UPDATED ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT (ESIA) REPORT

RENEWAL OF THE ENVIRONMENTAL CLEAREANCE CERTIFICATE FOR THE MARBLE TILES FACTORY ON ERF 8, KARIBIB EXTENSION 6, INDUSTRIAL, ERONGO REGION, NAMIBIA

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DOCUMENT INFORMATION

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PROJECT TYPE	UPDATED ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT STUDY
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COMPETENT AUTHORITY	MINISTRY OF MINES AND ENERGY, MINISTRY OF ENVIRONMENT, FORESTRY AND TOURISM/MINISTRY OF MINES AND ENERGY
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1. INTRODUCTION

The term Environment Impact Assessment (EIA) refers to 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 sanctioning clearance. An EIA is a tool used to identify the environmental, social and economic impacts of a project prior to decision-making. It 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.

The manufacture of ceramic materials is one of the oldest industrial processes and after the development of numerous technologies worldwide, the ceramic industry plays an important role in the economy growth, including of that of Namibia. The process of manufacturing ceramic artifacts consists basically of four stages, namely: preparation of the raw material and the mass, formation of the parts, heat treatment and the finishing step. In parallel with this process, there are environmental concerns, since several residues are generated by this activity in each of the above stages, which will vary with the ceramic typology, i.e., with a red or white base.

The structural ceramics industry, also known as red ceramics, produces perforated bricks, massive bricks, slabs or slabs, structural and structural blocks, tiles, shackles and rustic floors. It is a basic activity, when making civil construction, in general, from the simplest to the most sophisticated. The present study aimed to demonstrate the process of manufacturing red based ceramic artifacts, analysing the potential for degradation to the environment, as well as presenting possibilities of applicability of the cleaner production methodology in this sector, with a view to optimizing the production process, reducing of the generation of waste in the generating sources, as well as the possibility of transforming some waste into co-products, minimizing the use of raw materials and inputs. In relation to the methodology applied in the development of this work, it is classified as basic, qualitative, descriptive and bibliographical. The literature review indicated the existence of low technological density in the ceramic sector in Namibia and the region.

1.1 PURPOSE OF THE REPORT

Namland Consultants was assigned the job of updating the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) report for the project.

Every anthropogenic activity has some impact on the environment. The objective of EIA/EMP report is, thus, to foresee the potential environmental problems that would arise out of the development and address them in the project's planning and design stage. The project involves operation of manufacturing plant which directly falls under projects that require Environmental Clearance Certificates before they commence as enshrined in the Environmental Management Act No. 7 of 2007.

1.2 SCENARIO OF CEREMIC INDUSTRY IN NAMIBIA

Ceramic tiles today have become an integral part of home improvement. It can make a huge difference to the way your interiors and outdoors look and express. The Namibian tile industry despite an overall slowdown of the economy continues to grow at a healthy 15% per annum.

According to the Namibia Statistics Agency (NSA) (2016), distribution of households by main material used for roofing shows that the majority (72.1%) of the households used corrugated iron sheets as the main material for roofing, which were predominantly in urban areas (83.1%) compared to rural areas (58.6%). At regional level, housing units which had roofs made from corrugated iron/zinc were predominantly found in most regions, except in Kavango West (42.8%), Ohangwena (41.4%) and Erongo (27.3%) respectively. However, asbestos was the most common main material used for roofing in the Erongo region used in 40.0 percent of the households. With regards the Percent distribution of households by main material used for roof and area, brick tiles constitute 0.9% on national average.

The Namibian tile 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%). Tiles (Ceramic/wood/plastic) was used in the 17.7 percent of the households. Cement and tiles were particularly common in urban areas (37.4% and 29.4%) while sand/earth was more common in rural areas accounting for 42.2 percent of the households. Similar results were also observed at regional level. (NSA, 2016).

Namibia ranks in the top 3 list of countries in terms of tile 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 ceramic tiles in SADC.

1.3. IDENTIFICATION OF PROJECT & PROJECT PROPONENT

Dreamland Investment CC is a private owned company legally registered in Namibia, and wholly owned by Namibians.

Dreamland Investment has pioneer industrialization of the Karibib Region and Namibia as a whole by setting up of tile manufacturing project. Dreamland Investment established an exclusive tile production facility. The total plot area of the industrial park will be 80.805 Ha.

Karibib District boasts of abundant precious gemstones and other minerals, hence the strategic location of the tile manufacturing development.

1.4 BRIEF DISCRIPTION OF THE PROJECT

Dreamland Investment CC established an exclusive tile manufacturing industrial unit on Erf 8, Karibib Extension 6, Karibib District in Erongo Region. Dreamland Investment will provide basic infrastructure facilities like demarcation of plots, roads, drainage network, power supply, street light, green area development, etc.

TABLE 1 – BRIEF DESCRIPTION OF THE PROJECT

S.No.	Particulars	Details
01	Project	Ceramic Tile Manufacturing, Karibib, Erongo Region
02	Location	Erf 8, Extension 6, District, Karibib, Erongo Region, Namibia
03	Coordinates	21°56'48.10" S , 15°50'43.62" E
04	Total Plot Area	3.805 Ha
05	Type of Land	Karibib Municipality land allotted for industrial development
06	Topography	Plain Area
07	Total Water Requirements	**Industrial water demand:** as per estimation, approximately water requirement for individual industry will be 1000 litter per day
08	Total Power Requirement	The power demand will be met through 132 kVA Erongo Red station, who are the official regional electricity distributors in Erongo Region
09	Fuel Requirement	LPG will be required for Ceramic industries. The estimated quantity of LPG required for the project (based on individual industry consumption) will be 10,000 - 50,000 m^3/day.
10	Total Employment Generation	Approximately 150 workers will be employed due to this project activities.
11	Numbers of Ceramic Units / Factories	2
12	Ecological Sensitive Areas (National Park, Wild Life Sanctuary, Reserve/ Protected Forest etc.) within 10 Km radius	No ecological sensitive area like National Park, wildlife sanctuaries are present within 10 Km radius of the study area.
13	Archaeological Important Place	Not any
14	Nearest Towns	Arandis and Usakos
15	Nearest Railway Station	Karibib
16	Nearest National	B2 to Windhoek / Swakopmund

	Highway	

1.5 COMPLIANCE OF TERMS OF REFERENCE

TABLE 2 – SUMMARY OF THE TOR COMLIANCE

SN	Points Mentioned in ToR	Response
01	Update the description of the project.	The industrial area is a homogenous industrial area for ceramic industries only. The generic manufacturing process of ceramic industries is elaborated in updated EIA/EMP Report
02	Details of the elements of development, highlighting the areas to be reversed for construction, waste management and greenbelt development should be provided	The detailed impact due to the project on the land and soil has been elaborated. The green belt in the will be the responsibility of Dreamland Investment.
03	Identification of the major environmental issues of concern through the presentation of baseline data, which will include physical, biological, and socio-economic considerations.	The detailed baseline has been updated to assess the present environmental condition in the study during the period.
04	Outline of the Legislations and Regulations relevant to the project are given.	The list of applicable legislation and regulations are summarised in this document.

1.6 ENVIRONMENT CLEARENCE PROCESS

The project involves operation of tiles factories; therefore, the project may be appraised under Environmental Management Act, 2007 (Act No.7 of 2007).

The establishment of communication networks is a listed activity under the Environmental Management Act (EMA) which requires an Environmental Impact Assessment (EIA) for the project of this magnitude. Because the nature of the project, Namland Consultants has been instructed by the Client / Proponent update the EIA and EMP in order to apply for an Environmental Clearance Certificate (ECC) renewal for the project.

1.6.1 Purpose of the EA Process

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

The approach for the national EA was aligned with the requirements of the Environmental Management Act (Act 7 of 2007) to include three phases, namely:

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

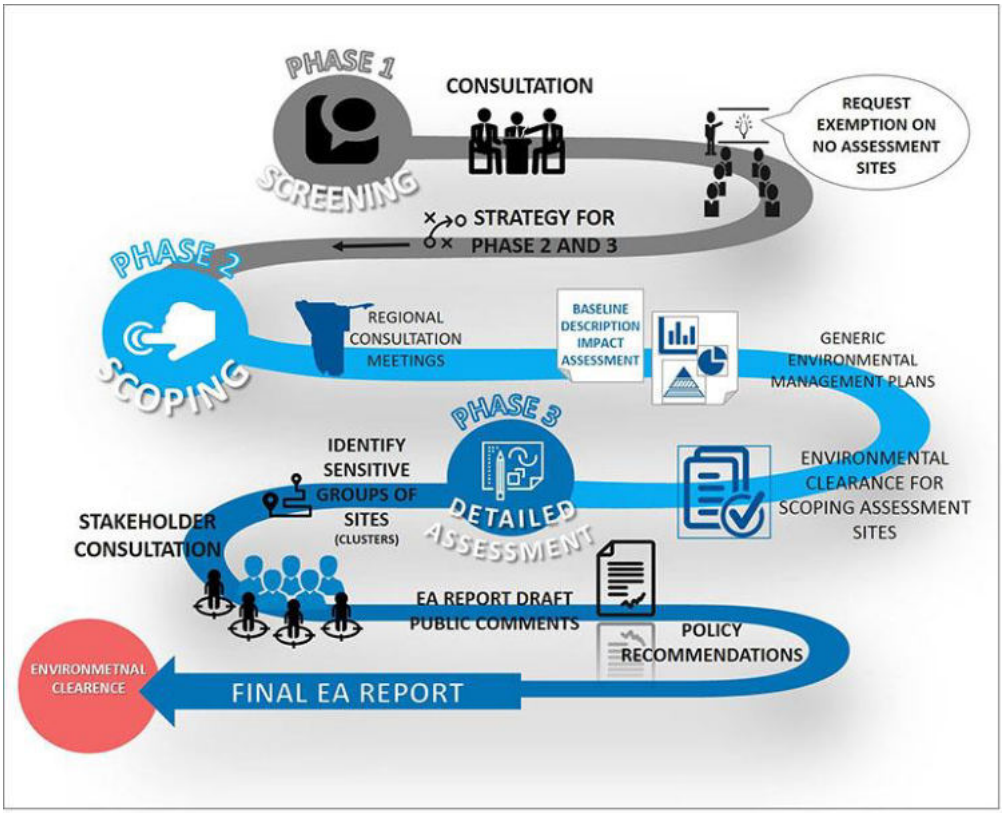


FIGURE 1 – APPROACH TO EIA INCLUDING THREE PHASES

Phase 1: Screening

The process was initiated during the project inception with the main objective to consult with the various affected Ministries/Authorities 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 on 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 proponent to achieve their short- and long-term objectives while operating in an environmentally sustainable manner.

Stakeholder Consultation
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 I& APs are informed and have an opportunity to take part in the process.

1.7 STRUCTURE OF ENVIRONMENTAL IMPACT ASSESSMENT

The 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):

1) Introduction
2) Project Description
3) Description of the Environment
4) Anticipated Environmental Impact & Mitigation Measures
5) Analysis of alternatives (Technology & Site)
6) Environmental Monitoring Program
7) Additional Studies
8) Project Benefits
9) Environmental Cost Benefit Analysis
10) Environmental Management Plan
11) Summary & Conclusion

1.8 THE POLICY, LEGAL, & ADMINISTRATIVE FRAMEWORK REQUIREMENTS FOR EIA

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

The main output of the EIA process is the Environmental Management Plan (EMP) or Environmental Statement (ES), which reports on the findings of the individual topic assessments and considers the overall impact of the proposed development on its 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.

1.8.1 Legislative Framework

The legislative framework for EIA is set below.
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 before the proposed project may commence. The findings of the abovementioned review are summarised below.

TABLE 3 – NAMIBIAN LEGISLATION RELEVANT TO 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).	
– **Forestry Act 12 of 2001** – **Nature Conservation Ordinance 4 of 1975**	– Prohibits the removal of any vegetation within 100 m from a watercourse (Forestry Act S22 (1)). – Prohibits the removal of and transport of various protected plant species.	Even though the Directorate of Forestry has no jurisdiction within Townlands, these provisions will be used as a guideline for conservation of vegetation.
– **Labour Act 11 of 2007**	Details requirements regarding minimum wage and working conditions (S39-47).	The proponent should ensure that all contractors involved during the construction, operation and maintenance of the proposed project comply with the provisions of these legal instruments.

LEGISLATION/ GUIDELINE	RELEVANT PROVISIONS	IMPLICATIONS FOR THIS PROJECT
– **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.
– **Town Planning Ordinance 18 of 1954**	Subdivision of land situated in any area to which an approved Town Planning Scheme applies must be consistent with that scheme (S31).	The proposed use of the project site must be consistent with the Karibib Town Planning Scheme (2012).
– **Townships and Division of Land Ordinance 11 of 1963**	Details the functions of the Township Board including what they consider when receiving an application for Township Establishment (S3).	The proposed layout and land uses should be informed by environmental factors such as water supply, soil etc. as laid out in Section 3.

LEGISLATION/ GUIDELINE	RELEVANT PROVISIONS	IMPLICATIONS FOR THIS PROJECT
– **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 roads. (S37.1) – Distance from proclaimed roads at which fences are erected (S38)	The limitations applicable on RA proclaimed roads should inform the proposed layout and zonings where applicable.
– **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.

2. PROJECT DESCRIPTION

2.1 TYPE OF PROJECT

Dreamland Investment CC has established a tile manufacturing plant / factories on Erf 8, Karibib industrial, Erongo Region. The land area for the project is 80hactares. The land has been allotted to Dreamland Investment CC by Karibib Town Council. The project is categorised as a manufacturing factory.

2.2 NEED OF THE PROJECT

The Namibian ceramics industry has emerged as a promising in terms of manufacturing and supplying the local and regional markets. Ceramic industry in Namibia provides employment to 4,000 plus 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 needed for the ceramic industry. Sixty two percent of the feldspar is found in the Karibib District. Karibib District boasts of glass grade feldspar, which makes these areas suitable for investment of ceramic industries. Though there are several units in Namibia which are into ceramics, they are all based in Windhoek, and the area and the absence of ceramic complex or factory in Karibib and the region of Erongo is being felt. Motivated by the need to empower and capacitate local communities, Dreamland Investment found it developmental and sustainable to have a tile manufacturing factory in Karibib closer to the raw materials and in line with the Harambee Prosperity Plan and other Government Developmental Goals.

The demand for ceramic tiles on the local, regional and international levels is growing high. 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 ceramic tiles, the overall market is estimated to grow at 9.2% from 2013 to 2019 (World Bank, 2013).

2.3 PROJECT LOCATION & CONNECTIVITY

The proposed Dreamland Ceramic Tile Factory is coming up in Karibib District on Erf 8, Industrial Area. The development of the factory is ideal as it involves all the incentives and

support structures required for the Ceramic / Tile Industry. he area is underlain by folded marble and subordinate quartz-mica schist of the Karibib Formation.

The identified 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 stri kes north-northwest parallel to the l ayering of the marble, although there are places where the ore body cross-cut the host rocks.

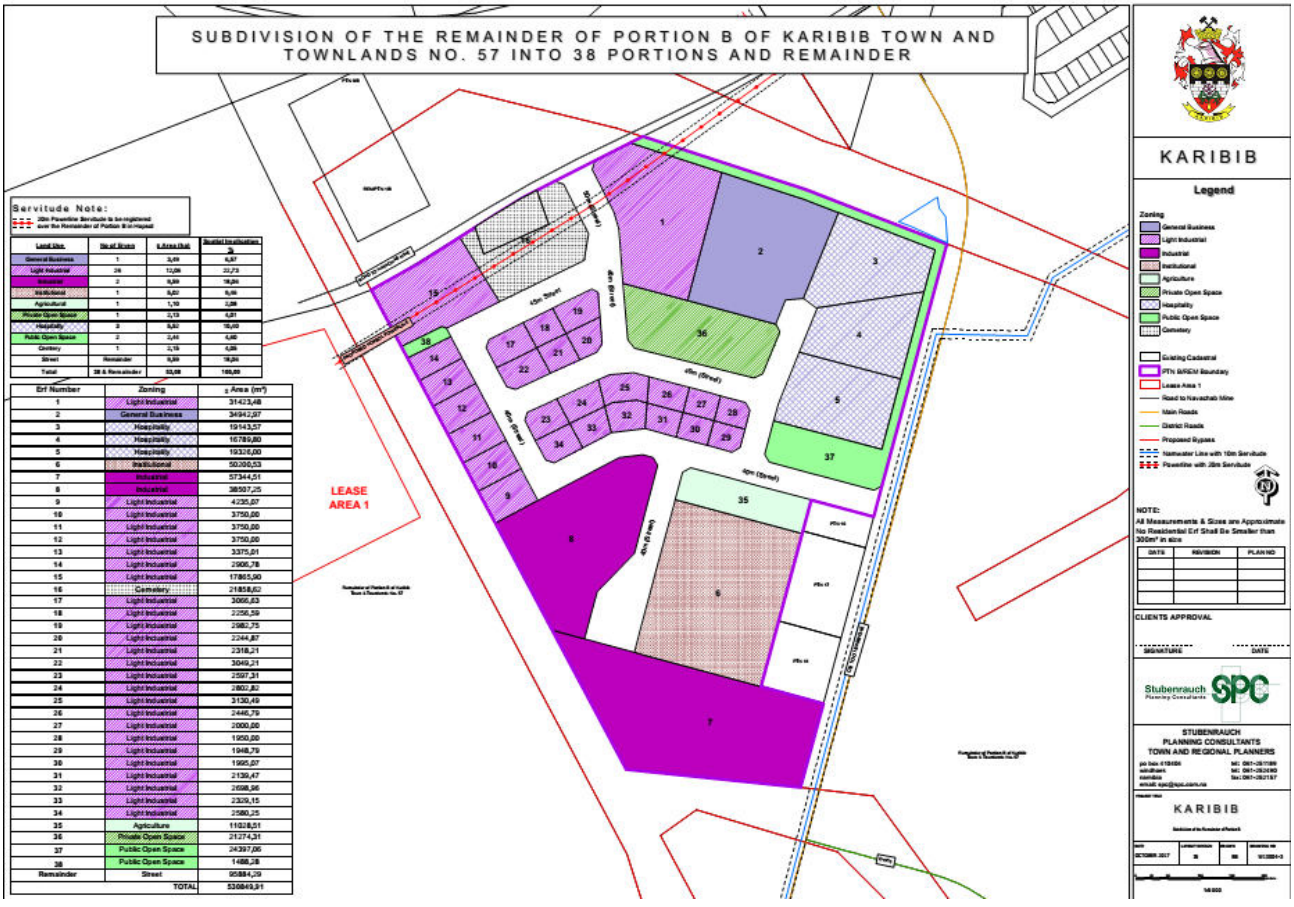


FIGURE 2 – LOCALITY PLANT OF THE DREAMLAND TILES FACTORY IN KARIBIB

2.3.1 Existing Infrastructure and connectivity

A. Existing infrastructure

Schools, hospitals, banks and churches are in close vicinity of the project site. Detail of some of them is as follows:

TABLE 4 – EXISTING INFRASTRUCTURE AND CONNECTIVITY

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

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

- Minerals like Quartz, Silica sand, Soapstone, etc needed for the Ceramic Industry are found in abundance in nearby area of the proposed site.
- Karibib is producer of all the raw materials required for Ceramic Industry.
- 80% of the Feldspar is found in the Karibib Region .
- Karibib district boasts of Glass Grade Feldspar, making areas suitable for Ceramic Industries.
- Absence of ceramic complex in area which is into ceramics

2.6 BRIEF ABOUT THE MANUFACTURING PROCESS OF CERAMIC TILES INDUSTRY

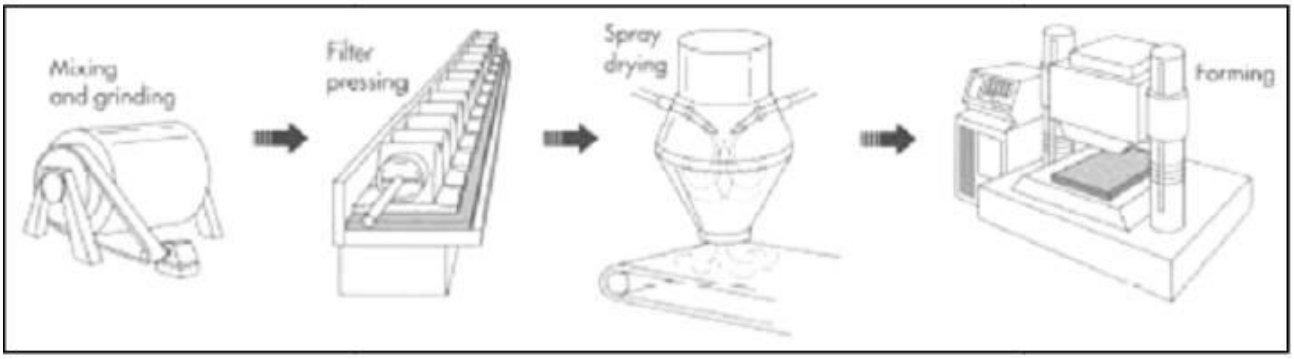
2.6.1 Raw Material

1) **Ball Clay:** Provides elasticity, bonding and improves the workability i.e. plastic molding properties and increase the fired strength.
2) **China Clay:** Imparts white color to the body and improves pressing characteristics
and to modify the body shrinkage.
3) **Quartz:** Improves thermal expansion properties. Confers strength and improves translucence and hence used for glaze preparation.

4) **Glaze Frit**: Provide uniform density single material that prevents layered sedimentation.
5) **Zircon:** Used in glaze preparation as an opacifier to control texture and provide resistance and color satiability.
6) **Wollastonite:** Used in preparation of the tile bodies help in reducing cracks and warp age.
7) **Pitchers:** Aid the pressing characteristics in preparation ofthe body material
8) **Pigments:** Impart color of the body.

The raw materials used to form tile consist of clayminerals mined from the earth's crust, natural minerals such as feldspar that are used to lower the firing temperature, and chemical additives required for the shaping process. The minerals are often beneficiated near the mine before shipment to the ceramic plant.

The raw materials must be pulverized and classifiedaccording to particle size. Primary crushers are used to reduce large lumps of material. Either a jaw crusher or gyratory crusher is used, which operate using a horizontal squeezing motion between steel plates or rotating motion between steel cones, respectively.



Secondary crushing reduces smaller lumps to particles. Hammer or muller mills are often used. A muller mill uses steel wheels in a shallow rotating pan, while a hummer mill uses rapidly moving steel hammers to crush the material.Roller or cone can be used.

Screens are used to separate out particles in a specific size range. They operate in a sloped position and are vibrated mechanically or electromechanically to improve material flow. Screens are classified according to mesh number, which is the number of openings per lineal inch of screen surface. The higher the mesh number, the smaller the opening size.

A glaze is a glass material designed to melt onto the surface of the tile during firing, and which then adheres to the tile surface during cooling. Glazes are used to provide moisture resistance and decoration, as they can be colored or can produce special textures.

2.6.2 Manufacturing Process

Once the raw materials are processed, a number of steps take place to obtain the finished product. product. These steps include batching, mixing and grinding, spray- drying, forming, drying, glazing, and firing. Many of these steps are now accomplished using automated equipment.

1. Batching

For many ceramic products, including tile, the body composition is determined by the amount and type of raw materials. The raw materialsalso determine the color of the tile body, which can be red or white in color, dependingon 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 chemicalcompositions of the raw materials. Once the appropriate weight of each raw material isdetermined, the raw materials must be mixed together.

2. Mixing and grinding

Once the ingredients are weighed, they are 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 plows. This step further grinds the ingredients, resulting in a finer particle size that improves the subsequent forming process (see step #4 below).

Sometimes it is necessary to add water to improve the mixing of a multiple-ingredient batch as well as to achieve fine grinding. This process is called wet milling and is often performed using a ball mill. The resulting water-filled mixture is called a slurry or slip. The water is then removed from the slurry by filter pressing (which removes 40-50 percent of the moisture), followed by dry milling.

3. Spray drying

If wet milling is first used, the excess water is usually removed via spray drying. This involves pumping the slurry to an atomizer consisting of a rapidly rotating disk or nozzle. Droplets of the slip are dried as they are heated by a rising hot air column, forming small, free flowing granules that result in a powder suitable for forming. Tile bodies can also be prepared by dry grinding followed by granulation. Granulation uses a machine in which the mixture of previously dry-ground material is mixed with water in order to form the particles into granules,which again form a powder ready for
forming.

4. Forming

Most tiles is 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 is compressed in a steel cavity by steel plungers and is then ejected

by the bottom plunger. Automated presses are used with operating pressures as high as 2,500 tons.

Several other methods are also used where the tile body is in a wetter, more moldable form. Extrusion plus punching is used to produce irregularly shaped tile and thinner tile faster and more economically. This involves compacting a plastic mass in a high-pressure cylinder and forcing the material to flow out of the cylinder into short slugs. These slugs are then punched into one or more tiles using hydraulic or pneumatic punching presses.

Ram pressing is often used for heavily profiled tiles. With this method, extruded slugs of the tile body are pressed between two halves of a hard or porous mold mounted in a hydraulic press. The formed part is removed by first applying vacuum to the top half of the mold to free the part from the bottom half, followed by forcing air through the top half to free the top part. Excess material must be removed from the part and additional finishing may be needed.

Another process, called pressure glazing, has recently been developed. This process combines glazing and shaping simultaneously by pressing the glaze (in spray-dried powder form) directly in the die filled with the tile body powder. Advantages include the elimination of glazing lines, as well as the glazing waste material that is produced with the conventional method.

5. Drying

Ceramic tile usually must be dried (at high relative humidity) after forming, especially if a wet method is used. Drying, which can take several days, removes the water at a slow enough rate to prevent shrinkage cracks. Continuous or tunnel driers are 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. Another method, impulse drying, uses pulses of hot air flowing in the transverse direction instead of continuously in the material flow direction.

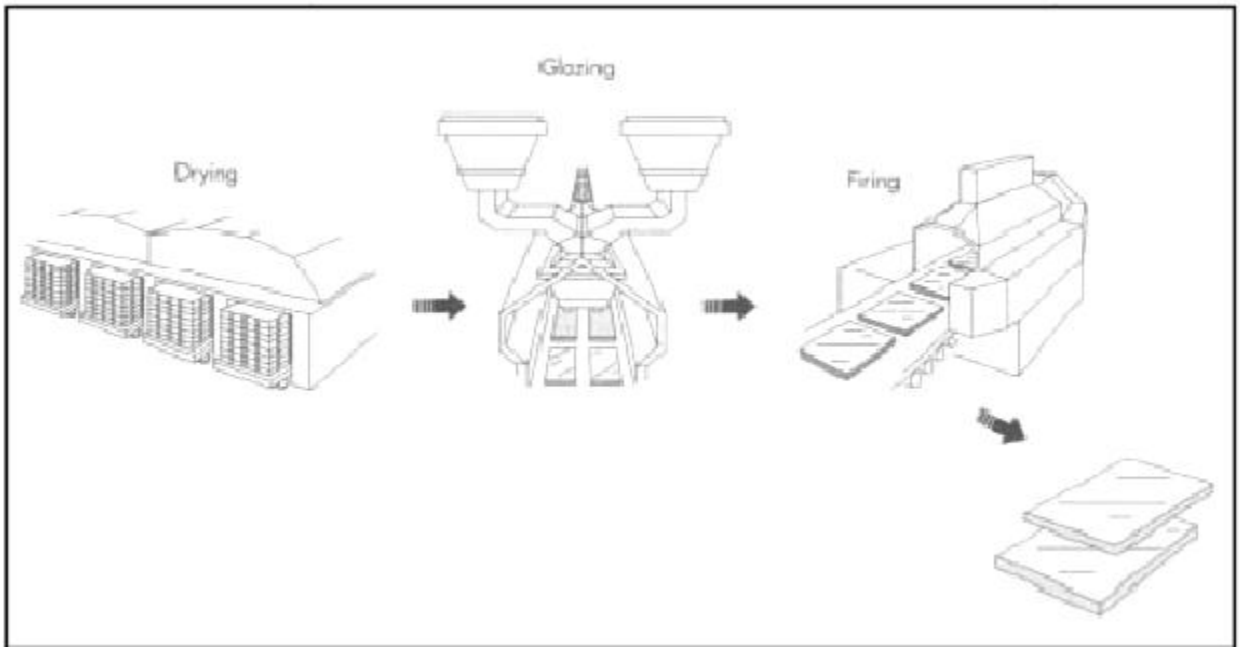
6. Glazing

To prepare the glaze, similar methods are used as for the tile body. After a batch formulation is calculated, the raw materials are weighed, mixed and dry or wet milled. The milled glazes are then applied using one of the many methods available. In centrifugal glazing or discing, the glaze is 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 is simply sprayed on. For multiple glaze applications, screen printing on, under, or between tile that have been wet glazed is used. In this process, glaze is forced through a screen by a rubber squeegee or other device.

Dry glazing is also being used. This involves the application of powders, crushed frits (glass materials), and granulated glazes onto a wet-glazed tile surface. After firing, the glaze particles melt into each other toproduce a surface like granite.

7. Firing

After glazing, the tile must be heated intensely to strengthen it and give it the desired porosity. Two types of ovens, or kilns, are used for firing tile. Wall tile or tile that is prepared by dry grinding instead of wet milling (see #2 and #3 above), usually requires a two-step process. In this process, the tile goes through a low-temperature firing called bisque firing before glazing. This step removes thevolatiles from the material and most or all of the shrinkage. The body and glaze are then fired together in a process called glost firing. Both firing processes take place in a tunnel or continuous kiln, which consists 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 saggers. Firing in a tunnel kiln can take two to three days, with firing temperatures around 2,372 degrees Fahrenheit (1,300degrees Celsius).



For tile that only requires a single firing usually tile that is prepared by wet milling - roller kilns are generally used. These kilns move the wares on a roller conveyor and do not require kiln furniture such as batts or saggers. Firing times in roller kilns can be as low as 60 minutes, with firing temperatures around 2,102 degrees Fahrenheit (1,150 degrees Celsius) or more. After firing and testing, the tile is ready to be packaged and shipped.

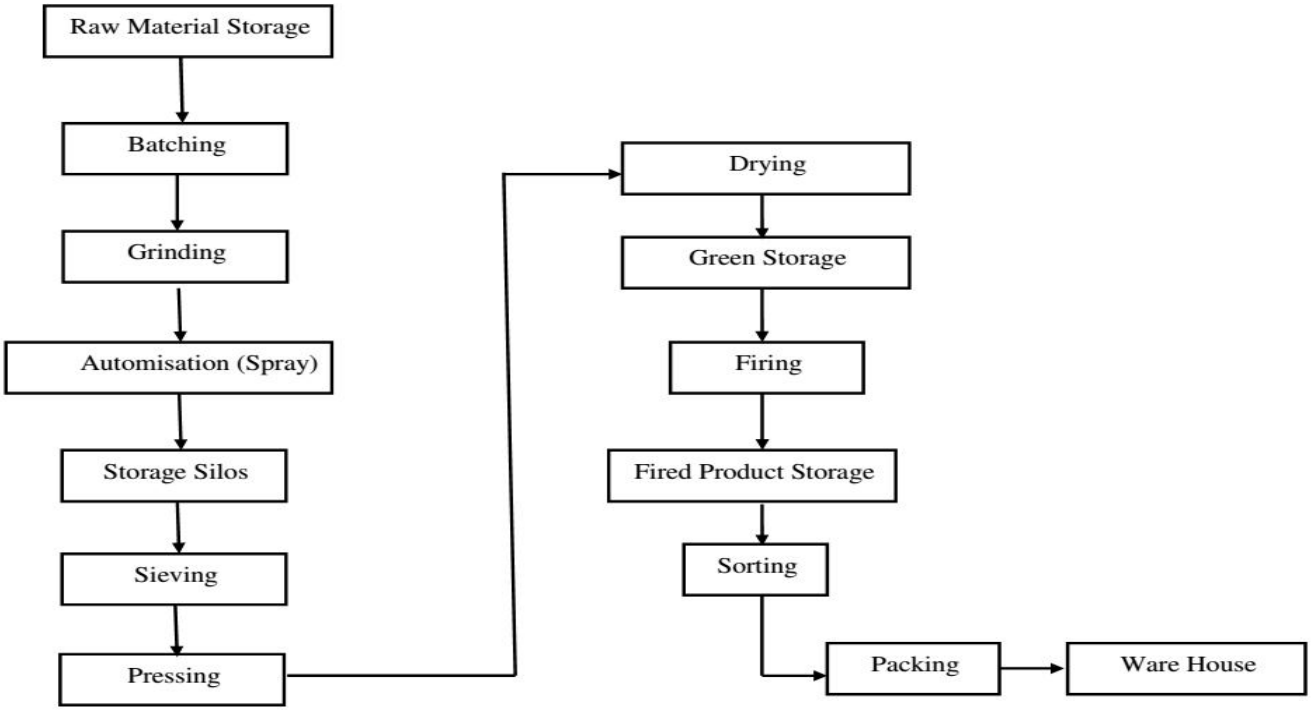


FIGURE 3 –STAGES IN THE MANUFACTURING OF CERAMIC GALAZED TILE

2.7 UTILITIES REQUIRED

2.7.1 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 .

2.7.2 Water Requirement

NamWater will be responsible for supplying water .The water supply will be met through ground water supply after obtaining necessary permission from NamWater for bstraction of ground water.

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

2.7.3 Man Power

Approximately 150 no. of worker will be employed by the development excluding those who will be temporarily employed by contractors during development phase.

2.5 SIZE AND THE MAGNITUDE OF THE PROJECT

The development has total plot area of 80.27 hectare. The total number hectare of the factories is about 2 hectares. However, the project shall to provide services such as approach road, power lines, street lights and water for drinking purpose provided by Karibib Local Authority.

3. DESCRIPTION OF ENVIRONMENT


3.1 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.

However, 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 aragonitemarble quarries and the Navachab Gold Mine.

3.2 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

finalised 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 Omaruru. 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.

3.3 HISTORIC BUILDINGS

One of Karibib's oldest buildings is the Roesemannhaus (*Roesemann's house*), erected 1900 shortly after the town was founded. Other historic structures are the Wollhaus (*Wool house*), erected in 1900 from local marble, the Railway station building (1901), the Kaiserbrunnen (*Emperor fountain*, 1906-1908), and the Christ Church (1910).

3.4 ECONOMY AND INFRASTRUCTURE

The Navachab Gold Mine owned by QKR Namibia is located 10 km from Karibib town. Them ine is the major employer of the town. In 2008, proposals surfaced for a new cement works.

3.5 TRANSPORT

Karibib is connected to the TransNamib railway network; Karibib Railway Station is situated downtown. The next 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 an 2,600 metres (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.

3.6 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.

3.7 EDUCATION

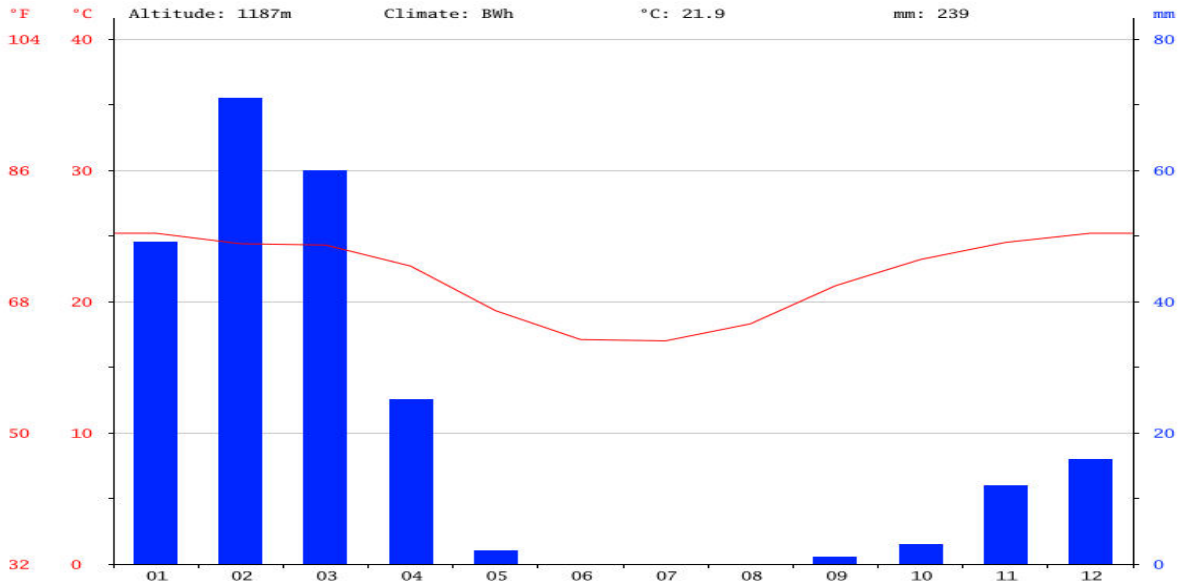
Schooling in Karibib started as a private missionary enterprise in 1902. From 1907 the Deutsche Schule Karibib (German: *German School Karibib*, also: Privatschule Karibib) operated in town, first as a government school of Imperial Germany, and after World War I as private school supported by German 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.

3.8 CLIMATE

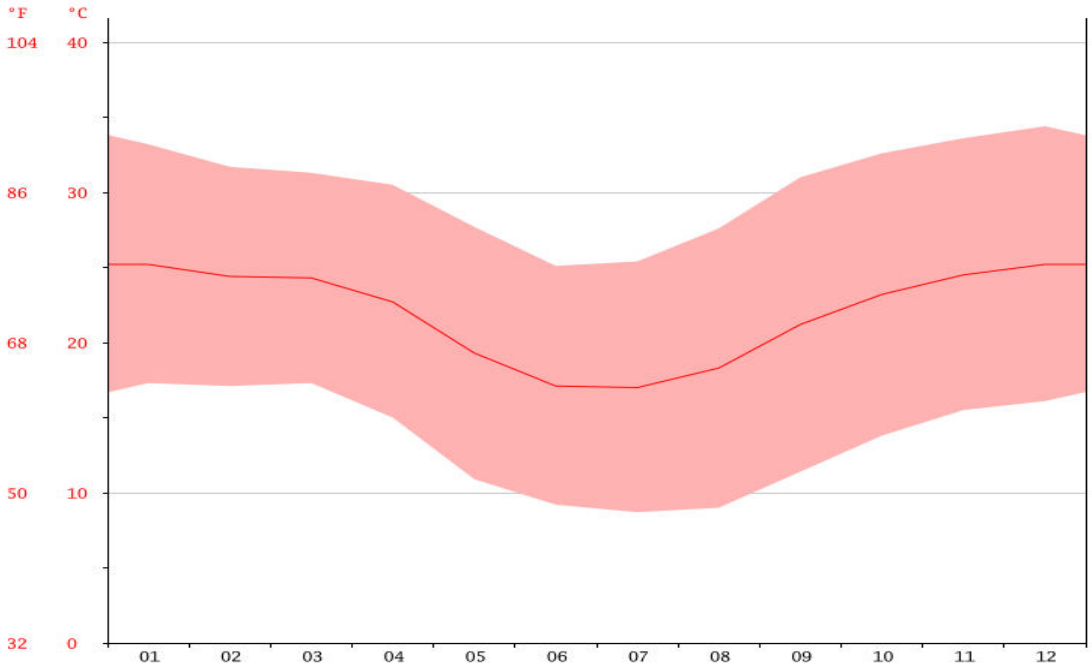
Karibib's climate is a desert one. There is virtually no rainfall during the year in Karibib. According to Köppen and Geiger, this climate is classified as BWh. The average annual temperature is 21.9 °C in Karibib. About 239 mm of precipitation falls annually.

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.

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.

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
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.

4. PUBLIC CONSULTATION / PARTICIPATION

4.1 INTRODUCTION

The role of stakeholder engagement in this development was greatly explored by the consultant. 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. Each situation requires thorough design and planning specifically tailored to the objectives sought for the relevant stage of a project or program. Depending on the unique situation and context, a range of different stakeholder engagement and public participation methods were employed.

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"

Stakeholder engagement broadly refers to a framework of policies, principles, and techniques which ensure that citizens and communities, individuals, groups, and organizations have the opportunity to be engaged in a meaningful way in the process of decision-making that will affect them, or in which they have an interest.

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.

As such, Namland Consultants adheres to the International Association for Public Participation **five elements**, which it used for this project in increasing order of public influence (IAP2, 2007):

TABLE 5 – FIVE ELEMENTS OF PUBLIC PARTICIPATION

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.

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:

TABLE 6 – CATEGORIES OF CONSULTED I&APS

CATEGORY	INSTITUTION
– **State Owned Enterprises (SOEs) / Departments or Line Ministries**	Ministry of Environment & Tourism (MET); Ministry of Mines and Energy; Erongo Regional Council; Roads Authority; NamWater; TransNamib; NamPol; Ministry of Youths; Ministry of Works;
– **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; SMEs;
– **Local Community**	Local Councillors; Youths Leaders; Church leaders;

Representatives	
– **Members of the General Public / Community**	Karibib Residents Association

4.2 STEPS AND METHODS USED BY THE CONSULTANT FOR PUBLIC PARTICIPATION

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

TABLE 7 – STAKEHOLDER ENGAGEMENT OR PUBLIC PARTICIPATION PROCESS STEPS

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

4.3 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 Consultant advertised using the targeted approach by using both the locally and nationally read and accepted Newspapers to reach out to I & APs

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.

TABLE 8 – ISSUED RAISED BY IAPS

THEME	NEGATIVE ISSUES RAISED BY IAPS	POSITIVE ISSUES
– **Economic**	– n/a	– n/a
– **Social**	– Illicit sexual Activities – Drug and Alcohol Abuse – Muggings at night – 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 – Urination – Graffiti – Open Defecation – Disposal of dog wastes by residents – Strong Urination Stench – Flies causing diseases (defecation) – Burning of tyres (air pollution) – Noise – Dumping of used condoms, beer bottles, cigarettes, etc – Illegal dumping site	– Aesthetic

5. IMPACT ASSESSMENT

5.1 APPROACH AND METHODOLOGY EMPLOYED FOR ASSESSMENT

5.1.1 The EIA Process

Environmental Impact Assessment (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.

5.2 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.

5.2.1 Initial Site Visit and Project Initiation

As part of the project initiation, Namland carried out an initial site reconnaissance visit in July 2018. The purpose of the site visit was to familiarise the project team with the project proposal and affected project area and to begin the environmental and social screening and scoping process. Three more site visits were carried out by Namland.

TABLE 9 – PUBLIC PARTICIPATION TASKS

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

5.3 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.

5.4 INTEGRATION AND ASSESSMENT PHASE

The final phase of the EIA is the Integration and Assessment Phase. The assessment of impacts proceeds through an iterative 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. Relevant technical studies are included as appendices to this ESIA.

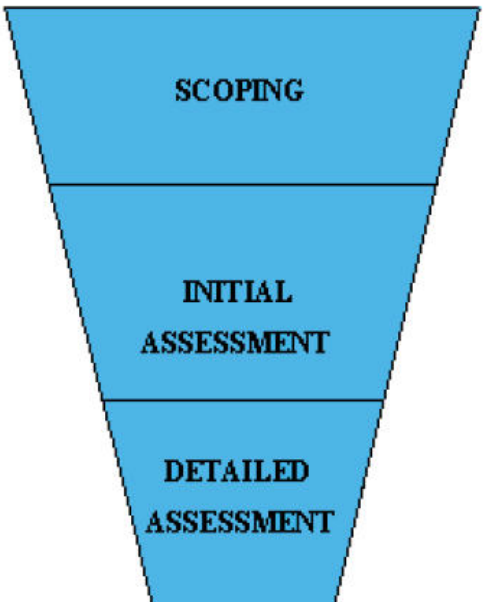
The ESIA was made available to I&APs for a public comment period and registered and identified I&APs were notified of the release of the EIA and where the report can be reviewed.

Comments received on the 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.

5.5 IMPACT ASSESSMENT METHODOLOGY

5.5.1 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.



- **SCOPING:** Interactions between project activities and environmental and social receptors are identified for further assessment. Areas where interactions are not expected to occur are 'scoped out' of the assessment.
- **INITIAL ASSESSMENT:** Potential interactions are further evaluated against site-specific conditions using information gathered through baseline studies.
- Interactions are 'screened out' if the potential for impact does not exist or is negligible.
- **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.

FIGURE 4 – IMPACT IDENTIFICATION AND ASSESSMENT PROCESS

5.5.2 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.

TABLE 10 – IMPACT TYPES AND DEFINITIONS

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 summarised.

TABLE 11 – SIGNIFICANCE CRITERIA

IMPACT MAGNITUDE	
Extent	**On-site** – impacts that are limited to the boundaries of the development site. **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 12 – 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 13 – SIGNIFICANCE COLOUR SCALE

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

TABLE 14 – 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.

5.6 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 MEFT.

A paleontological, archaeological and cultural heritage study was undertaken.

TABLE 15 – ARCHAEOLOGY, HERITAGE AND PALAEONTOLOGY

STUDY	DESCRIPTION
Palaeontology	A desktop paleontological study was undertaken for the identified site. The impact assessment phase involved the determination of the nature of likely impacts of the development and recommendations on mitigation.
Archaeology	A desktop study was carried out of publicly available scientific publications to determine the archaeological history of the affected project area. In

	addition, an archaeological field survey was undertaken of the affected project area. Archaeological materials and structures were inventoried, with approximate age and descriptions recorded as necessary. The impact assessment phase involved the determination of the nature of likely impacts of the development and recommendations on mitigation.
Heritage	Publications of the history of the affected project areas were investigated and informed the specialist study. A heritage field survey was undertaken in order to identify existing heritage structures in the affected project area. The impact assessment phase involved the determination of the nature of likely impacts of the development and recommendations on mitigation.

5.6.1 Landscape and Visual

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.

5.6.2 Agriculture

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

5.6.3 Socio-economic

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.

5.7 ASSUMPTIONS AND LIMITATIONS

Environmental Impact Assessment 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.

5.7.1 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 onto the main town plan.

5.7.2 Gaps in Project Description

Regarding the location of the site, the assessment is based on a refined layout / rezoning derived from revisions of earlier layouts, to accommodate environmental sensitivities. Although the final layout has been confirmed,

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.

5.7.3 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 school children who frequently use these corridors were on holidays, including beer hall patrons who had gone for holidays

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.

5.7.4 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 specialists have used 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**.** Impacts for which insufficient information is available are discussed at the end of this section.

TABLE 16 – POTENTIAL IMPACTS IDENTIFICATION AND SCREENING

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	Improbable	Yes	Low	Yes	**EMP**
Employment creation	The construction and manufacturing activities associated with the project is due to create local employment opportunities.	Local	Temporary	Medium	Definite	Yes	Low	Yes	**EMP**
Noise (construction phase)	Construction and manufacturing 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 manufacrturing processes can create dust.	Local	Temporary	Low	Improbable	Yes	Low	Yes	**EMP**
Traffic (Operational phase)	Increase in traffic in the area is expected due to construction and manufacturing activities	Local	Permanent	Medium	Definite	Yes	Low	Yes	**EMP**
Impact on existing properties	The proposed development is believed to impact on exiting property	Local	Long-term	Low	Probable	Yes	Low	Yes	**EMP**

	values in the area.								
Public open space encroachment	The proposed development may encroach in public areas	Local	Temporary	Low	Probable	Yes	Low	Yes	**EMP**

6. ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

6.1 ANALYSIS OF ALTERNATIVE SITE

Erf 8, Karibib Extension 6 is site specific project. Dreamland Investment CC established a tile manufactirng fctories in the Karibib District of 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:

- Raw material like Quartz, Silica sand, Soapstone, etc needed for the Ceramic Industry.
- Karibib District is producer of all the raw materials required for Ceramic Industry.
- Sixty two percent of the Feldspar is found in karibib District of Namibia.
- Karibib Regio also boasts of Glass Grade Feldspar, making areas suitable for Ceramic Industries.
- Absence of ceramic complex or ffactoriy/ies in area

6.2 ANALYSIS OF ALTERNATIVE FOR TECHNOLOGY

No alternative technology has been considred in this regards.

7. ENVIRONMENTAL MONITORING PROGRAM

7.1 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 Mnagament 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,

7.2 ENVIRONMENTAL MONITORING AND REPORTING PROCEDURE

Monitoring shall confirm that commitments are beingmet. 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.

7.3 MONITORING METHODOLOGIES AND PARAMETERS

TABLE 17 – 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	PMs10	As per Environmrntal 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 to the extent possibl	Vehicle logs	Daily records	Main Gate
2	**Noise**	Noise generated from plant perations, vehicular to be optimized and monitored	Spot Noise Level recording; Leq(night), Leq(day), Leq(dn)	As per EC 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	-
4		Take care in disposal of wastewater generated such that soil and groundwater resources are protected	Discharge norms for effluents will be aintained	Periodic during operation phas	
5		Compliance of treated wastewater usage/ discharge to standards		Periodic during operation phase	One location (Treated Wastewater)

S.No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring	Location
6	Drainage and effluent Management	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	-
7	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	-
8	Emergency preparedness, such as fire fighting	Fire protection and safety measures to take care of fire and explosion hazards, to be assessed and steps taken for their prevention	Mock drill records, on site emergency plan, evacuation plan	Periodic during operation phase	-
9	Maintenance of flora and fauna	Vegetation, greenbelt / green cover development	No. of plants, species	Periodic during operation phase	-
10	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	
11	Health	Employees and migrant labour	All relevant		

S.No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring	Location
		health check ups	parameters including HIV parameters including HIV • 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		

7.4 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.

TABLE 18 – 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

7.5 LOCATIONS 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.

7.6 REPORTING SCHEDULE DURING OPERATION

After completion of analysis, copies of all the analysis reports will be sent to Comptent 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.

8. PROJECT BENEFITS

8.1 GENERAL

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

8.2 PHYSICAL BENEFITS

The opening of the proposed project will enhance the following physical infrastructure facilities in the adjoining areas:

a) **Road Transport:** There will be improved road communication due to the proposed project and maintenance will also be done time to time.
b) **Market:**Generating useful economic resource for construction.
c) **Infrastructure:** Creation of community assets (infrastructure) likeprovision 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.
d) **Enhancement of Green Cover:** Plantation will be carried along the road sides or near the civic amenities.
e) **Green Belt Development:** A suitable combination of trees that can grow fast and also have good leaf cover will be adopted to develop the green belt.
f) **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.

8.3 IMPROVEMENT IN SOCIAL INFRASTRUCTURE

The project will create employment. It has been observed that conditions of the surrounding area around industrial estate are better than that of distant villages. The ceramic industry 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 salient features for the improvement of social infrastructure are as follows:

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

8.4 CORPORATE SOCIAL RESPONSIBILITY

Dreamland Investment CC proposed to develop infrastructure and employ local people for such jobswhere locals skills are readily available towards Corporate Social Responsibility.

9. ENVIRONMENTALMANAGEMENT PLAN

9.1 BRIEF INTRODUCTION

Environmental Management Plan, (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 listing of the the 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.

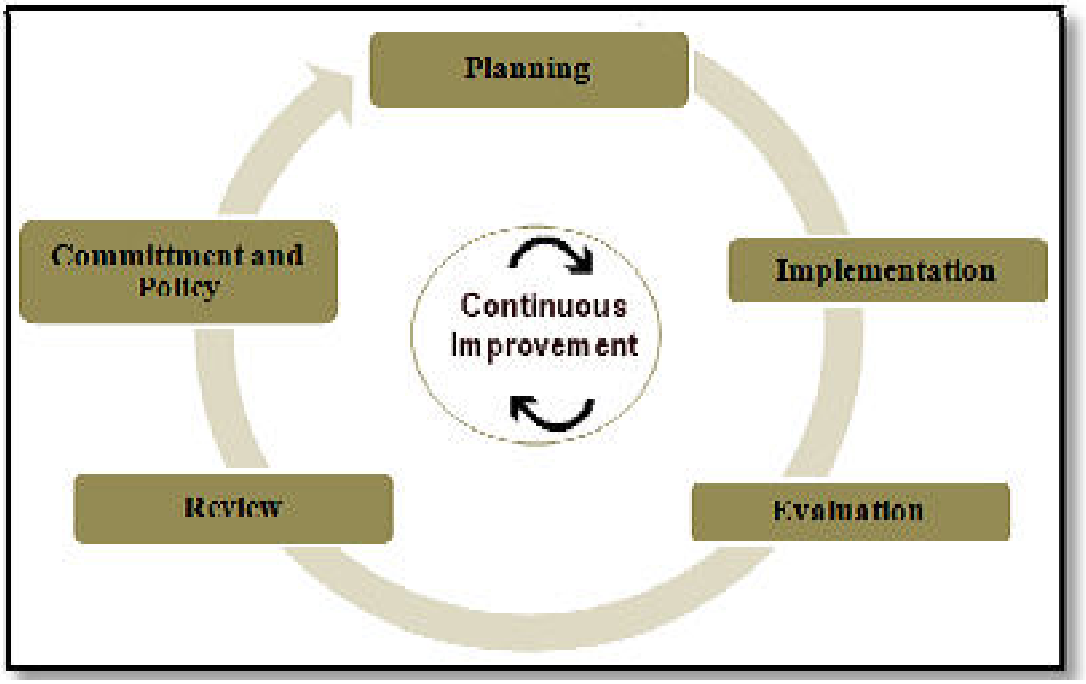


FIGURE 5 – FLOW CHART OF EMP

TABLE 19 – ENVIRONMENT MANAGEMENT PLAN

S. No.	Activity	Area of Environmental impacts	Management action to be taken for mitigation of the possible impact
I. Operation of Plant Facilities for manufacture of Ceramic tiles			
	Production of glazed ceramic tiles	**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 Manufacturing & handling of the materials (tiles)
			Use vapor recovery systems to prevent the release of toxic gases into air (fluorides) wherever it is required.
			The various operating parameters should be monitored. Monitoring parameters should be analyzed 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 of tiles. All the waste tiles to be recycled back or to be sold as off grade material in the Market.
			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

S. No.	Activity	Area of Environmental impacts	Management action to be taken for mitigation of the possible impact
			segregation should be adopted.
			The broken tiles to be segregated properly and sent for recycling. If the tiles cannot be recycled then they should be properly stored and used for land filling making of roads etc. after crushing them properly
			All the hazardous waste from ceramic units like used lubricating oil, scrapped lead acid storage batteries etc. should be segregated and sold to authorized recyclers.
II. Operation of Utilities			
Operation of Furnace for firing (Heating) of tiles	Operation of Furnace for firing (Heating) of tile	**Air, Water Noise, and solid waste**	Ensure proper maintenance of air blower and other machinery to reduce noise
			Ensure proper preventive maintenance of fuel firing system, and optimization of air fuel ratio. This will increase the efficiency of furnace and minimize air pollution and save the fuel .
			The emissions of fluorine should be controlled by scrubbers (spraying water) or by specially designed bag filters coated with lime .
			Ensure that lead emissions from firing process are minimized by use of low lead containing glaze material
3	DG Set (only in case of power failure and other	**Noise, Land, Air & Health**	Ensure disposal of spent oil through registered recyclers and maintain records of the same.
			Ensure operator uses PPE (especially ear plug or ear muff) when he is working near to DG set

S. No.	Activity	Area of Environmental impacts	Management action to be taken for mitigation of the possible impact
	emergencies)		Periodic health check of the persons working on the DG set to be done (for hearing impairment)
			Monitor the DG set stack periodically to ensure that the emissions are within the limit
III. Operation of Environmental facilities			
	Effluent Treatment Plant	**Water and Land**	Recycle waste water produced during produced during milling, glazing, and spray-drying. Ensure disposal of contaminated waste water by Treatment.
			Ensure that waste water 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**	The Industrial solid waste generated from various operations to be stored properly within the premises and disposed off suitably
	Storage of all the raw materials, products.	**Air, Water, Land and Health**	Ensure disposal of used liners -bags, drums for sale/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 PPE's to truck drivers during transportation
	Transportation of all the raw materials,	**Air, Water and Land**	Ensure training of the drivers in handling the hazardous chemicals.

S. No.	Activity	Area of Environmental impacts	Management action to be taken for mitigation of the possible impact
	finished products & hazardous wastes		

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9.2 ENVIRONMENTAL MONITORING PLAN

TABLE 20 – ENVIRONMENT MONITORING PLAN

No.:	Activity	Schedule
Air Pollution Monitoring		
1.	Stack monitoring of flue stacks sets as given in air consent from time to time (DG set furnace and dryer stack)	Once every Quarter
2.	Ambient air 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
Water Pollution Monitoring		
4.	Monitoring of wastewater inlet 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		
5.	Records of generation of solid waste from grinding, milling and firing operations of the tiles	Daily
6.	Records of generation of used drums, bags and records of waste used oil (This includes the record of used batteries and its recycling)	Daily
7.	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		
8.	Environmental statement under the EMA (Act) 2007 if required	Once in a year
9.	Environmental audit as per the pollution control under EMA Act / as required by the consent	Twice per year

10. SUMMARY & CONCLUSION

10.1 INTRODUCTION

Dreamland Investment CC has established an exclusive tile manufacturing factories in Karibib. The land has been allotted to Dreamland Investment CC by Karibib Town Council.

Considering the magnitude of the project, the project may be appraised under the Environmrntal Management Act 7 of 2007 and its related Regulations.

10.2 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. The base line data has been collected between July and September 2018.

10.3 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The summary of anticipated adverse environmental impacts due to the proposed project and mitigation measures are given below.

10.3.1 Air Environment

The main sources of emission during the construction period are the movement of equipment at site and dust emitted during the leveling, 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 levelsof NOx, PM and CO.

During operational phase, the specific emission quantification could not be possible as the type of ceramics / tiles to be manufactured is still unknown. During operation phase all factories will use best available technology to abate the environmental pollution.

- Through 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, dryfinishing 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. Similarly, the clay grinding process should be isolated from the rest of the departments as it is the main source of dust.
- Cleaning of dry wares should be carried out by vacuum process. Manual cleaning of the floor benches and equipments be carried out either beforethe 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.
- The utilisation of sintered lamellar filters permits the separation of wet dust arising, for example, in spray glazing. This filter system makes a direct feeding back of glazing particles possible, separated from the off-gas of the spraying cabin.
- An upstream quiescent zone guarantees that the dustin 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 processesif 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 ceramic 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.
- The use of raw materials and additives, which have low contents of pollutant precursors, can, in principle, be applied to all sectors of the ceramic industry.
- however their single case related availability and possible product quality problems (e.g. regarding colour compressive strength and frost resistance) always have to be taken into consideration and careful testing of the raw material mixtures always has to be carried out.
- Zinc and zirconium compounds which are less toxic be substituted to lead compounds, in glaze preparation.
- 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 safety wares such as gloves, gumboots, heat protective clothes and respirators. Workers be advised to take ample waterto 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.

10.3.2 Water Environment

During the construction phase site preparation (leveling, 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 waste water 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 plantfor 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.

10.3.3 Noise Environment

- During the 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 ceramic production processes, e.g. when splitting cleaving tiles 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.

10.3.4 Socio-Economic Environment

The requirement of unskilled manpower will be met from nearby villages 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 for the region. There will be a general upliftment of standard of living in Erongo region.

10.3.5 Solid Waste

There will be generation of solid as well as liquidwaste during the operational phase of the project which will be responsibly managed byrespective industry only. 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 0.15 kg/worker/day, which is proposed to be sent and disposed off at the municipal site. The Industrial process may also lead to generation of hazardous waste as defined under EMA Act (7 of 2007) and its Regulations.

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

10.4 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 this individual authorities will taken 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.

10.5 PROJECT BENEFITS

Physical Benefits

a) **Road Transport:** There will be improved road communication due to the proposed project and maintenance will also be done time to time.
b) **Market:** Generating useful economic resource for construction.
c) **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.
d) **Enhancement of Green Cover:** As a part of reclamation plan, plantation will be carried along the road sides or near the civic amenities.
e) **Green Belt Development:** A suitable combination of trees that can grow fast and also have good leaf cover will be adopted to develop the green belt.
f) **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.

Social Benefits

a) Social welfare programme like provision of medical facilities educational facilities, water supply for the employees as well as for nearby area will be taken.
b) A well laid plan for employment of the local peoplehas been prepared by giving priority to local people.
c) Supplementing Govt. efforts in health monitoring camps, social welfare and various awareness programs among the rural population.
d) Assisting social forestry programme.
e) Adoption of villages for general development.
f) Supply of water to village nearby villages.
g) Development of facilities within villages like roads, etc

10.6 ENVIRONMENT MANAGEMENT PLAN DURING OPERATION PHASE

Environmental Management Plan, EMP, consists of specific site measures and good generic practices. Implementation of which is based on the environmental impacts associated with the proposed activities and mitigating potential.

The EMP provides a delivery mechanism to address potential adverse impacts and to introduce standards of good practice to be 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 in the EIA.

10.8 CONCLUSIONS

As it is predicted that socio-economic impact due to this project will positively increased the employment opportunities for local inhabitants. There are no resettlement and rehabilitation issues involved in this project. The project infrastructures are used the by people of the area. The document found it practical and efficient towards the improvement of environmental sustainability. The contribution to the revenue of the proposed development will be put in public welfare and augment growth. The the project is not affect the environment or adjacent ecosystem adversely. The Proponet adhered to the EMP and EIA report and and to the existing guidelines stipulated in the Environmental Clearance Cerficated, therefor the Environmental Practincioner are recommending the Renewal of the Clearance certificate for operation of the Factory

11. REFERENCES

1) Brown, M., Wyckoff-Baird, B. (1992). 'Designing integrated conservation and development projects'. Biodiversity Support Program, Washington D.C.
2) Checkoway, B. (1981). 'The politics of public hearings'. Journal of Applied Behavioural Science.
3) Gippel, C. (2010). 'Environmental Flow Assessment Framework and Methods, Including Environmental Asset Identification and Water Re-allocation'. ACEDP - River Health and Environmental Flow in China Technical Report No.2. International Water Centre, Brisbane.
4) GRN. (2014). 2011 Housing and Population Census Regional Profile, Erongo Region. Windhoek: Namibia Statistics Agency.
5) GRN: Ministry of Environment and Tourism, (2012). Environmental Impact Assessment Regulations, GG 4878, GN 29, Windhoek: MET.
6) GRN: Namibia Statistics Agency, (2012). Population and Housing Census Main Report, Windhoek: NSA.
7) Hilliker, M. and Kluz, M. (2001). Developing a Public Participation Plan. Originally adapted from materials developed by the UW-Extension Citizen Participation Team.
8) Krick, T., Forstater, M., Monaghan, P., and Sillanpää, M. (2005). The stakeholder engagement manual volume 2: The practitioner's handbook on stakeholder engagement. The United Nations Environment Programme, and Stakeholder Research Associates, October 2005.
9) Lynn, F. M., and Busenberg, G.J. (1995). *'Citizen advisory committees and environmental-policy: What we know, what's left to discover'*. Risk Analysis. Vol.15 (2),
10) Middendorf, G., and L. Busch. (1997). *'Inquiry for the public good: Democratic participation in agricultural research'*. Agriculture and Human Values. Vol. 14,
11) Smith, L.G. (1983). Impact Assessment and Sustainable Resource Management. Longman, Harlow, UK.
12) Stalker Prokoby, L. (2005). *'The relationship between participation and project outcomes: Evidence from rural water supply projects in India'.* World Development. Vol. 33(11),

13) Namibia Statistics Agency, 2016
14) World Bank Report, 2015; 2016
15) Namibia Chamber of Comemrce and Indusries (NCCI), 2016 Report