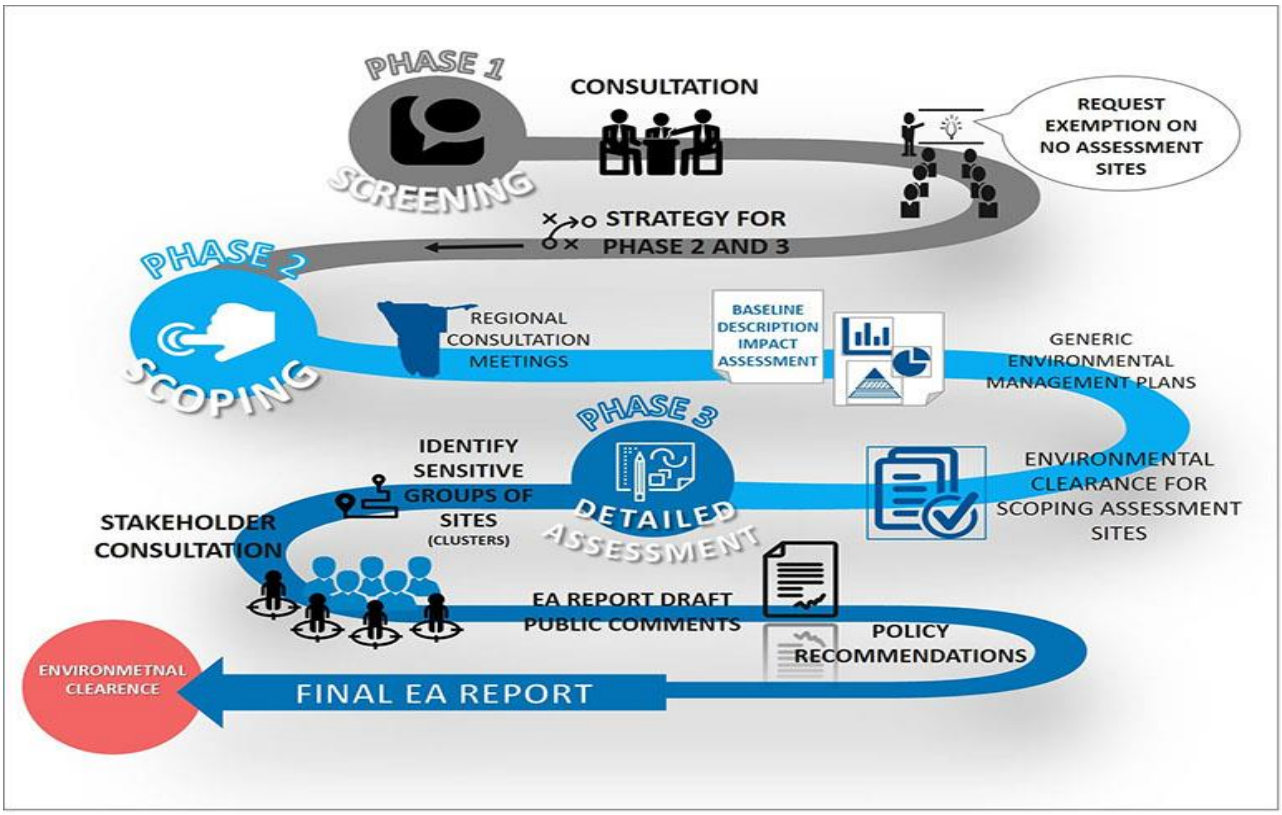


Figure 1 – Environmental Assessment Process indicating the three main steps

Phase 1: Screening

The process was initiated with the main objective to consult with the various affected parties to establish their concerns and recommendations regarding a strategy for implementation. Secondary to this, a team of specialists was put together to consider how environmental sensitivities will be approached at a national level.

Phase 2: Scoping Assessment
This phase involves review of baseline information for the study. It includes information about the legislative framework, the receiving biophysical and social environment information, and any other information that could be used to elaborate on or substantiate the current baseline conditions. The focus is to identify what information is available which will in turn guide work in the subsequent phase.

Phase 3: Detailed Assessment
This is the core step of the EA. Potential risks associated project implementation are assessed. This stage will not only provide detailed information on the ecological, social and economic setting of potentially sensitive areas in Namibia, but also provide an opportunity for Dreamland Investment cc to achieve their short- and long-term objectives while operating in an environmentally sustainable manner.

Stakeholder consultation was undertaken during all phases of the project to ensure a focused and effective public consultation process. Consultation formed the basis of the entire environmental assessment process ensuring that all Interest and Affected Parties (I& Aps) are informed and have an opportunity to take part in the process.

1.6 STRUCTURE OF ENVIRONMENTAL IMPACT ASSESSMENT

Namland Consultant used the following internationally accepted format in the compilation of this report. The generic structure of EIA documents shall be as follows (not in order of importance):

- Introduction
- Project description
- Description of the environment
- Anticipated environmental impact & mitigation measures
- Analysis of alternatives
- Environmental monitoring program
- Additional studies
- Project benefits
- Environmental cost benefit analysis
- Environmental Management Plan
- Summary & conclusion

1.7 POLICY, LEGAL, & ADMINISTRATIVE FRAMEWORK REQUIREMENTS FOR EIA

The Policy, Legal, and administrative framework requirements for EIA are defined by select Namibian and international relevant r legislation which may influence or regulate certain aspects of project.

The main output of the EIA process is the EMP which reports on the findings of the individual topic assessments and considers the overall impact of the proposed development on the receiving environment. This document ensures that relevant competent authorities, statutory bodies, general public and other interested parties understand the scale and importance of the likely effects.

1.7.1 Legislative Framework

The pursuit of sustainability, with respect to any development, is guided by a sound legislative and policy framework. This section provides a review of applicable and relevant Namibian legislation, policies and guidelines. This review serves to inform the proponent of the requirements and expectations, as laid out in terms of these instruments, to be fulfilled. The findings of the abovementioned review are summarised below.

Table 3 – Applicable legislation, relevant and implication for the project

LEGISLATION/ GUIDELINE	RELEVANT PROVISIONS	IMPLICATIONS FOR THIS PROJECT
Namibian Constitution First Amendment Act 34 of 1998	*"The State shall actively promote… maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future" (Article 95(l)).*	Ecological sustainability should inform and guide this EA and the proposed development.
Environmental Management Act EMA (No 7 of 2007)	– Requires that projects with significant environmental impact are subject to an environmental assessment process (Section 27). – Details principles which are to guide all EAs.	The EMA and its regulations should inform and guide this EA process.
Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878)	– Details requirements for public consultation within a given environmental assessment process (GN 30 S21). – Details the requirements for what should be included in a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15).	
The Minerals Prospecting and Mining Act No.33 of 1992	– Approves and regulates mineral rights in relation to exploration, quarrying, prospecting, small scale mining, quarrying, large-scale mining and transfers of mineral licenses.	Marble stones mining activity requires an EIA to be carried out, as it triggers listed activities in the Environmental Management Act N.7 of 2007 regulations.
Forestry Act 12 of 2001 **Nature Conservation Ordinance 4 of 1975**	– Prohibits the removal of any vegetation within 100 m from a watercourse. – Prohibits the removal of and transport of various protected plant species.	These provisions will be used by the Directorate of Forestry as a guideline for conservation of vegetation.
Labour Act 11 of 2007	– Details requirements regarding minimum wage and working conditions	The proponent should ensure that all contractors involved during the construction, operation and maintenance of the proposed project comply with the

LEGISLATION/ GUIDELINE	RELEVANT PROVISIONS	IMPLICATIONS FOR THIS PROJECT
	(S39-47).	provisions of these legal instruments.
Health and Safety Regulations GN 156/1997 (GG 1617)	– Details various requirements regarding health and safety of laborers.	
Public Health Act 36 of 1919	– Section 119 states that "no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."	
National Heritage Act 27 of 2004	– Section 48 (1) states that "A person may apply to the National Heritage Council (NHC) for a permit to carry out works or activities in relation to a protected place or protected object".	Any heritage resources (e.g., human remains etc.) discovered during construction requires a permit from the NHC for relocation.
Burial Place Ordinance 27 of 1966	– Prohibits the desecration or disturbance of graves and regulates how bodies may be unearthed or dug up.	Regulates the exhumation of graves.
Water Act 54 of 1956	The Water Resources Management Act 24 of 2004 is presently without regulations; therefore, the Water Act No 54 of 1956 is still in force: – Prohibits the pollution of underground and surface water bodies (S23 (1)). – Liability of clean-up costs after closure/ abandonment of an activity (S23 (2)).	The protection of ground and surface water resources should be a priority. The main threats will most likely be concrete and hydrocarbon spills during construction and hydrocarbon spills during operation and maintenance.
Road Ordinance 1972 (Ordinance 17 0f 1972)	– Width of proclaimed roads and road reserve boundaries (S3.1) – Control of traffic on urban trunk and main roads (S27.1) – Rails, tracks, bridges, wires, cables, subways or culverts across or under proclaimed roads (S36.1) – Infringements and obstructions on and interference with proclaimed	The limitations applicable on RA proclaimed roads should inform the proposed layout and zonings where applicable.

LEGISLATION/ GUIDELINE	RELEVANT PROVISIONS	IMPLICATIONS FOR THIS PROJECT
	roads. (S37.1) – Distance from proclaimed roads at which fences are erected (S38)	
Atmospheric Pollution Prevention Act (Act No 45 of 1965).	– Limitations imposed on working hours, or prohibiting certain activities or methods of working	The proponent must ensure the contractors address explosive reagent safety and best practices related to environmental management awareness. – Blast crews and engineering staff should be aware that nitrates and ammonia are generally the compounds of greatest concern for water quality
Explosives Act 26 of 1956 Explosives Regulations;	– The Notices will be done according to the Act on the blasting times and use of blasting materials	

Design Development and Environmental Mitigation

In the EIA, the initial assessment of a potential impact and its significance:

- Took into account any methods to reduce the impact that are already incorporated into the design (e.g., noise controls, emission abatement etc.);
- assumed that standard "good practice 'will be applied, including production of management plans (environmental, construction, waste, transport, etc.) and the development of an Environmental Management System; and
- Assumed that regulatory and legislative requirements will be complied with, including operating permit requirements, emission standards, Namibian and International Standards, etc.

Where, even after the application of the above, a significant adverse effect is identified, specific /specialist mitigation measures to minimise, reduce, offset, enhance or avoid such effects will need to be proposed and stated. In general, mitigation measures will not need to be proposed for beneficial impacts or those of negligible significance.

1.8 PUBLIC PARTICIPATION

The role of stakeholder engagement in this development was greatly explored by the consultant, who explored the different elements of a Stakeholder Engagement Framework, while considering the steps, stakeholder categories, and possible options for public participation in the whole process. It is important to note that there is no single 'magic bullet' solution that exists for stakeholder engagement. Public participation was conducted as per the Environmental Management Act No.7 of 2007 and its regulations as detailed in chapter 4 in this report.

2. PROJECT DESCRIPTION

2.1 TYPE OF PROJECT

Dreamland Investment cc has constructed and operated a marble stone mine near Karibib in Erongo Region. The project is categorised as a manufacturing factory. The development involves mining and quarrying activities which triggers the Environmental Management Act No.7 of 2007and its regulations.

2.2 NEED OF THE PROJECT

The Namibian marble stones industry has emerged as a promising in terms of manufacturing and supplying the local and regional markets. Marble stones industry in Namibia provides employment to more than 4,000 people, of whom 1,500 are directly employed. Karibib is one of the producers of all the raw materials which are used in this industry. It is also a producer of minerals like quartz, silica sand, soapstone, etc, which are complementary to marble stones mining. There are several marble stones in Namibia which are into marble stones mining, but due to the potential and availability of marble stones in the area, mining of this nature is profitable. Motivated by the need to empower and capacitate local communities, Dreamland Investment found it developmental and sustainable to have a marble factory near Karibib. The development is also line with the Harambee Prosperity Plan and other Government Developmental Goals.

Marble stone industry in Namibia has been in existence since the early years of this century, however its potential has not yet been fully developed. Thus, Namibia should use its varied geological environments to continue take advantage of this opportunity. Namibia's complex geological history, especially in the central portions of the country, have given rise to a variety of metamorphic and tectonic environments that have formed rock types such as marbles, calc-silicates, carbonatites, granitoids and mafic intrusive that have unique colours and textures (e.g., banding, folding, brecciation) that have enormous potential as dimension stone. The demand for marble stones products on the local, regional and international levels is growing high. This is due to various growth drivers such as easy availability of raw materials, rapid growth of the building and construction industry, and increasing technological innovation in manufacturing marble stones, the overall market is estimated to grow at 9.2% from 2013 to 2019 (World Bank, 2013).

2.3 PROJECT LOCATION & CONNECTIVITY

Dreamland marble stones factory is located about 7 km south of Karibib in Erongo Region. The development of the factory is ideal as it involves all the incentives and support structures required for marble stones industry. The area is underlain by folded marble and subordinate quartz-mica schist of the Karibib Formation, intruded by small bodies of granite and pegmatite. The mineralised zone strikes north-northwest parallel to the l layering of the marble, although there are places where the ore body cross-cut the host rocks.

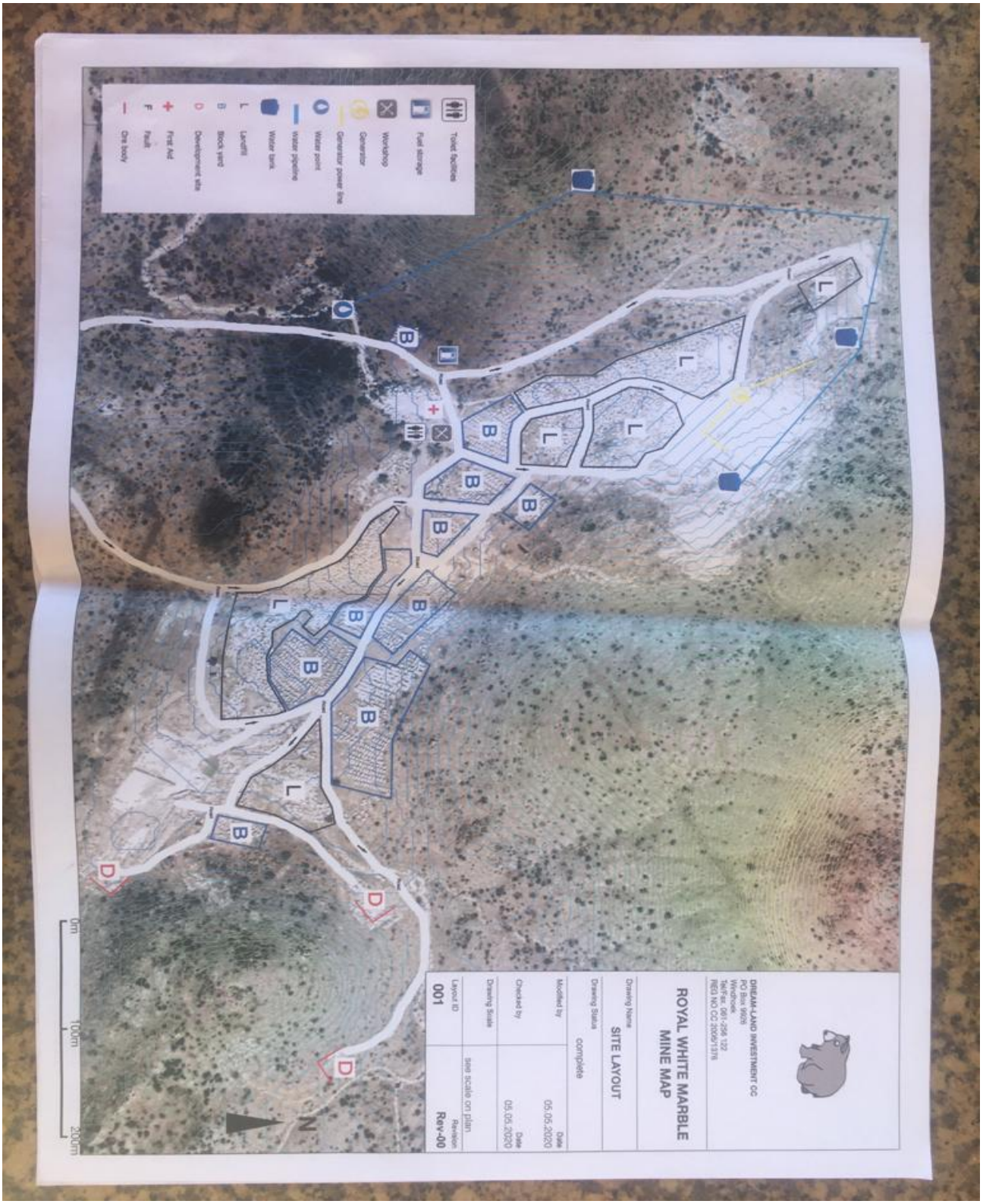


Figure 2 – Site layout of Dreamland marble stones mine in Karibib district, Erongo Region

2.3.1 Existing Infrastructure and Connectivity

A. Existing infrastructure within the vicinity of the development

Schools, hospitals, banks and churches are in close vicinity of the development as detailed below.

PARTICULARS	DISTANCE	DIRECTION
Hospitals		
Government Hospital	3	NW
Churches		
AFM, Methodist	1.5	S
Banks		
FNB, Standard, Nedbank	1	E
School/s		
Government / Private	2	SW, NE
Post Office		
Karibib Namport	2	NW
Police Station		
Karibib Nampol	1	W

B. Connectivity

S. No.:	Connectivity	Name	Direction
1	By Road	National Highway	
2	By Train	Nearest Train Station	
3	By Plane	Nearest Airport	

2.4 JUSTIFICATION FOR SELECTING PROJECT SITE

The site has been selected due to the availability of the following precious minerals:

- Marble stones are found in abundance in nearby area of the development site.
- Karibib is producer of all the raw materials required for marbles stones industry.

It should be noted that marbles stones are sustainably mined by local miners.

2.5 SIZE AND THE MAGNITUDE OF THE PROJECT

Dreamland Investment is located on a farm land which is about 100 hectares. The development will provide essential services to the project team, such as, access road if required, power supply and water among others as required by the project team.

2.6 MARBLE STONES MINING AND QUARRYING PROCESS

2.6.1 Marble Quarrying Method

There are various options for mining out a marble deposit in Namibia. It is crucial to consider the kind of material, shape and size of the geologic formation, thickness of the overburden, topographical features, production level, locality of the quarry and imposed restrictions by the government or conditions as set out by the competent authority. For example, if the calcitic marble proves to be homogeneous, **the quarrying method will be by a regular bench design with the aid of diamond-based cutting technologies**. Diamond-based cutting technologies are the best methods due their recent advantage and the following operations will be carried out:

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

Dreamland marble quarrying involves, but is not limited to cutting channels on all sides of large rectangular sections of marble called **quarry blocks**. The blocks usually have an open face, and once the ends and backs of the doorstep which looks like ledges are channelled loose, horizontal lift holes are drilled along the bottom of the open face, the quarry blocks are being freed from the surrounding mass, with diamond wire sawing. The diamond saw which basically consists of an engine pulling wire cable through a system of pulleys and return wheels with a steel cable on which diamond grit impregnated beads, are held in place by plastic spacers.

Thereafter, the wire saw strand is threaded through intersecting vertical and horizontal holes and is jointed together making a large loop which simultaneously cuts the top, bottom, and one end of the granite mass. It is this period, whereby water is fed continuously through the narrow cuts to cool the wire. If the ledge has two open sides, the wire saw can cut the entire block freely. It is important to make sure that the attached side is still channelled by way of drilling or light blasting. It is during this period that the entire block will now be moved over with a water bag jacking plant. Thereafter, the block is then cut with dressing diamond wire saws into smaller blocks of 10 – 35 tons.

2.6.2 Marble Mineral Processing

In the process, the smaller marble blocks are moved to the dressing yard for further inspection and processing. Dimension stone mining such as marble are merely rough-dress, such that the cut block is done by jack hammer trimming or diamond wire dressed. On the other hand, a derrick boom is slowly raised, tightening the hooks in their holes and the block is lifted from the quarry and paved onto the truck for transportation to the dressing yard. Thereafter, the final dressing and quality control of these dimensioned saw blocks are removed by mobile crane onto trucks and shipped to monument plants for final processing.

2.6.3 Quarry Residue and Rehabilitation

In terms of the marble quarry mining, the only noticeable residue will be the waste marble material which are not usable. This material can be used for rehabilitation purposes during decommissioning phase. The overburden materials removed during the opencast operation will be used to fill the excavations during rehabilitation with the result that on completion of mining with no waste dumps will remain.

2.6.4 Waste dumps

When choosing a waste dumpsite, the following aspects will be strongly considered by Dreamland Investment which are, but not limited to:

- Topography
- Land-use
- The presence of any hazardous geological structures
- Available water resources
- The prevailing wind direction
- Visual impacts
- Any other sensitive ecological areas

Since the area is located on privately-owned farm, all waste will be transported and disposed of to the nearest permitted landfill facility.

2.6.5 Other complementary raw materials to the marble stones factory

Dreamland marble stone factory will make use of the following raw materials.

Raw material	Description
Ball Clay	Provides elasticity, bonding and helps improve the workability i.e. plastic melding properties and increase the fired strength.
China Clay	Imparts white colour to the body and improves pressing characteristics and to modify the body shrinkage.
Quartz	Improves thermal expansion properties. Confers strength and improves translucence and hence used for glaze preparation.
Glaze Frit	Provide uniform density single material that prevents layered sedimentation.
Zircon	Used in glaze preparation as an opacifier to control texture and provide resistance and colour satiability.
Wollastonite:	Used in preparation of the tile bodies help in reducing cracks and warp age.
Pitchers	Aid the pressing characteristics in preparation of the body material
Pigments	Impart colour of the body.

Some of the raw materials will be used to form tile at Karibib Factory which consist of clay minerals mined from feldspar which is as well mined at Dreamland marble stones factory, and it will be used to lower the firing temperature, and chemical additives required for the shaping process.

Dreamland Investment marble factory will be pulverized and classified according to particle size. Primary crushers will be used to reduce large lumps of material. A jaw crusher or gyratory crusher will be used, which will operate using a horizontal squeezing motion between steel plates or rotating motion between steel cones, respectively.

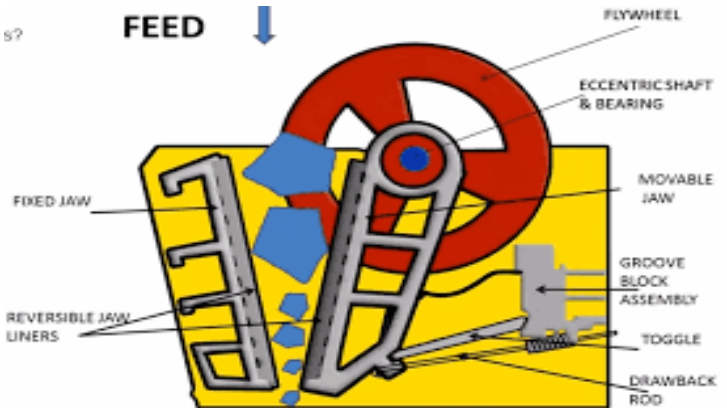


Figure 3 – **Jaw crusher that will be used at the Karibib Factory**

The secondary crushing reduces smaller lumps to particles. Hammer or muller mills will be use, which uses steel wheels in a shallow rotating pan, while a hummer mill uses rapidly moving steel hammers to crush the material.

Screens will be used to separate out particles in a specific size range. They will operate in a sloped position and will be vibrated mechanically / electromechanically to improve material flow.

Glazes will be used to provide moisture resistance and decoration, as they can be coloured or can produce special textures.

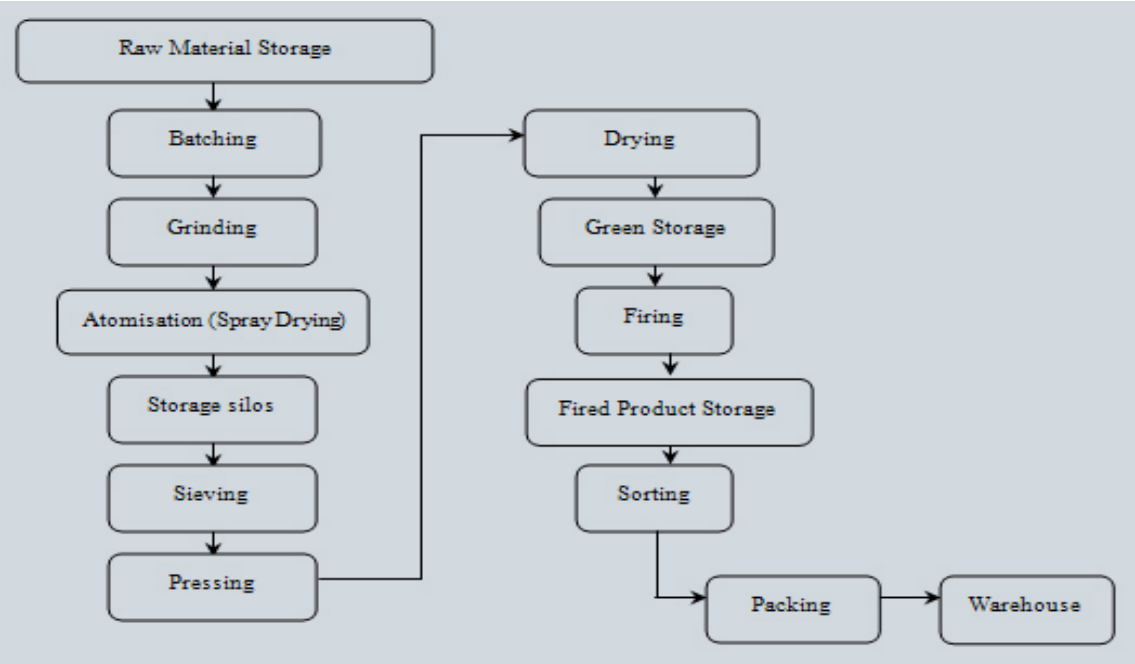
2.6.6 Manufacturing Process

A soon as the raw materials have processed, several steps will take place to obtain the finished product. The steps include, but is not limited to batching, mixing and grinding, spray-drying, forming, drying, glazing, and firing. Many of these steps will now accomplished using automated equipment.

Table 4 – Stages in the Manufacturing of Marble Stones by Products

Process	Description
1. Batching	For many marbleless stone's products, including tile manufacturing, the body composition is determined by the amount and type of raw materials. The raw materials also determine the colour of the tile body, which can be red or white in colour, depending on the amount of iron-containing raw materials used. Therefore, it is important to mix the right amounts together to achieve the desired properties. Batch calculations are thus required, which must take into consideration both physical properties and chemical compositions of the raw materials. Once the appropriate weight of each raw material is determined, the raw materials must be mixed together.
2. Mixing and grinding	Once the ingredients are weighed, they will be added together into a shell mixer, ribbon mixer, or intensive mixer. A shell mixer consists of two cylinders joined into a V, which rotates to tumble and mix the material. A ribbon mixer uses helical vanes, and an intensive mixer uses rapidly revolving plods. This step further grinds the ingredients, resulting in a finer particle size that improves the subsequent forming process (Ceramic-Research, 2017)

3. Spray drying	Wet milling will first be used, stand the excess water will be removed via spray drying. This will involves pumping the slurry to an atomizer consisting of a rapidly rotating disk or nozzle. Droplets of the slip will be dried as they will be heated by a rising hot air column, forming small, free flowing granules that result in a powder suitable for forming. Marble bodies will also be prepared by dry grinding followed by granulation. Granulation will use a machine in which the mixture of previously dry-ground material is mixed with water in order to form the particles into granules
4. Forming	Dreamland marble stone will be formed by dry pressing. In this method, the free-flowing powder, containing organic binder or a low percentage of moisture, flows from a hopper into the forming die. The material will be compressed in a steel cavity by steel plungers and is then ejected by the bottom plunger. Automated presses will be used with operating pressures as high as 2,500 tons.
5. Drying	Marble by products usually must be dried (at high relative humidity) after forming, Ryan, especially if a wet method is used (Ryan, 1999). Drying, which will take several days, removes the water at a slow enough rate to prevent shrinkage cracks. Continuous or tunnel driers will be used that are heated using gas or oil, infrared lamps, or microwave energy. Infrared drying is better suited for thin tile, whereas microwave drying works better for thicker tile (Ceramic-Research, 2017)
6. Glazing	To prepare the glaze, similar methods will be used as for the materials. After a batch formulation has been calculated, the raw materials will then be weighed, mixed and dry or wet milled. The milled glazes will then apply using one of the many methods available. In centrifugal glazing, the glaze will be fed through a rotating disc that flings or throws the glaze onto the tile. In the bell/waterfall method, a stream of glaze falls onto the tile as it passes on a conveyor underneath. Sometimes, the glaze will be simply sprayed on.
7. Firing	After glazing, the process involves a heated intensely to strengthen it and give it the desired porosity. Two types of ovens, or kilns, will be used for firing process. Both firing processes will take place in a tunnel or continuous kiln, which will consist of a chamber through which the ware is slowly moved on a conveyor on refractory batts— shelves built of materials that are resistant to high temperatures—or in containers called staggers. Firing in a tunnel kiln can take two to three days, with firing temperatures around 2,372 degrees Fahrenheit (1,300degrees Celsius).



1.1 UTILITIES REQUIRED

1.1.1 Power

The estimated power requirement for the industrial units under the proposed project will be approx. 5 MVA. The same will be met through 132kVA supply. Power supply will be provided by Erongo Red.

1.1.2 Water Requirement

NAMWATER will be responsible for supplying water and also brought to site by means of water truck, if possible. If needs to be, the water supply will be also met through ground water supply after obtaining necessary extra permission from NAMWATER for abstraction of ground water together with other competent authority.

The estimated quantity of water required for the marble stones industry (based on the assumption of individual industry consumption) will be 1,000 liter/day. Water demand for industrial purposes will be responsibly managed by Dreamland Investment.

1.1.3 Labour Requirements

Approximately 100 of worker will be employed by the development excluding those who will be temporarily employed by contractors.

2. DESCRIPTION OF ENVIRONMENT

2.1 INTRODUCTION

As per the EIA notification 2006 guidelines for preparing EIA report, baseline study of 10 km radius area surrounding the project site shall be covered under the study and the same is denoted as study area. As part of the study, description of biological environment and human environment such as environmental settings, demography & socio-economics, land-use/land cover, ecology & biodiversity have been carried out for entire 10 km radius.

As a universally accepted methodology of EIA studies, physical and environmental attributes such as meteorology, ambient air quality water quality, soil quality, noise levels, hydro-geology and solid waste generation have been studied at selective locations representing various land use such as industrial, rural/ residential, commercial and sensitive locations including the densely populated areas, agricultural lands, forest lands and other ecologically sensitive areas, if any falling within 10 km radius study area. Secondary data deemed necessary was collected from various Government organizations and Institutes.

The baseline status of the project environment is described section wise for better understanding of the broad-spectrum conditions. Field monitoring studies to evaluate the baseline status of the project site has been carried out during the June to September 2018.

Karibib is a town in the Erongo Region of western Namibia. It has 3,800 inhabitants and owns 97 square kilometres (37 sq. mi) of town land. Karibib is the district capital of the Karibib electoral constituency. It is situated on the Khan River, halfway between Windhoek and Swakopmund on the B2 (Trans-Kalahari Highway), the main road between the Walvis Bay and Johannesburg. The town is known for its aragonite marble quarries and the Navachab Gold Mine.

2.2 HISTORY

Karibib was a waterhole known to the Herero under the name *Otjandjomboimwe*. Expecting business opportunities arising from the railway construction work between Swakopmund and Windhoek, Eduard Hälbich, merchant at Otjimbingwe, bought the waterhole and 20,000 hectares of land surrounding it from Herero headman Zacharias Zeraua. The deal was finalized on 7 January 1895, the purchase price was 22,500 marks (ℳ), two ox wagons, and 742 pounds 5 shillings that Zeraua had incurred in debts in Hälbich's shop in Otjimbingwe.

Hälbich then opened a branch at Karibib in 1897 or 1898. In 1900, the settlement had a population of 10 (and an unknown number of Blacks that were not counted). Karibib began to grow quickly when on 30 May 1900 the railway construction reached the newly founded place. 1 June 1900 marks the day of the official foundation of Karibib at the occasion of the first train arriving from Swakopmund. The railway station was built, a medical practice, storage facilities, a prison, and living quarters were erected, and the population rose to 274. This development disadvantaged the settlement of Otjimbingwe; ox wagons that before would travel via Otjimbingwe on the Alter Baiweg (*Old Bay path*) would now take the route through Karibib.

When the railway workers moved on towards Windhoek in 1902, business quieted down. In 1904 the place became again important as a railway hub for ferrying troops in the Herero and Namaqua War. Its status was upgraded to that of a county, and governance was extended to include Old Bay. At the end of the war in 1907, Karibib counted 316 white residents, and the remaining Herero land was expropriated and offered to white farmers. Karibib was declared a municipality in 1909, and Eduard Hälbich was its mayor.

2.3 ECONOMY AND INFRASTRUCTURE

The min economic infrastructure is Navachab Gold Mine owned by QKR Namibia and it is located 10 km from Karibib town. The mine is the major employer of the town, a with other miner upcoming developments including dimension stones such as marble stones mining.

2.4 TRANSPORT

Karibib is connected to the TransNamib railway network; Karibib Railway Station is situated downtown. The next railway station to the west is Kranzberg, the junction for the branch railways to Tsumeb and Grootfontein from the line to the capital Windhoek.

North of the town is the location of the headquarters of the Namibian Air Force at the Karibib Air Base, housing the Command of the Air Force. The air base has a 2,600 meters (8,500 ft) asphalt runway, parallel paved taxiways and apron. The history of Karibib Airport goes back to pre-independence when it was used by the South African Air Force.

2.5 POLITICS

Karibib was downgraded from municipal to town status in 2010. It is now governed by a town council that has seven seats

In the 2010 local authority election in Karibib, a total of 990 votes were cast. SWAPO won with approximately 60% of the vote. Of the three other parties seeking votes in the election, United Democratic Front (UDF) received approximately 31% of the vote, followed by RDP (9%) and the Congress of Democrats, which, despite being on the ballot, did not receive a vote. SWAPO also won the 2015 local authority elections, gaining 4 seats (653 votes). 2 seats went to the UDF (223 votes), and the remaining seat was won by the local Karibib Residents Association that gained 128 votes.

2.6 EDUCATION

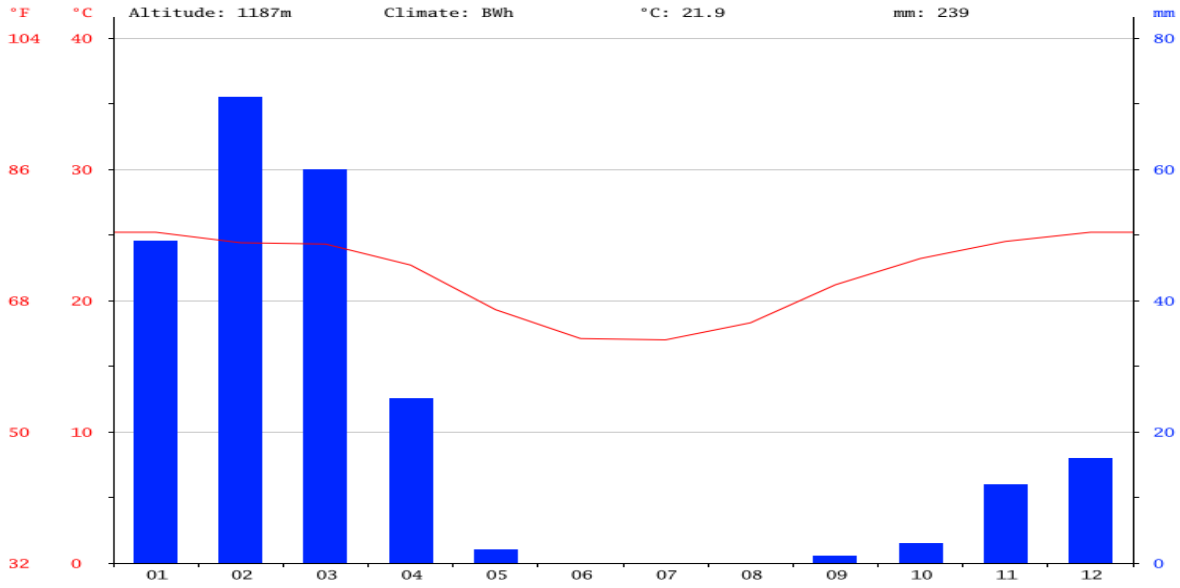
Schooling in Karibib started as a private missionary enterprise in 1902. From 1907 the Deutsche Schule Karibib (German: *German School Karibib*, also: Privat Schule Karibib) operated in town, first as a government school of Imperial Germany, and after World War I as private school supported by German government. In 1965 it had 13 teachers and 53 learners. When competition from other German schools eroded its pupil base, the school closed down in 1986. The campus is currently leased to the similarly named but unrelated Karibib Private School.

Karibib is also home to Karibib Junior Secondary School and Ebenhaeser Primary School, situated in the Usab Location. Karibib Junior Secondary School emerged from Ebenhaeser Primary School when the latter was started offering classes beyond grade 7. The Navachab gold mine in Karibib has played a major role in developing the school. Karibib Junior Secondary School is situated in town and offers grade 8 to Grade 10.

2.7 CLIMATE

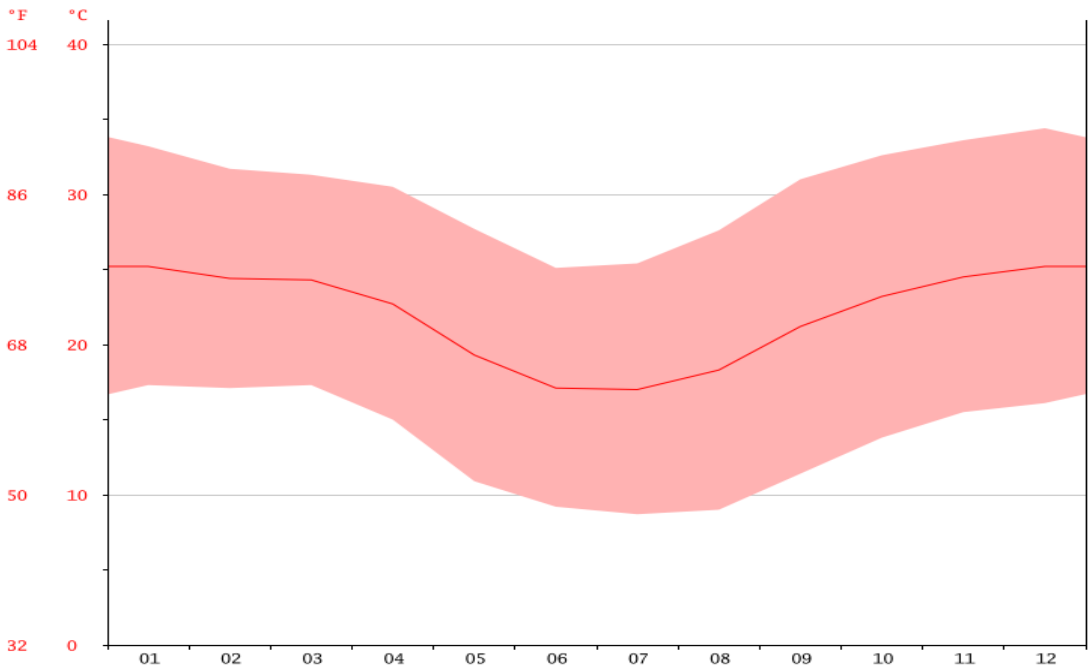
Karibib's climate is a desert one. There is virtually no rainfall during the year in Karibib. According to Köppen and Geiger, this climate is classified as BWh. The average annual temperature is 21.9 °C in Karibib. About 239 mm of precipitation falls annually.

3.7 CLIMATOGRAPHY



Precipitation is the lowest in June, with an average of 0 mm. The greatest amount of precipitation occurs in February, with an average of 71 mm.

2.8 TEMPERATURE GRAPH OF KARIBIB



At an average temperature of 25.2 °C, January is the hottest month of the year. The lowest average temperatures in the year occur in July, when it is around 17.0 °C.

2.9 KARIBIB CLIMATE TABLE / HISTORICAL WEATHER DATA

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	25.2	24.4	24.3	22.7	19.3	17.1	17	18.3	21.2	23.2	24.5	25.2
Min. Temperature (°C)	17.3	17.1	17.3	15	10.9	9.2	8.7	9	11.4	13.8	15.5	16.1
Max. Temperature (°C)	33.2	31.7	31.3	30.5	27.7	25.1	25.4	27.6	31	32.6	33.6	34.4
Avg. Temperature (°F)	77.4	75.9	75.7	72.9	66.7	62.8	62.6	64.9	70.2	73.8	76.1	77.4
Min. Temperature (°F)	63.1	62.8	63.1	59.0	51.6	48.6	47.7	48.2	52.5	56.8	59.9	61.0
Max. Temperature (°F)	91.8	89.1	88.3	86.9	81.9	77.2	77.7	81.7	87.8	90.7	92.5	93.9

	January	February	March	April	May	June	July	August	September	October	November	December
Precipitation / Rainfall (mm)	49	71	60	25	2	0	0	0	1	3	12	16

Between the driest and wettest months, the difference in precipitation is 71 mm. The variation in temperatures throughout the year is 8.2 °C.

3. PUBLIC CONSULTATION / PARTICIPATION

3.1 INTRODUCTION

The term participation typically refers to some aspect of local community involvement in the design, implementation and evaluation of a project or plan (Brown & Wyckoff-Baird, 1992). According to Smith (1983), public participation encompasses a range of procedures and methods designed to consult, involve, and inform the public to allow those that would be potentially affected by a decision or policy to have input into the process. The latter are also known as stakeholders, which include (IFC 2007):

"...persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively. Stakeholders may include locally affected communities or individuals and their formal and informal representatives, national or local government authorities, politicians, religious leaders, civil society organizations and groups with special interests, the academic community, or other businesses"

Thus, public participation can be recognised as a practice of stakeholder engagement. Stakeholder engagement and public participation are a means of achieving:

- Participatory democracy (e.g., community empowerment and providing the opportunity to develop knowledge for making informed choices)
- Transparency in decision-making process
- Community empowerment and support
- Reduced conflict over decisions between decision-makers and public groups, and between the groups
- Public participation may involve both individual and group input.

Public Participation Five Elements
International Association for Public Participation (2007) has summarised public participation in five elements as illustrated below.

Element	Description
(a) Inform	Provided the general public with balanced and objective information to assist them in understanding the problem (housing shortage), alternatives, opportunities and/or solutions, which is the servicing of land.
(b) Consult	Obtained public feedback on analysis, alternatives and/or decisions.
(c) Involve	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.
(d) Collaborate	Partnered with the public in each aspect of the decision, including the development of alternatives and the identification of the preferred solution.
(e) Empower	Placed final decision making in the hands of the public.

Notice Board & Newspaper Advertising

Given the dispersed nature of the identified corridors and the means of communication outlined above, it was deemed necessary to display a makeshift Notice Board near the identified site as well as the Council Offices as laid out in the EIA Regulations (RN: MET, 2012: Reg 21(2)(a)). The Consultant advertised using the targeted approach by using both the locally and nationally read and accepted Newspapers to reach out to I&APs. The initial period for Public Participation ran between Tuesday 9 February 2021 and 16 February 2021, a total of four weeks. The newspaper advert appeared consecutively in the New Era Newspapers on the dates Tuesday 9 February 2021 and 16 February 2021, respectively. The New Era Newspaper is widely circulated in the Region and beyond **(Annexure H).**

The Public Participation Meeting was held on Karibib Municipal Hall, Erongo Region DATE: 20 February 2021 on **Annexures F and G** respectively)

Having clearly defined and communicated ideas on the level of engagement desired by the proponent, organisation is an important step in later evaluation and monitoring (Krick et al., 2005). Ideally, the Consultant identified and mapped itself somewhere along a continuum of engagement scales, and adaptive management cycles, aimed at moving along the continuum towards improving engagement practices. However, the extent to which an organisation moves along this continuum will ultimately depend on the situation and specific context of its engagement process. An important aspect that is critically linked to the consideration of types and levels of engagement relate to stakeholder categories.

The categories of stakeholders (I&APs) identified for involvement in a public participation process will directly have an influence on the method of engagement. Although the specific categories of stakeholders for a given engagement process will be largely dependent on its goals and objectives, a typical generic profile of stakeholders in this project, and Namland's assessments were categorised into the following types:

CATEGORY	INSTITUTION
– **State Owned Enterprises (SOEs) / Departments or Line Ministries**	Ministry of Environment, Forestry & Tourism; Ministry of Mines and Energy; Erongo Regional Council; Roads Authority; NamWater; TransNamib; NamPol; Ministry of Sport, Youth and National Service (MSYNS); Ministry of Works and Transport;
– **Karibib Town Council**	Engineering Department: Planning, Projects and Housing Offices; Community Development Services: Local Economic Development, Youths Development; Public Relations Department; Chief Executive Officer; Mayor's Office;
– **Industry or sector representatives**	Namibia National Chamber of Commerce and Industries (NCCI); Erongo Red; Salt Company; Small Business Development Centre Network; National Housing Enterprises;
– **Research (e.g., scientific, technical specialists) or academic institutions**	Desert Research Foundation (DRF); Namibia Uranium Institute; Namibia Uranium Association; Namibia Institute of Public and Environmental Affairs;
– **Special interest groups**	Youths; Small and Medium Enterprises (SMEs);
– **Local Community Representatives**	Local Councillors; Youths Leaders; Church leaders;
– **Members of the General Public / Community**	Karibib Residents Association

3.2 Steps and Methods used by the Consultant for Public Participation

A stakeholder engagement or public participation process typically involves the following steps (IFC, 2007):

Stage	Description of activities
1. Preliminary Planning and Design	
	(a) Situation Analysis (b) Decision Process

	(c) Information Exchange (d) Stakeholder Identification and Analysis (e) Planning Team (f) Approvals
2. Develop the Stakeholder Engagement Plan	
	(a) Establish Objectives (b) Identify and address major issues (c) Identify and involve the key stakeholders (d) Determine public participation method (e) Prepare to provide and receive information (f) Develop critical path (g) Budget, staff, resources, logistics, roles and responsibilities (h) Prepare to give and receive feedback
3. Plan Implementation	
	(a) Follow the Critical Path (b) Apply Public Participation Method (c) Provide and receive information (d) Monitor the Process
4. Feedback	
	(a) Report to decision-makers (b) Report to participants (c) Evaluate the overall process

3.3 Notice Board & Newspaper Advertising

Given the dispersed nature of the identified corridors and the means of communication outlined above, it was deemed necessary to display a makeshift **Notice Board** near the identified site as well as the Karibib Town Council Offices as laid out in the EIA Regulations (RN: MET, 2012: Reg 21(2)(a)).

The main issues arising from the comments received during the commenting period meeting have been summarized below. These comments, as well as those received during the course of the Public Consultation Process have been recorded in an Issues and Responses Trail. These issues as well as those identified are addressed in detail are summarized below.

THEME	NEGATIVE ISSUES RAISED BY IAPS	POSITIVE ISSUES
– **Economic**	– None	– Employment creation – Increase local and national economic growth
– **Social**	– Illicit sexual activities – Drug and Alcohol Abuse – Burglaries and Robberies – Type of structure to be set in the area – Illegal routes by private vehicles thereby endangering lives	– Short cuts to get to services like shops, markets, school
– **Environmental**	– Blasting / explosives – Air, visual and noise pollution – Impacts on the fauna, flora and avifauna species – Generation of waste	– Aesthetic

4. IMPACT ASSESSMENT

4.1 APPROACH AND METHODOLOGY EMPLOYED FOR ASSESSMENT

4.1.1 The EIA Process

EIA is a systematic process that identifies and evaluates the potential impacts (positive and negative) that a Project may have on the biophysical and socio-economic environment, and identifies mitigation measures that need to be implemented in order to avoid, minimise or reduce the negative impacts and also identifies measures to enhance positive impacts. The EIA is not fully a linear process, but one where several stages are carried out in parallel and where the assumptions and conclusions are revisited and modified as the project Progresses. The following sections provide additional detail regarding the key stages in this EIA process. These stages are:

1) Scoping Phase;
2) Specialist Study Phase; and
3) Integration and Assessment Phase.

4.2 Scoping Phase

The first phase of the EIA process is a Scoping Study, with an emphasis on public involvement. The various tasks and consultation activities undertaken by the Consultant thus far are described and summarised below.

4.2.1 Initial Site Visit and Project Initiation

As part of the project initiation, carried out an initial site reconnaissance visit. The purpose of the site visit was to familiarise the project team with the development and affected project area and to begin the environmental and social screening and scoping process as detailed below.

ACTIVITY	DESCRIPTION AND PURPOSE
– **Preparation of a preliminary stakeholder database**	A preliminary database has been compiled of authorities (local and provincial), Non-Governmental Organisations and other key stakeholders. This database of registered I&APs was expanded during the ongoing EIA process.
– **Erection of site notices**	Site notices were placed on and along the mining site
– **Distribution of BIDs**	Background Information Documents (BIDs) were distributed to all I&APs.
– **Release of Draft Scoping Report for Public Comment**	The Draft Scoping Report was released for public comment. All comments received have been included in this Final Scoping Report.
– **Newspaper Advertisement**	The release of the Draft Scoping Report was advertised through the Facebook Pages, NCCI website and bulk emailing
– **Compilation of Comments and Responses Report**	Through the public participation process a Comments and Reponses Report has been compiled
– **Notification of submission Final Report**	Notification of the submission of the final Scoping Report to the MET was sent to register I&APs.
– **Notification of issuance of Environmental Clearance Certificate**	The I& APs will be notified through the normal channels on the issuance of the Environmental Clearance Certificate. Newspaper adverts will also be utilised.
– **Notification of Blasting**	The Notices will be done according to the Explosives Act 26 of 1956 Explosives Regulations; and all related blasting permits shall in terms of section 9 (1) (a) of the Act, to use blasting materials

4.2.2 Specialist Studies Phase

During the Specialist Study phase, the Consultant gathered data relevant to identifying and assessing environmental impacts that might occur as a result of the Project. They assisted the project team in assessing potential impacts according to a predefined assessment methodology included in the Scoping Report. The Consultant also suggested ways in which negative impacts could be mitigated and benefits could be enhanced.

4.3 Integration and Assessment Phase

The final phase of the EIA is the Integration and Assessment Phase. The assessment of impacts proceeds through an interactive process considering three key elements:

1) **Prediction of the significance** of impacts that are the consequence of the Project on the natural and social environment.
2) **Development of mitigation measures** to avoid, reduce or manage the impacts.
3) **Assessment of residual significant impacts** after the application of mitigation measures.

A synthesis of the studies, which addresses the key issues identified during the Scoping Phase, is documented in this ESIA.

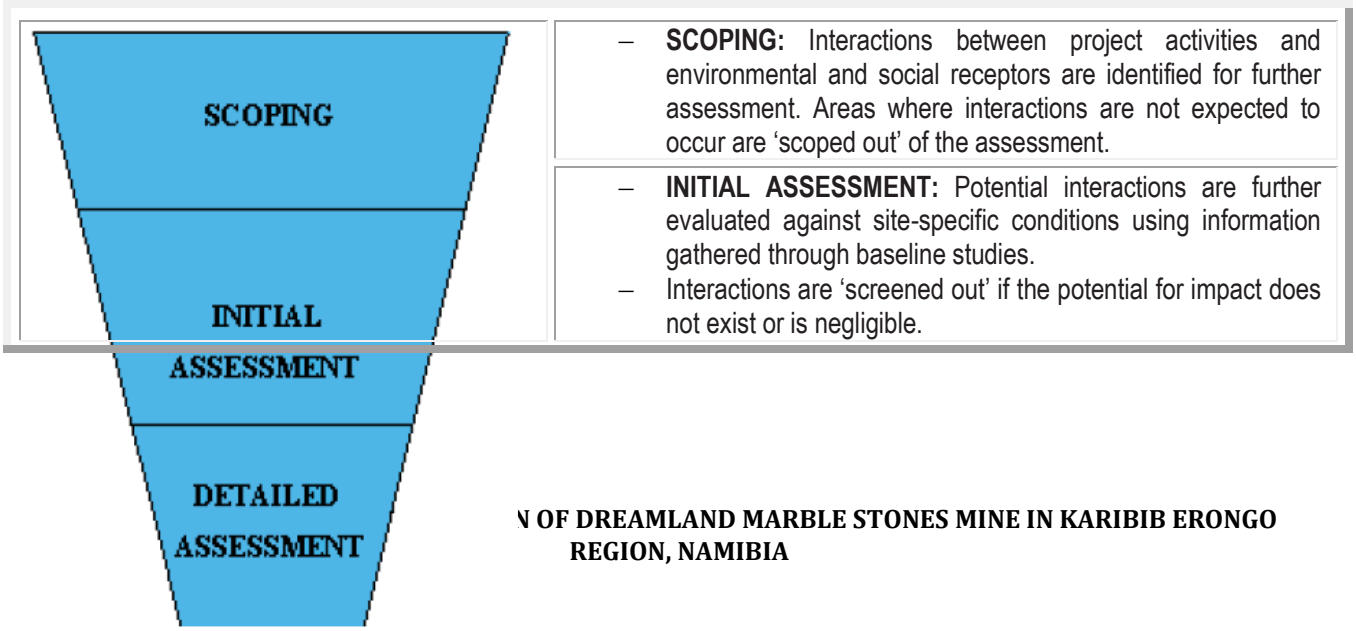
The Draft ESIA was made available to I&APs for a public comment period and registered and identified I&APs were notified of the release of the Draft EIA and where the report can be reviewed.

Comments received on the Draft EIA have been assimilated and the EIA project team provided appropriate responses to all comments. All registered I&APs will be notified when an Environmental Authorisation has been issued by MEFT.

4.4 Impact Assessment Methodology

4.4.1 Impact Assessment Process

The following diagram describes the impact identification and assessment process through scoping, screening and detailed impact assessment. The methodology for detailed impact assessment is outlined below.



	– **DETAILED ASSESSMENT**: Interactions with potential for impact are assessed in detail to determine the nature and characteristics. Mitigations are applied and the residual impact is re-assessed. The significance of the residual impact is then reported.

4.4.2 Impact Assessment Methodology

The purpose of impact assessment and mitigation is to identify and evaluate the significance of potential impacts on identified receptors and resources according to defined assessment criteria and to develop and describe measures that will be taken to avoid or minimise any potential adverse effects and to enhance potential benefits.

Definition of Key Terminology

- **Project** - The features and activities that are a necessary part of the Project Proponent's development, including all associated facilities without which the Project cannot proceed. The Project is also the collection of features and activities for which authorization is being sought.
- **Project Site** - The (future) primary operational area for the Project activities. Private transport corridors (i.e., those dedicated for use solely by Project operational activities) are included as part of the Project Site.
- **Project Footprint** - The area that may reasonably be expected to be physically touched by Project activities, across all phases. The Project Footprint includes land used on a temporary basis such as construction lay down areas or construction haul roads, as well as disturbed areas in transport corridors, both public and private. The type or nature of the impacts are described below.

Table 5 – The type or nature of the impact

Nature or Type	Definition
Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Negative	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Direct impact	Impacts that result from a direct interaction between a planned project activity and the receiving environment/receptors (e.g., between occupation of a site and the pre-existing habitats or between an effluent discharge and receiving water quality).
Indirect impact	Impacts that result from other activities that are encouraged to happen as a consequence of the Project (e.g., in-migration for employment placing a demand on resources).
Cumulative Impact	Impacts that act together with other impacts (including those from concurrent or planned future third-party activities) to affect the same resources and/or receptors as the Project.

An impact is any change to a resource or receptor brought about by the presence of a project component or by the execution of a project related activity. The evaluation of baseline data provides crucial information for the process of evaluating and describing how the project could affect the biophysical and socio-economic environment. Impacts are described according to their nature or type as well their significance are summarised below.

Table 6 – Significance criteria

IMPACT MAGNITUDE	
	On-site – impacts that are limited to the boundaries of the development site.

Extent	**Local** – impacts that affect an area in a radius of 25km around the development site. **Regional** – impacts that affect regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries, habitat type/ecosystem. **National** – impacts that affect nationally important environmental resources or affect an area that is nationally important/ or have macro-economic consequences.
Duration	**Temporary** – impacts are predicted to be of short duration and intermittent/occasional. **Short-term** – impacts that are predicted to last only for the duration of the construction period. **Long-term** – impacts that will continue for the life of the Project, but ceases when the project stops operating. **Permanent** – impacts that cause a permanent change in the affected receptor or resource (e.g., removal or destruction of ecological habitat) that endures substantially beyond the project lifetime.
Intensity	**BIOPHYSICAL ENVIRONMENT**: *Intensity can be considered in terms of the sensitivity of the biodiversity receptor (i.e., habitats, species or communities).* **Negligible** – the impact on the environment is not detectable. **Low** – the impact affects the environment in such a way that natural functions and processes are not affected. **Medium** – where the affected environment is altered but natural functions and processes continue, albeit in a modified way. **High** – where natural functions or processes are altered to the extent that they will temporarily or permanently cease. ***Where appropriate, national and/or international standards are to be used as a measure of the impact.*** *Specialist studies should attempt to quantify the magnitude of impacts and outline the rationale used.*
	SOCIO-ECONOMIC ENVIRONMENT: *Intensity can be considered in terms of the ability of people/communities affected by the Project to adapt to changes brought about by the Project.* **Negligible** – there is no perceptible change to people's livelihood. **Low** - people/communities are able to adapt with relative ease and maintain pre-impact livelihoods. **Medium** – people/communities are able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support. **High** - affected people/communities will not be able to adapt to changes or continue to maintain-pre impact livelihoods.
Likelihood - the likelihood that an impact will occur	
Unlikely	The impact is unlikely to occur.
Likely	The impact is likely to occur under most conditions.
Definite	The impact will occur.

Once a rating is determined for magnitude and likelihood, the following matrix can be used to determine the impact significance.

Table 7 – Significance Rating Matrix

SIGNIFICANCE				
MAGNITUDE		**LIKELIHOOD**		
		Unlikely	**Likely**	**Definite**
	Negligible	Negligible	Negligible	Minor
	Low	Negligible	Minor	Minor
	Medium	Minor	Moderate	Moderate
	High	Moderate	Major	Major

Table 8 – Significance Colour Scale

Negative ratings	Positive ratings
Negligible	Negligible
Minor	Minor
Moderate	Moderate
Major	Major

Table 9 – Significance definitions

SIGNIFICANCE DEFINITIONS	
Negligible significance	An impact of negligible significance (or an insignificant impact) is where a resource or receptor (including people) will not be affected in any way by a particular activity, or the predicted effect is deemed to be 'negligible' or 'imperceptible' or is indistinguishable from natural background variations.
Minor significance	An impact of minor significance is one where an effect will be experienced, but the impact magnitude is sufficiently small (with and without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value.
Moderate significance	An impact of moderate significance is one within accepted limits and standards. The emphasis for moderate impacts is on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that 'moderate' impacts have to be reduced to 'minor' impacts, but that moderate impacts are being managed effectively and efficiently.
Major significance	An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. A goal of the EIA process is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e., ALARP has been applied). An example might be the visual impact of a development. It is then the function of regulators and stakeholders to weigh such negative factors against the positive factors such as employment, in coming to a decision on the Project.

Once the significance of the impact has been determined, it is important to qualify the degree of confidence in the assessment. Confidence in the prediction is associated with any uncertainties, for example, where information is insufficient to assess the impact. Degree of confidence can be expressed as low, medium or high.

Mitigation Measures and Residual Impacts

For activities with significant impacts, the EIA process is required to identify suitable and practical mitigation measures that can be implemented. The implementation of the mitigations is ensured through compliance with the regulatory Frameworks. After first assigning significance in the absence of mitigation, each impact is re-

evaluated assuming the appropriate mitigation measure(s) is/are effectively applied, and this results in a significance rating for the residual impact.

4.5 Identification of Mitigation Measures

For the identified significant impacts, the project team, with the input of the client, has identified suitable and practical mitigation measures that are implementable. Mitigation that can be incorporated into the project design, in order to avoid or reduce the negative impacts or enhance the positive impacts, have been defined and require final agreement with the client as these are likely to form the basis for any conditions of approval by MET.

4.6 Specialist Study Methodology

No specialist study was conducted for this development, however, a botany, terrestrial ecological and avifaunal observation was undertaken. As part of this study, a desktop study was carried out of publicly available scientific publications to investigate the ecology and biodiversity of the affected project area. A site visit was undertaken where the different biodiversity features, habitat, vegetation and landscape units present at the site were identified and mapped in the field. Walk-through-surveys were conducted across the sites (corridors) and all plant and animal species observed were recorded. Searches for listed and protected plant species at the site were conducted and the location of all listed plant species observed was recorded. The impact assessment phase involved the determination of the nature of likely impacts of the development and recommendations on mitigation.

A landscape and visual impact assessment study was undertaken. Site visits were undertaken where visual features and the landscape setting of the site were recorded. An assessment was also made as to what degree people who make use of these locations would be sensitive to change(s) in their views, brought about by the Project. These receptors were then identified, as well as Key Observation Points (KOPs) (those sensitive receptors who had views of the Project) particularly those relating to intersections of major roads, arterial and scenic routes, as well as urban areas, settlements and farmsteads.

The landscape character was then surveyed in terms of scenic quality (landscape significance) and receptor sensitivity to landscape change (of the site) in order to define the visual objective for the project site. Photomontages using panoramic photographs were used to determine the degree of visibility of the Project and change in views of the surrounding landscape. The impact assessment phase involved the determination of the nature of likely impacts of the development and recommendations on mitigation.

An agriculture impact assessment study was also considered, although in this whole project it was not of much impact or relevance considering the nature of the whole project, and setting as Karibib is a semi desert, barren environment with not much agricultural activities taking place.

The socio-economic study was undertaken. The study began with the compilation of a baseline description. The baseline description was derived from a range of secondary data (including but not limited to census data, existing reports, development plans and other strategic planning documents) and primary data collection. The primary data used for the baseline is based on information provided by the Client / Proponent and issues raised through the public consultation process.

The impact assessment phase incorporated the identification and assessment of socio-economic impacts (direct, indirect and cumulative) that may result from the closure of various corridors (construction and

operation phases) of the project. Mitigation measures that address the local context and needs were recommended as the final phase of the study.

4.7 Assumptions and Limitations

EIA is a process that aims to identify and anticipate possible impacts based on past and present baseline information. There is, inevitably, always some uncertainty about what will actually happen in reality. Impact predictions have been made based on field surveys and with the best data, methods and scientific knowledge available at this time. However, some uncertainties could not be entirely resolved. Where significant uncertainty remains in the impact assessment, this is acknowledged and the level of uncertainty is provided.

In line with best practice, this ESIA has adopted a precautionary approach to the identification and assessment of impacts. Where it has not been possible to make direct predictions of the likely level of impact, limits on the maximum likely impact have been reported and the design and implementation of the project (including the use of appropriate mitigation measures) will ensure that these are not exceeded. Where the magnitude of impacts cannot be predicted with certainty, the team of specialists have used professional experience and available scientific research from solar facilities worldwide to judge whether a significant impact is likely to occur or not. Throughout the assessment, this conservative approach has been adopted to the allocation of significance.

4.7.1 Gaps and Uncertainties

Inevitably knowledge gaps remain. For instance, there is an incomplete understanding of cumulative impacts as it is not known how the project will get consolidated at this stage.

Gaps in Project Description

- Regarding the location of the site, the assessment is based on a refined layout derived from revisions of earlier design, to accommodate environmental sensitivities.
- At this stage it is unknown, although unlikely, whether a borrow pit for rock or soil material or blasting activities will be required for the closing off of the mine.

Gaps in Baseline Information

- Ecological limitations; a limitation associated with the sampling approach was the narrow temporal window of sampling. Ideally, a site should be visited several times during all the different annual seasons to ensure that the full complement of plant and animal species present are captured, as well as the temporary usage of the corridor by some local community who frequently use these corridors.

However, this is rarely possible due to time and cost constraints and therefore, the data captured is representative of the species at the site. The vegetation at the time of the site was in a reasonable condition for sampling. This represents a sufficiently conservative and cautious approach which takes account of the study limitations.

Gaps in Understanding of Impacts

- It should be noted that the closure of various corridors all at once are new to Namibia and in this case the impacts associated with them have not been scientifically researched in the context of their occurrence in this country, and therefore the precautionary principal where necessary in undertaking their respective impact assessments.

All impacts included in the table below fall within the scope of this project and responsibility of the client or proponent. Each of the potential impacts is screened and subjected to the criteria stipulated above. The significance of each potential impact is determined based on the criteria below.

Detailed descriptions of mitigation measures for impacts that require mitigation are contained in the EMP (Chapters 9 and 10) and also summarized in the screening and assessment of impacts (Table 10).

Impacts for which insufficient information is available are discussed at the end of this section.

Table 10 – Screening and assessment of impacts

POTENTIAL IMPACT	DESCRIPTION	EXTENT	DURATION	INTENSITY	PROBABILITY	CONFIDENCE/ SUFFICIENT INFORMATION AVAILABLE?	SIGNIFICANCE	SIGNIFICANT MITIGATION DEEMED POSSIBLE?	NEXT STEP
Aesthetic issues	The change in the existing landscape may be an eye sour due to blockage of open views.	Immediate area	Temporary	Low	Definite	Yes	Low	Yes	**EMP**
Employment creation	The construction and operational activities associated with the marble stones is due to create local employment opportunities.	Local	Temporary/permanent	Medium	Definite	Yes	Low	Yes	**EMP**
Noise (construction phase)	Construction and operational activities can create noise for local nearby residents.	Local	Temporary	Low	Highly probable	Yes	Low	Yes	**EMP**
Dust (construction phase)	The ingress and egress of construction vehicles and blasting processes can create dust.	Local	Temporary	Low	Probable	Yes	Low	Yes	**EMP**
Traffic (Operational phase)	Increase in traffic in the area is expected due to construction and operational activities	Local	Permanent	Medium	Definite	Yes	Low	Yes	**EMP**
Impact on existing properties	The proposed development is believed to impact on exiting property values in the area.	Local	Long-term	Low	Probable	Yes	Low	Yes	**EMP**
Public open space encroachment	The proposed development may encroach in public areas	Local	Temporary	Low	Probable	Yes	Low	Yes	**EMP**

5. ANALYSIS OF ALTERNATIVES

5.1 ANALYSIS OF ALTERNATIVE SITE

Dreamland Investment cc established a marble stone factory 7 km south of Karibib in Erongo Region. No alternative site has been examined for the project. The features which are considered extremely important for selecting the site are as follows:

- Availability of the land and marble stones.
- Karibib District is producer of all the raw materials required for marble stones mining.
- Lack of marble stones mining in vicinity.

5.2 ANALYSIS OF ALTERNATIVE FOR TECHNOLOGY

No alternative marble stones technology has been considered in this regard.

6. ENVIRONMENTAL MONITORING PROGRAM

6.1 INTRODUCTION

Regular monitoring of the various environmental parameters is necessary to evaluate the effectiveness of the management programme so that the necessary corrective measures can be taken in case there are some drawbacks in the proposed programme. Since environmental quality parameters at work zone and surrounding area are important for maintaining sound operating practices of the project in conformity with environmental regulations, the post project monitoring work forms part of Environmental Monitoring Program. Environmental Monitoring Program will be implemented once the project activity commences. Environmental Monitoring Program includes:

(i) environmental surveillance
(ii) analysis and interpretation of data
(iii) preparation of reports to support environmental management system and
(iv) organizational set up responsible for the implementation of the programme. Environmental Monitoring / Management Plan will be taken up for various environmental components as per conditions stipulated in Environmental Management Act 7 of 2007. Compliance of same will be submitted to respective authorities on regular basis.

The main objectives of environmental monitoring are:

- To assess the change in the environmental conditions,
- To monitor the effective implementation of mitigation measures,

6.2 ENVIRONMENTAL MONITORING AND REPORTING PROCEDURE

Monitoring shall confirm that commitments are being met. This may take the form of direct measurement and recording of quantitative information, such as amounts and concentrations of discharges and wastes, for measurement against corporate or statutory standards, consent limits or targets. It may also require measurement of ambient environmental quality in the vicinity of a site using ecological/biological, physical and chemical indicators. Monitoring may include socio-economic interaction, through local liaison activities or even assessment of complaints.

The key aims of environmental monitoring are:

- To ensure that results/ conditions are as forecast during the planning stage, and where they are not, to pinpoint the cause and implement action to remedy the situation.
- To verify the evaluations made during the planning process, in particular with risk and impact assessments and standards and target setting and to measure operational and process efficiency.
- Monitoring will also be required to meet compliance with statutory and corporate requirements.

Finally, monitoring results provide the basis for auditing, i.e., to identify unexpected changes.

6.3 MONITORING METHODOLOGIES AND PARAMETERS

Environmental monitoring aspects, methods and parameters to be measured are summarised in the table below.

Table 11 – Monitoring methodologies and parameters

S.No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring	Location
1	**Air Emissions**	Ambient air quality within the premises of the industrial area and nearby habitations to be monitored	PM10	As per Environmental Clearance conditions	At least two locations inside premises
		Exhaust from vehicles to be minimized by use of fuel-efficient vehicles and well-maintained vehicle	Vehicle logs to be maintained		-
		Vehicle trips to be minimized too the extent possible	Vehicle logs	Daily records	Main Gate
2	**Noise**	Noise generated from plant operations, vehicular to be optimized and monitored	Spot Noise Level recording; Leg(night), Leg(day), Leq(dn)	As per ECC conditions	Noise measurement Set, Reactors, Boilers and within premise
		Generation of vehicular noise	Maintain records of vehicles	Periodic during operation phase	-
3	**Wastewater Discharge**	No untreated discharge to be made to surface water, groundwater or soil.	No discharge hoses in vicinity of watercourses.	Periodic during operation phase	-
		Take care in disposal of wastewater generated such that soil and groundwater resources are protected	Discharge norms for effluents will be maintained	Periodic during operation phase	
		Compliance of treated wastewater usage/ discharge to standards		Periodic during operation phase	One location (Treated Wastewater)
		Ensure drainage system and specific design measures are working effectively. Design to incorporate existing drainage pattern and avoid disturbing the same	Visual inspection of drainage and records thereof	Periodic during operation phase	-
4	Energy Usage	Energy usage for air-conditioning and other activities to be minimized Conduct annual energy audit for the buildings	Energy audit report	Annual audits and periodic checks during operational phase	-
5	Emergency preparedness, such as fire fighting	Fire protection and safety measures to take care of fire and explosion hazards, to be assessed and	Mock drill records, on site emergency plan, evacuation plan	Periodic during operation phase	-

		steps taken for them prevention			
6	Maintenance of flora and fauna	Vegetation, greenbelt / green cover development	No. of plants, species	Periodic during operation phase	-
7	Solid and Hazardous Waste Management	Implement waste management plan that identifies and characterizes every waste arising associated with proposed activities and which identifies the procedures for collection, handling & Disposal of each waste arising	Records of solid waste generation, treatment and disposal	Periodic during operation phase	
8	Health	Employees and migrant labour health check ups	All relevant parameters • X-ray of chest to exclude • Pulmonary • TB, etc. • Lung function test • Audiometer test to find deafness • Urine test, • Blood test, • Blood sugar etc. • Eye test		

6.4 MONITORING SCHEDULE

Regular Monitoring of all the environmental parameters viz, air, water, noise and soil as per the formulated program based on existing guidelines will be carried out every year in order to detect any changes from the baseline status. Below is a potential monitoring schedule.

Table 12 – Monitoring schedule

No.	Description	Schedule of Monitoring
1	**Air Quality**	Quarterly except Rain Season
2	**Noise Level**	Six Monthly
3	**Socio Economic Condition**	Once every 18 months

6.5 LOCATION OF MONITORING STATIONS

The location of the monitoring stations was selected on the basis of prevailing micro meteorological conditions of the area like; wind direction and wind speed, relative humidity, temperature.

6.6 REPORTING SCHEDULE DURING OPERATION

After completion of analysis, copies of all the analysis reports will be sent to Competent Authorities including Karibib Town Council. Copies of the reports will be maintained in the Office and will be made available to the concerned inspecting authorities.

7. PROJECT BENEFITS

7.1 GENERAL

The project brings overall improvement in the locality, neighbourhood and the Erongo Region, and Namibia at large by bringing industry, employment and hence improving living standard and economic growth.

7.2 PHYSICAL BENEFITS

The construction and operation of the marble stone mine will enhance the following physical infrastructure facilities in the adjoining areas:

a) **Market:** generating useful economic resource for construction and operation.
b) **Infrastructure:** creation of community assets (infrastructure) like provision for drinking water, construction of school buildings, village roads/ linked roads, dispensary and health centre, community centre, market place etc, as a part of corporate social responsibility.
c) **Local employment:** this project will enhance the opportunities of employment for the local villagers near the lease area due to which their economic status become better.

7.3 IMPROVEMENT IN SOCIAL INFRASTRUCTURE

The project will create employment which improve the living standards for the local community. It has been observed that conditions of the surrounding area around industrial estate are better than that of distant villages. Marble stones mining in the region will have positive impact on the social economic condition of the area by way of providing employment to the local in-habitants; wages paid to them will increase the per capita income, housing, education, medical and transportation facilities, economic status, health and agriculture.

The features that are tagged for the improvement of social infrastructure are as follows:

- Social welfare programme like provision of medical facilities educational facilities, water supply for the employees as well as for nearby area will be taken.
- Supplementing Government efforts in health initiatives, social welfare and various awareness programs among the local and rural population.
- Assisting social economic programme.
- Adoption of villages for general development.
- Supply of water to village nearby villages.
- Development of facilities within villages like roads, etc.

7.4 CORPORATE SOCIAL RESPONSIBILITY

Dreamland Investment cc aims to develop infrastructure and employ local people for such jobs where locals' skills are readily available towards Corporate Social Responsibility.

8. ENVIRONMENTALMANAGEMENT PLAN

The EMP consists of specific site measures and good generic practices. Implementation of which is based on the environmental associated with the proposed activities and mitigating measures.

Purpose of EMP is to facilitate effective environmental management of the project or operations, in general and implementation of the mitigation measures to reduce the environmental impacts in particular. The EMP provides a delivery mechanism to address potential adverse impacts and to introduce standards of good practice adopted for all projects and operational works. For each stage of the EMP all the requirement and operational activities are listed to ensure effective mitigation of every potential biophysical, socio-economic and environmental impact identified the EIA. For each activity or the operation, which could otherwise give rise to environmental impact the following information, is required:

- The parameters that shall be monitored to ensure effective implementation of the mitigation measures;
- A comprehensive check list of the jobs where mitigation measures (actions) that the organization shall implement;
- The timing for implementation of the action to ensure that the objectives of mitigation are fully met as summarised below.

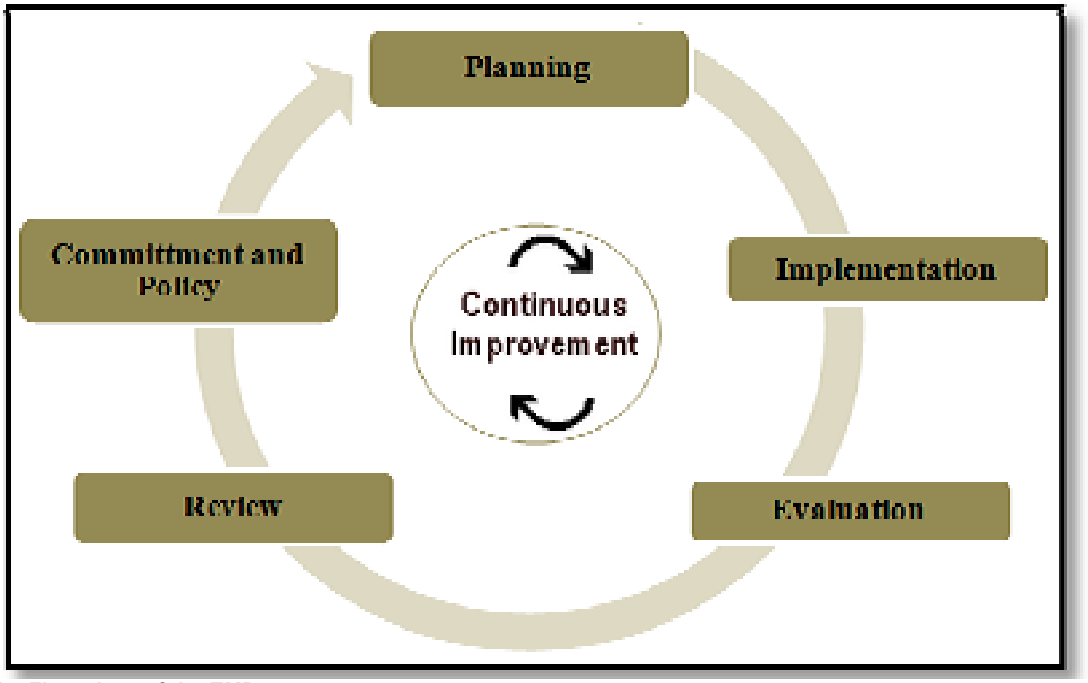


Figure 4 – Flow chart of the EMP

Table 13 – Environmental management mitigation action

S. No.	Activity	Area of Environmental impacts	Management action to be taken for mitigation of the possible impact
1. Operation of marble stones mine			
	Production of Marble stones	**Air, land, water**	Ensure proper procedure of various raw materials so that dust generation is minimized.
			Provide required personnel protective equipment to all employees involved in marble stones mining process.
			Use vapor recovery systems to prevent the release of toxic gases into air, if it is required.
			The various operating parameters should be monitored. Monitoring parameters should be analysed and reviewed at regular intervals and compared with the standard operating parameters so that any necessary corrective actions can be taken. This is to avoid wastage of raw material and production of off-spec product. As the off-spec product can result into a solid waste generation. All the waste materials to be recycled, if possible.
			Water use should be carefully monitored and controlled. Leakage and waste of water should be strictly avoided. This is to conserve the precious water.
			Practices such as process optimization, production scheduling, materials tracking and inventory control, special material handling and storage procedures, preventive maintenance programs, and solid waste segregation should be adopted.

S. No.	Activity	Area of Environmental impacts	Management action to be taken for mitigation of the possible impact
			The non-reusable materials to be segregated properly and sent for recycling. If the material cannot be recycled then they should be properly stored and used for land filling making of roads.
			All the hazardous waste from marble stones mining process, such as used lubricating oil, scrapped lead acid storage batterie should be segregated and sold to authorized recyclers.
2. Operation of environmental facilities			
	Wastewater and effluent treatment	**Water and Land**	Recycle waste water produced during produced during mining process. Ensure disposal of contaminated wastewater and effluent at a permitted facility.
			Ensure that wastewater and effluent is not mixed with rain water and does not go to storm water channel. Ensure the sewage water is disposed to soak pit
	Temporary solid waste storage and handling within the premises	**Land and Water**	Industrial solid waste generated from various operations to be stored properly within the premises and disposed of suitably.
	Storage of all the raw materials, products.	**Air, Water, Land and Health**	Ensure disposal of used liners -bags, drums for recycle/reuse, only after decontamination. Also used chemical drums are sent back to the suppliers.
			Ensure proper training to drivers for transportation of hazardous chemicals, spill control and emergency actions
			Ensure availability of MSDS of all the raw materials and finished products to the operating staff and Off-site Emergency team, whenever required.
			Ensure provision of PPEs to truck drivers during

S. No.	Activity	Area of Environmental impacts	Management action to be taken for mitigation of the possible impact
			transportation.
	Transportation of all the raw materials, finished products & hazardous wastes	**Air, Water and Land**	Ensure training of the drivers in handling the hazardous chemicals.
	Quarrying and associated mining activities	**Air, Water, Land, Local community, Fauna & Flora**	Maintain vehicles and drilling equipment. Quarrying should be carried out only during daytime. Workers to wear earmuffs if working in noisy section and other appropriate PPE. Management to ensure that noise is kept within reasonable levels. Environmental considerations will be adhered to at all times before clearing roads, trenching and excavating.
		Archaeological/Heritage Sites	Buffer zones will be created around the sites. Adhere to practical guidelines provided by an archaeologist to reduce the archaeological impact of quarrying activities. All archaeological sites to be identified and protected before further quarrying commences.
	Environment Health and Safety	**Workforce**	Train workers on personal safety and disaster preparedness. A well-stocked first aid kit shall be maintained by qualified personnel. Report all accidents / incidences (include near-misses) and treat and compensate affected workers. Provide sufficient and suitable sanitary conveniences which should be kept clean at all times. Conduct monthly and annual Health and Safety Audits.
3. Decommissioning Phase			

S. No.	Activity	Area of Environmental impacts	Management action to be taken for mitigation of the possible impact
	Disturbed Physical environment	**Noise, Air, Land & Water pollution, Vegetation**	Maintain plant equipment. Decommissioning works to be carried out only during daytime. Workers working in noisy section to wear earmuffs. Workers should be provided with dust masks. Undertake a complete environmental restoration programme and introducing appropriate vegetation.

8.1 ENVIRONMENTAL MONITORING PLAN

Dreamland Investment cc environmental monitoring program have been summarised below.

Table 14 – Environmental monitoring schedule

No.:	Activity	Schedule
Air Pollution Monitoring		
1.	Stack monitoring of flue stacks sets as given in air consent from time to time	Once every Quarter
2.	Ambient air quality monitoring of parameters specified by EMA in their air consents from time to time within company premises including noise monitoring.	Once every Quarter
3.	Work place monitoring to control the secondary fugitive emission in the work place, especially the spm and rspm levels	Once in a year
4	Employ dust suppression e.g., by using water truck, if required.	Daily
Water Pollution Monitoring		
5.	Monitoring of wastewater in let and outlet at waste water treatment plant for the parameters specified by pollution control board in their water consent from time to time.	Alternative Day
Solid Waste Generation Monitoring / Record Keeping		
6.	Records of generation of solid waste from all activities related to marble stones mining operation.	Daily
7.	Records of generation of used drums, bags and records of waste used oil (This includes the record of used batteries and its recycling)	Daily
8.	Records of generation, handling, storage, transportation and disposal of other solid, aqueous and organic hazardous wastes as required by hazardous waste authorization, this should include generation of electrical and electronic waste as per the rules.	To be updated monthly
Environmental Audit		
9.	Environmental statement under the Environmental Management Act No.7 of 2007, if required.	Once in a year
10.	Environmental audit as per the pollution control under EMA Act / as required by the consent	Monthly

9. SUMMARY & CONCLUSION

9.1 INTRODUCTION

Dreamland Investment cc has constructed and operating an exclusive marble stone factory near Karibib. The development is located predominantly on marble rock units of the Karibib Formation, within the Damara Orogen, which is currently underutilised, while it has a potential to increase economic growth and reduce poverty in the region.

9.2 ENVIRONMENTAL MONITORING

For monitoring of the environmental parameters like meteorology, air, water, soil and noise quality, the monitoring stations have been established at different locations in and around the project area.

9.3 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The summary of anticipated adverse environmental impacts due to the construction and operation as well as the mitigation measures are given below.

9.3.1 Air Environment

The main sources of emission during the construction period are the movement of equipment at site and dust emitted during the levelling, grading, earthwork and foundation works. The dust emitted during the above-mentioned activities depend upon the type of soil being excavated and the ambient humidity levels.

The impact during construction phase will be for short duration and confined within the project boundary and is expected to be negligible outside the boundaries. Exhaust emissions from vehicles and equipment deployed during the construction phase is also likely to result in marginal increase in the levels of NOx, PM and CO2.

During operational phase, the specific emission quantification will be determined by means of dust fallout bucket – this can be established across the project sensitive receptor and monitored on monthly basis. During operation phase the project will use best available technology to abate the environmental pollution, which includes but is not limited to:

- Proper redesigning of the factory, the working area be properly made ventilated to have free air movements.
- Necessary effective exhaust draft machines, elevators and conveyers may be installed to improve work atmosphere.
- The place marked for glaze spray, dry grinding, dry finishing of wares, should also be provided with effective exhaust system. This will eliminate the spread of dust and control contaminates at the source.
- The dusty processes with higher dustiness of tone department should be isolated from other departments.

- Cleaning of dry wares should be carried out by vacuum process. Manual cleaning of the floor benches and equipment's be carried out either before the work session or after the work session or use the industrial vacuum cleaners.
- Bag filters for dust removal from off-gases can, in principle, be applied in all sectors of the ceramic industry, especially for dusty operations (dedusting of silos for dry raw material storage, in dry raw materials preparation including spray drying, in dry shaping and in dry machining or grinding processes). Sometimes a combination with cyclone pre-filters is useful.
- An upstream quiescent zone guarantees that the dusting the system is relatively dry.
- In an ideal case, the separated glaze particles arise as trickling powder in the filter system.
- Wet dust separators are especially suitable for reducing humid or wet dust emissions in particular from spray drying processes if they are used in combination with cyclones. They are especially beneficial if the rinsing water can be re-used.
- Electrostatic precipitators are used in the marble stones industry, primarily in the manufacture of expanded clay aggregates behind rotary kilns and dry grinding units, where high volume flows have to be treated at high temperatures with relatively high operating reliability.
- The use of low sulphur raw materials and additives can significantly reduce SOX emissions, In the case of sulphur rich raw materials, the addition of low sulphur body additives (e.g. sand) or low sulphur clay reduces SOX emissions by a dilution effect. The use of low sulphur fuels, such as natural gas or LPG, leads to significantly reduced SOX emissions.
- Periodical testing of environmental dust and thermal conditions carried out and a record of this be maintained properly.
- Workers be made aware of the potential hazards and dangers arising out of dust, glaze and heat and also simultaneously educate them through vocational programmes.
- The workers engaged in grinding, casting, spraying and glaze dipping processes be provided with appropriate safety wares such as gloves, gumboots, heat protective clothes and respirators. Workers be advised to take ample water to avoid electrolyte imbalance and dehydration.
- Women and child labour be avoided in certain hazardous processes such as grinding, cleaning, and spraying.
- The periodical medical examination including chest x-ray of the employees in the industry should be carried out and medical records be maintained properly.

9.3.2 Water Environment

During the construction phase site preparation (levelling, excavations etc.) and erection of structures will have temporary effect on the water quality of receiving water body. Effluents from the construction area mainly contain suspended solids while the sanitary waste from the labour colonies contains suspended as well as organic matter.

During operational phase, the wastewater and effluent in the process mostly shows turbidity and colouring owing to the very fine suspended particles of glaze and clay minerals. From a chemical point of view, these are characterized by the presence of:

- Suspended solids: clays, frits and insoluble silicates in general
- Dissolved anions: sulphates
- Suspended and dissolved heavy metals: e.g., lead and zinc
- Boron in small quantities
- Traces of organic matter (screen printing vehicles and glues used in glazing operations).

Management:

- Acting on the water circuit, installing automatic valves that prevent leaks of water when it is no longer needed.
- Installation of a high-pressure system in the plant for cleaning purposes (or high-pressure cleaning equipment)
- Switching from wet off-gas cleaning systems to alternative, non-water consuming systems
- Installation of 'in-situ' waste glaze collection systems
- Installation of slip conveying piping systems
- Separate collection of process waste water streams from different process steps
- Re-use of process waste water in the same process step, in particular repeated reuse of the cleaning water after suitable treatment.

9.3.3 Noise Environment

- During the quarrying, loading and unloading of raw materials, noise and associated vibrations may occur for a short time.
- During the drying and firing phases, fans are used which may generate noise levels in excess of 85 dB(A). These noise sources must be installed outside permanent workplaces.
- During special marble stones production processes, e.g., when splitting the stone and when using sheet metal plates, frames or pallets for internal conveying systems, typical noise problems arise. However, such noise levels can be reduced by taking appropriate measures, e.g., encapsulating permanent workplaces and buffering mobile conveying systems with rubber.

Management

- Complete construction work especially heavy work will be done during day time.
- Vehicular movement carrying raw materials will be avoided during night time.
- The vehicles will be regularly maintained and optimum use of the same will be made.
- Adequate PPE's (ear plugs, ear muffs, helmet, mask etc) will be provided to the workers.
- fit / certified vehicles will be used.
- All possible measures will be taken to minimize the noise.
- The insulation provided for prevention and loss of heat and personnel safety shall also act as noise reducer.
- Foundations and structures will be designed to minimize vibrations and noise.
- Regular equipment maintenance and better work habits will be adopted.

9.3.4 Socio-Economic Environment

The requirement of unskilled manpower will be sourced from nearby local community during construction and operational phase through training and development. The project will also help in generation of the indirect employment apart from direct employment. This will be a positive socio-economic development at local and region level. There will be a general upliftment of standard of living in the local community and Erongo Region at large.

9.3.5 Solid Waste

There will be generation of solid as well as liquid waste during the operational phase of the project which will be responsibly managed by respective competent industry. There are no common facilities for the treatment or disposal of solid or liquid waste within the project premises.

The estimated quantity of municipal waste (domestic and or commercial waste) generated from the industrial site will be approximately 0.20 kg/worker/day, which will be disposed of at the municipal site. The marble stone mining process may also lead to generation of hazardous waste as defined under Environmental Management Act No.7 of 2007 and its Regulations.

Industrial solid waste will be generated from the industrial process which is proposed to be disposed of suitably. Construction waste like soil, bricks, bits, will be utilized in levelling of land and road making.

9.4 ENVIRONMENTAL MONITORING PROGRAMME

Environmental Monitoring Cell

In order to maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary which will complied as per conditions. For these individual authorities will take decision to formulate an Environment Policy of the proposed industry and constitute an Environmental Management Cell and committed to operate the proposed project with the objectives mentioned in approved Environment Policy. The System of reporting of non-compliance / violation of any Environmental law/Policy will be as per quality management system. The internal audit will be conducted on periodic basis and any non-conformities/violation to environment law will be closed and discussed in Management Review Meeting of Board of Director/Partners.

9.5 ENVIRONMENT MANAGEMENT PLAN DURING OPERATION PHASE

The EMP consists of specific site measures and good generic practices. Implementation of which is based on the environmental impacts associated with the development and mitigating potential.

The EMP provides a delivery mechanism to address potential adverse impacts and to introduce standards of good practice to be adopted and operational works. For each stage of the EMP all the requirement and operational activities are listed to ensure effective mitigation of every potential biophysical, socio-economic and environmental impact identified in the EIA.

9.6 CONCLUSIONS AND RECOMMENDATIONS

It is predicted that socio-economic impact due to this project will positively increase the employment opportunities for local inhabitants. There are no resettlement and rehabilitation issues involved within the development. The contribution to the revenue of the development will be put in public welfare and augment growth. The conservation plan for endangered fauna found in the study has been included in the EIA report. Thus, the proposed project is not likely to affect the environment or adjacent ecosystem adversely.

It is therefore, against the above background and opinion for Namland Consultant that, an Environmental Clearance Certificate be issued to Dreamland Investment cc to proceed with the development, with full implementation, enforcement and regularly monitoring compliance with conditions as set out in the EMP.

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