



APP-000757

**Environmental Impact Assessment for Brick Manufacturing Project At
Omakuku Village in Tsandi Constituency, Omusati Region**



Photo: For illustration purposes

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PROJECT CONSULTANT	Mr. Ipeinge Mundjulu
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ACRONYMS

DEA	Department of Environmental Affairs
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EMA	Environmental Management Act (No. 7 of 2007)
EMP	Environmental Management Plan
MEFT	Ministry of Environment Forestry and Tourism
NAMWATER	Namibian Water Corporation
OTA	Ongandjera Traditional Authority
PPE	Personal Protective Equipment
RDC	Red-Dune Consulting CC
SEMP	Social Environmental Management Plan
TC	Town Council

Executive Summary

Bricks are essential for property development. Unlike conventional bricks, modern bricks are manufactured under various compression ratio to achieve strengths required to build modern buildings. There are no modern brick manufacturing plants in areas of Tsandi and Okahao Towns. The existing bricks manufactures do not produce “super bricks” that meet the standard to build modern buildings or be used to pave roads.

The proposed brick manufacturing therefore bridges the gap of producing and supplying modern brick, often called “super bricks” and other products such as pavers to the nearby towns and to property developers. Besides the products, the plants is expected to contribute to socio economics through employment creation and generation of government revenues through taxes.

Generation of noise and dust are the main impacts by brick making process and maybe health hazard to human at high exposure. The assessment of these two critical impacts identified practical mitigation measures which brings these impacts to insignificant levels as follows;

Noise	Dust
<ul style="list-style-type: none">• Vibrating table must be fitted with rubber material to ensure sound absorption• Vibrator Motor must be well maintained• Where metal are likely to collide, fit rubber material to avoid squeak noise• Proper maintenance and avoid friction against the floor• Pellets must be removed manually, so that there is no possible collision of pellets• If automated, pellets edges must be fitted with an impact absorbing material such as rubber.	<ul style="list-style-type: none">• Trucks transporting dust must be covered during transportation• Use dust suppression measures such as water spraying to mitigate dust impacts.• The end of the conveyor belt must be fitted with a funnel to ensure sand is directed to the pile and avoid being brown away• Adhere to the Labour act, non-toxic human dust exposure levels may not

Noise	Dust
<ul style="list-style-type: none"> • If possible, only use forklift to pack bricks in the yard • Switch off vehicles and machinery when not in use • The crusher plant needs proper sound absorption designs to limit the noise from escaping • Long term solution should be to enclose the crusher within a building with sound absorption quality • Proper maintenance, to avoid squeak sounds etc. 	<p>exceed 5mg/m³ for respiratory dust and 15mg/m³ for total dust.</p> <ul style="list-style-type: none"> • Avoid working during extreme windy times • Avoid unnecessary movement of vehicles on site • Provide employees with personal protective equipment such as dust mask, protective glass wear etc. • It is inevitable that noise level shall exceed the required maximum amounts, hence workers must have sufficient breaks and proper ear muffs to hearing conservation.

In addition to the above mitigation measures, it is recommended for the proponent to construct a boundary wall around the project to limit dust escape and noise blockage as well to prevent animal accessing the site.

The assessment concluded that, with adequate implementation of the SEMP, the objective of sustainable environmental management shall be met.

1. Introduction and Background

1.1. Introduction

Mr. Gandja Ayihe Ndeshipanda Iyambo is Namibia Citizen, a resident of Okahao-Tsandi area in Omusati Region. Mr. Iyambo has interest in Brick Manufacturing and has been allocated a land parcel of communal land by Ongandjera Traditional Authority at Omakuku Village, Tsandi Constituency, Omusati Region for purpose of establishing a brick manufacturing project.

2. Regulatory Requirements

2.1. Communal Land Reform Amendment Act 13 of 2013

Section 31 (1) of the Communal Land Reform Amendment Act 20913 (Act No. 13 of 2013) obliges Mr. Iyambo to apply for the leasehold to the land board because of his indented activities is business and not customary right.

Section 30 (2) of the Communal Land Reform Amendment Act 20913 (Act No. 13 of 2013) requires consent from the Traditional Authority for the Minister to grant and Gazette the leasehold. This consent was granted to Mr. Iyambo (Annex 1). The Traditional Authority undertook consultation with the Omakuku village (Annex 2) of which the village leadership and residents did not oppose the project and granting of the land parcel to Mr. Gandja Iyambo.

2.2. The Environmental Management Act (Act No 7 of 2007)

Section 27(2) of the Environmental Management Act (Act No 7 of 2007) read together with annexure of the Environmental Impact Assessment (EIA) regulation, has listed activities that cannot be undertaken without an Environmental Clearance Certificate (ECC).

Under annexure 10.1 of the EIA regulation, construction and operation of a Brick manufacturing is NOT a listed activity. However, the primary inputs of production such as

sand, aggregates / stone or rock dust from quarries are acquired through listed activities that may not be undertaken without an ECC. Mr. Iyambo will NOT be involved in sand mining and quarrying of aggregates. Sand will be obtained from Ongandjera Traditional Authority, while aggregated and rock dust will be obtained from various suppliers in the region.

Although this application is done for purposes of obtaining a leasehold to the land parcel granted to Mr. Iyambo, all other potential environmental threats such as land degradation by the movement of heavy trucks to and from site, noise and dust pollution, occupation health and safety will be addressed when developing the Socio-Environmental Management Plan for the project.

3. The Need and Desirability of the Project

Bricks are essential for property development. Traditionally northern property were developed using hand moulds to manufactures bricks, the compression of handmade bricks is relatively of poor quality resulting in short life span of properties. The building of houses, businesses and other structure in town requires mechanical compressed bricks referred to as “Super bricks” which the project aim to produce.

The project is further expected to create permanent and temporal employment opportunities, where in Namibia every employment opportunity is needed to high unemployment. Local youth, women and people living with disability will be given first preferential. The project is further in line with developmental goals of Namibian, which promotes manufacturing for the country to attain its industrialization goals.

3.1. Terms of Reference

The Terms of Reference (TORs) for this Environmental Impact Assessment (EIA) is in accordance with framework of EMA and its (EIA) Regulation 9(a-d). It also considers other relevant local, national, and international laws. These guidelines are aimed to focus on issues of greater environmental concerns and to develop mitigation measures for effective

environmental management. Eventually, this EIA is aimed at obtaining the ECC for the project and to ensure environmental sustainability. The TORs of this project include;

- a description of all tasks to be undertaken as part of the assessment process, including any specialist to be included if needed;
- an indication of the stages at which the Environmental Commissioner is to be consulted;
- a description of the proposed method of assessing the environmental issues and alternatives; and
- the nature and extent of the public consultation processes to be conducted during the assessment process.
- identify relevant legislation and guidelines for the project;
- identify potential environmental (physical, biological and social) conditions of the project location and conduct risk assessment;
- Inform Interested and Affected Parties (I&APs) and relevant authorities about the proposed project to enable their participation and contribution;
- Develop an Environmental Management (EMP) that would be a legal guideline for the environmental protection by the project

3.2. Scope of the EIA

The scope of this project is guided by the EIA Regulations 2012, which follows the process as shown in figure 1. The scope aims at identifying possible impacts, assessing the impact and formulate the optimum, practical mitigation measure to minimize the impacts.

Red-Dune (RD) believes that the Social Environmental Management Plan (SEMP) provides practical mitigation measure which shall ensure environmental sustainability. Further, RD believes that, the information provided is adequate and sufficient to enable the Environmental Commissioner (EC) to make an informed decision for the project.

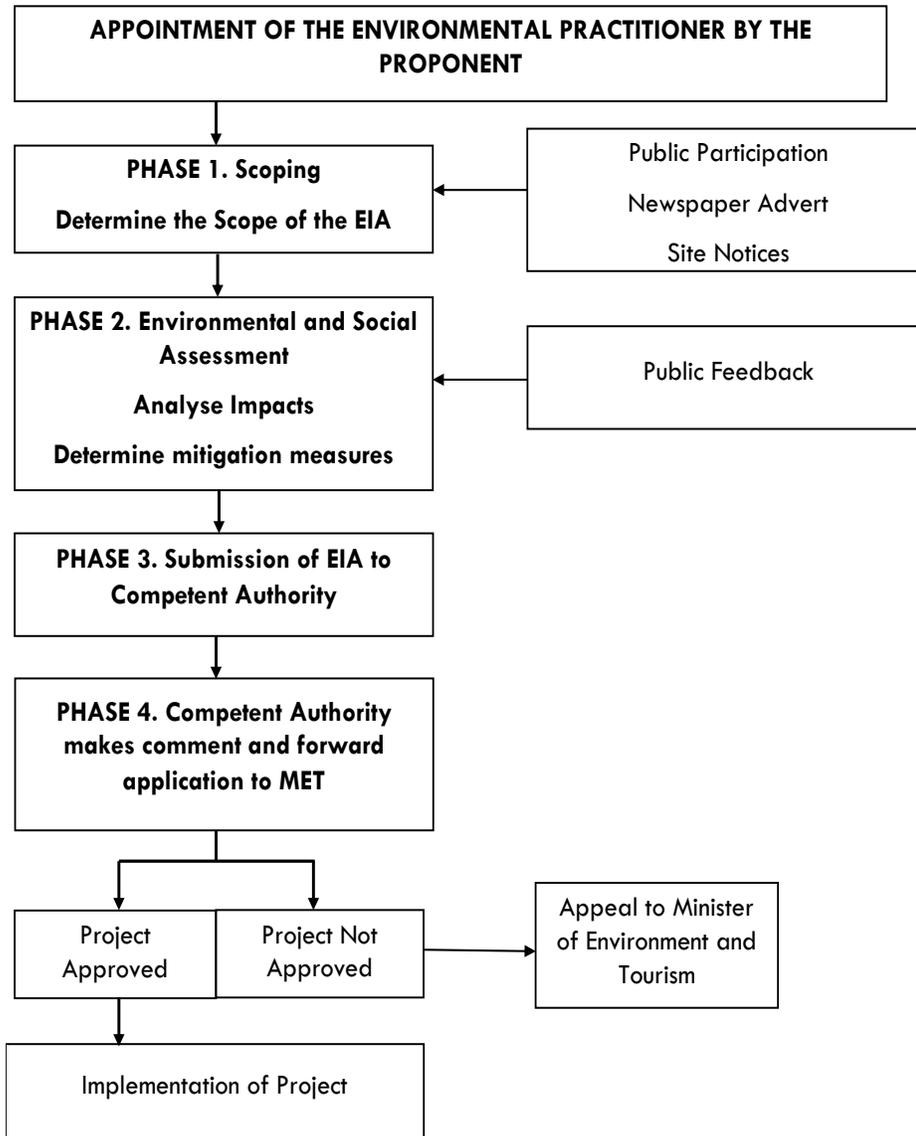


Figure 1 The EIA Process in Namibia

4. Project Description

4.1. Location

The land parcel, measuring 12000m², is situated at Omakuku Village in Tsandi Electoral Constituency of Omusati region (-17.843950°S, 15.023410°E) Fig 2&3.



Figure 2. Location of Land Parcel

The land is 109m from the M123 bitumen road while the two nearby homesteads are over 400m away from the site figure 2.



Figure 3. Location of Land Parcel and its proximity

4.2. Description of the surrounding environment

As shown in figure 3 above, the site is surrounded by homestead with the nearest being 144, and two other at a distance of over 400m and a M123 road at 109m.

4.3. Bio-Physical Environment

The site is in the floodplain commonly known as *Iishana* which contains water during rainy seasons. Like the region name “Omusati” which is an Oshiwambo word for Mopane tree *Colophospermum Mopane*, vegetation on site is made of small tree and shrubs of Mopane and Makalani palms trees *Hyphaene petersiana* (fig 4). There are no wild animals, like every part of northern Namibia, the area is frequented either through passages of seldom grazing by domestic animals such as Donkeys, Cattle and Goats. There could be crawling animals such as rats, lizards, insects, and pests which will eventually run away due to human movement. Thus, impact of the project on the biodiversity is negligible.



Figure 4. Physical site view

4.4. Materials

4.4.1. Water

The project will be supplied with water by NAMWATER.

4.4.2. Sand

The project will NOT be involved in sand mining activities but with rather purchase sand from Ongandjera Traditional Authority which currently sells sand to various developer in areas of Okahao and Tsandi towns. It is thus the responsibility of Ongandjera Traditional Authority (OTA) to ensure that their sand mining operation are conducted in accordance with the EMA.

4.4.3. Aggregates and Rock Dust

The project will NOT be involved in quarrying for aggregates and rock dust. It plans to import these materials from suppliers.

4.5. Equipment

4.5.1. Vehicles

The project will use normal pick-ups and hauling / tipping trucks. Other vehicles include front loaders and folk lifts.

4.5.2. Brick Manufacturing Machine

The project will use a QT4-15S brick making machine. This machine is semi enclosed, to ensure workers safety from the heat and containment of noise vibration. It is equipped with self-mixing compartment for mixing the cement, sand, rock dust and course stone with water to the preferred mixture. The brick are formed by vibration compaction on pellets (rubberized to prevent squeaky noise) which are transported to the yard by workers for air drying. At full capacity, the factory is able to produce about $\pm 35,000$ brick per day. In addition to the bricks, depending on the mould, other products such as pavers will be produced.



Figure 5. QT4-15S brick making machine (*Photo for illustration purpose only*)

4.6. Project activities

4.6.1. Construction

At the project commencement stage, construction will involve site levelling and establishment of area of operation. The project will first starts with the construction of a boundary wall to secure the premises. This phase will be a short lived activities that may last few weeks, thus impact from construction of the boundary will be short-lived as well.

4.6.2. Operation

The project operation will include the procurement of input material (sand, cement, aggregates and rock dust) from suppliers. These materials will be stock piled and covered as appropriate on site. The impact assessment on how these materials will be transports and stored is provided in chapter 8. The manufactured bricks will be air dried and stock piled for markets. Folk lifts will be used to load brick on client vehicle / trucks.

5. Description of the Affected Environment

5.1. Physical Environment

5.1.1. Topography and Drainage

The has a flat topography with drainage influenced by the Cuvelai Basin. The drainages is made up of networks of shallow watercourses locally known as “*Iishanas*”. These *Iishanas* are recharged by floodwater from Angola during times of high rainfall or filled by rain that occur in the region. Drainage is mainly from North to West and South to East. Unlike river channels which are narrow and deeper, the *Iishanas* channels are broad and shallow whereby elevation between the bottom and high ridges (*Omitunda*) are less than 10m. The high ground slopes from west to east basically defines the flow/drainage of the Cuvelai basin.

5.1.2. Geo-Hydrology

Namibian’s northern part, commonly known as the “Owambo Basin” is formed by sand deposit from water borne deposit millions of years ago. These deposit of sand and water borne deposits formed the Kalahari Basin. The deposits of sands, clay and calcretes makes up the Kalahari Group. Some rivers such as Okavango River of the Kalahari Group are still active today, while some drainage are formed up by intermittent flow of water such as the Cuvelai drainage system.

Surface water in the area is found in the *Iishanas* during rainfall season and the end of the rainfall season, water is found in natural ponds (*Omadhiya*). Surface water that normally last between rainfalls seasons are found in manmade lakes. Ground water is abundant in the region, normally found 10m below the ground. Before tap water, people dug wells for water, for human and animals consumption. Currently, many households depends on tap water supplied by NAMWATER through the Calueque canal.

5.2. Biodiversity

Like the region name “*Omusati*” which is an Oshiwambo word for Mopane tree *Colophospermum Mopane*, vegetation of Tsandi constituency is made of Mopane trees and shrubs. On site, there two trees of makalani palms trees *Hyphaene petersiana* which are protected and should be preserved and not cut down unless cutting them will be unavoidable.

There are no wild animals, like every part of northern Namibia, there are domestic animals such Donkeys, Cattle and Goats that roams around the area. There might be other crawling animals such as rats, lizards, insects, and pests which eventually run away due to human movement, henceforth the project impact on biodiversity is negligible.

5.3. Socio-Economic Environment

5.3.1. Population Demography

Omakuku village is located in Tsandi constituency in Omusati region. Population demography shows that, the region had a high unemployment rate of 42% (Table 1). There are 16 constituencies and Tsandi is one of the least populated constituencies Figure 6.

Table 1. Population Demography of Omusati Region, 2011 and 2001 (*Namibia 2011 population and housing census main report*)

	2011	2001		2011	2001
Population Size			Literacy rate, 15+ years, %	88	84
Total	243 166	228 842	Education, 15+ years, %		
Females	133 621	126 368	Never attended school	13	17
Males	109 545	102 473	Currently at school	23	24
Annual growth rate (%)	0.6	1.9	Left school	60	56
Percent in Urban/Rural areas			Labour force, 15+ years, %		
Urban	6	1	In labour force	49	38
Rural	94	99	Employed	58	65
Sex ratio: Males per 100 females	82	81	Unemployed	42	35
Population density			Outside labour force	43	59
People per sq. km.	9.1	8.6	Student	50	31
Age composition, %			Homemaker	13	49
Under 5 years	14	13	Retired, too old, etc.	37	19
5 – 14 years	26	31	Housing conditions, %		
15 – 59 years	49	45	Households with		
60+ years	11	9	Safe water	52	83
Marital status: 15+ years, %			No toilet facility	78	83
Never married	65	61	Electricity for lighting	9	4
Married with certificate	20	19	Wood/charcoal for cooking	88	93
Married traditionally	6	8	Main source of income, %		
Married consensually	3	4	Household main income		
Divorced/Separated	2	3	Farming	22	46
Widowed	5	5	Wages & Salaries	25	16
Citizenship, %			Cash remittance	5	6
Namibian	98	98	Business, non-farming	10	8
Non-Namibian	2	2	Pension	31	22
Main language spoken at home,			Fertility		
Percent of households			Average number of children per woman	3.8	4.9
Oshiwambo	96	95	Disability, %		
Private households			With disability	6	6
Number	46 698	38 202			
Average size	5.2	5.9			
Head of household, %					
Females	55	62			
Males	45	38			

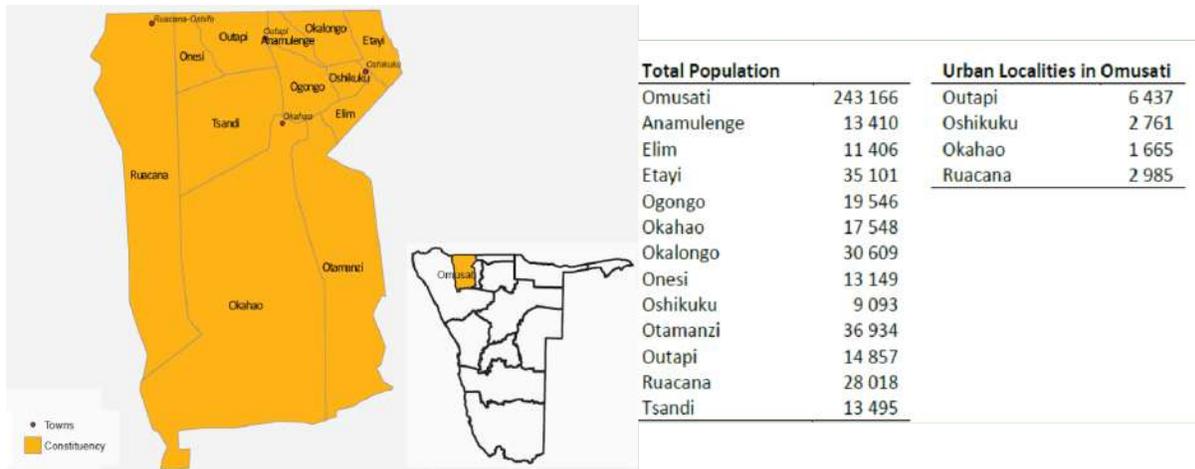


Figure 6. Constituency population of Omusati Region

The project will not require the relocation of people, neither closing of access road for the residents.

6. Project Alternatives

The provision of EMA requires an EIA to explore various project alternatives which aims to ensure that a chosen project component does not have significant impact to the environment. Project alternatives ranges from not implementing the project (no go alternative), when the environmental impacts are severe, or there is high degree of uncertainty. Other alternative considers the project site, technology and equipment to be used. The description of alternatives is given in table 2 below.

Table 2. Project alternatives

Alternative	Description	Advantages	Disadvantage	Chosen Option
No Project	This alternative would keep a status quo	The environment would be in its pristine nature.	The following benefits would be lost if the project does go ahead. <ul style="list-style-type: none"> • Deprived development for the town • Loss of income to the town • Compromise on government development goals of manufacturing and industrialization • Loss of employment opportunities which compromise poverty reduction 	NO
Project Site	The proposed project site is barren land which does not pose significant social & environmental threat	<ul style="list-style-type: none"> • The area is relatively free of vegetation, • The site does not pose conflicting use of the surrounding areas • The site close to the Bitumen Road, hence ease access and no need to establish access roads. 	<ul style="list-style-type: none"> • Potential dust and noise pollution to surrounding areas 	Yes

Alternative	Description	Advantages	Disadvantage	Chosen Option
Implement project	This entails the implementation and operation of the project	<ul style="list-style-type: none"> • Enhance development • Enhance skill and capacity building of the local • Create Employment opportunity • Cut cost of procuring super bricks from far 	The natural environment may be disturbed, but with adequate implementation of the Social-Environmental Management Plan, environmental sustainability shall be achieved.	Yes

7. Policy and Legal Framework

The following regulatory frameworks are key to the implementation of the project.

Regulatory Framework	Summary	Applicability
The Namibian Constitution	The State shall actively promote and maintain the welfare of the people by adopting policies aimed at ... The maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future	Protection of the environment and biodiversity
Environmental Management Act No. 7 of 2007	This act aims to promote the sustainable management of the environment and the use of natural resources and to provides for a process of assessment and control of activities which may have significant effects on the environment; and to provide for incidental matters	The acts provides a list of activities that may not be undertake without an environmental clearance certificate to prevent environmental damages.
Traditional Authorities Act 25 of 2000	To provide for the establishment of traditional authorities and the designation, election, appointment and recognition of traditional leaders; to define the powers, duties and functions of traditional authorities and traditional leaders; and to provide for matters incidental thereto.	The traditional authority has the power to allocate and give consent to a land parcel for recommendation of the leasehold

Regulatory Framework	Summary	Applicability
Communal Land Reform Amendment Act 13 of 2013	To provide for the allocation of rights in respect of communal land; to establish Communal Land Boards; to provide for the powers of Chiefs and Traditional Authorities and boards in relation to communal land; and to make provision for incidental matters.	To recommend for the provision of leasehold to the Minister for approval
Draft Pollution Control and Waste Management Bill	This Bill serves to regulate and prevent the discharge of pollutants to air and water as well as providing for general waste management	To protect the Environment from possible hydrocarbons and oil leaks from the machinery and vehicles
Environmental Policy framework (1995)	This policy subjects all developments and project to environmental assessment and provides guideline for the Environmental Assessment.	Consideration of all possible impacts and incorporate them in the development stages
The Occupational Safety and Health Act No. 11 of 2007	Promotes the Safety and Health of employees at the work place	Employees and public subjected to noise and dust
Public Health Act No. 36 of 1919	To Protect the public from nuisance and 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.	Application of proper mitigation measure to noise and dust
Labour Act No. 11 of 2007	This Act outlines the labour laws which encompass protection and safety of employees at work.	This project will require labour during its operational stage and decommissioning stage.

Regulatory Framework	Summary	Applicability
Water Act No, 54 of 1956	All water resources belongs to the State. It prevents pollution and promotes the sustainable utilization of the resource	Prevention of discharging contaminated water at unauthorised places
Soil Conservation Act No. 76 of 1969	To promotes the conservation of soil, prevention of soil erosion	Uncontrolled movement of heavy vehicles and truck at areas surrounding the site may cause land degradation
Water Resource Management Act No.11 of 2011	The Act stipulates the prevention of both Surface and Ground water sources.	Oil spillage coming from brick making machines and transporting vehicles need to minimised to avoid water contamination.
Public Health Act no. 36 of 1919	The Act gives provision for the protection for the health of all people.	The noise and dust level emanating from the project could affect the surrounding community.
National Heritage Act No.27 of 2004 Government Notices No.287 of 2004	The Act gives provision of the protection and conservation of places and objects with heritage significance.	There were no heritage features identified on site or within the close vicinity of the site.

8. Public Consultation

Section 21 of the EIA regulation requires the undertaking of an Environmental Impact Assessment (EIA) to follow a robust and comprehensive public consultation. This is an important process, because it gives members of the public, especially the Interested and Affected Parties to comment or raise concerns that may affect the socio-economic or general environment as a result of the project. Further, it solicits crucial local knowledge that the Environmental Assessment Practitioner may not have. The process was undertaken as follows;

- I. **Notice board:** In accordance with Section 21 (a) a notice board was placed at the project site and other public place to inform public about the project and the application of ECC Fig 7.



Figure 7. Notice board at the project site and Tsandi Community Hall and Nearby Shebeens

- II. **Written notice:** In accordance with Section 21 (b) written notices were given to the public, particularly in the surrounding areas informing them about the project and the application (Annex 3).
- III. **Newspaper advertisement:** In accordance with Section 21 (c), the application was advertised once a week for two consecutive weeks in two newspapers that are widely circulated in Namibia. The project was advertised in New-Era, the Namibian, Confidante and Namibian Sun Newspaper (Annex 4).
- IV. **Public Meeting** In accordance with Section 21 (5,6) a public meeting was planned at the project site but no attendance. The Omakuku village headman, on the day of the public meeting indicated that, the village members had just recently attended a meeting called by the Traditional authorities where it was agreed for the land to be granted to Mr. Iyambo and proceed with the implementation of the project (Annex 2). Thus, it was unlikely for the community to come for another meeting just a month after.

9. Impact Identification and Risk Assessment

9.1. Impact Identification

During literature review and site assessment, possible impacts were listed. The criteria used to assess the impacts and the method of determining their significance is outlined in Table 3. This process conforms with the Environmental Impact Assessment Regulations of Environmental Management Act, 2007 (Government Gazette No. 4878) EIA regulations. The approach for determining and analysing impacts is undertaken into two steps.

- **Impact Determination;** during this step, the impact is assessed based on severity, spatial scale and its duration.
- **Impact Significance;** various rating exists to determine the overall rating of the impact

Impact significance is determined under two mitigation scenarios; **without mitigation** and **with mitigation**. The confidence of impact mitigation depends on the level of certainty based on available information to assess the impact.

Table 3. Criteria for impact assessment

Risk Event	Rating	Description of the risk that may lead to an Impact
Impact type	0	No Impact
	+VE	Positive
	-VE	Negative
Probability	The probability that an impact may occur under the following analysis	
	1	Improbable (Low likelihood)
	2	Low probability
	3	Probable (Likely to occur)
	4	Highly Probable (Most likely)
	5	Definite (Impact will occur irrespective of the applied mitigation measure)
Confidence level	The confidence level of occurrence in the prediction, based on available knowledge	
	L	Low
	M	Medium

	H	High
Significance (Without Mitigation)	0	None (Based on the available information, the potential impact is found to not have a significant impact)
	L	Low (The presence of the impact's magnitude is expected to be temporal or localized, that may not require alteration to the operation of the project)
	M	Medium (This is when the impact is expected to be of short term moderate and normally regionally. In most cases, such impacts require that the projects is altered to mitigate the impact or alternative method of mitigation is implemented)
	H	High (The impact is definite, can be regional or national and in long term. The impact could have a no-go implication unless the project is re-designed or proper mitigation can practically be applied)
Mitigation	The applied measure / alternative to reduce / avoid an impact	
Significance (With Mitigation)	0	None (Based on the available information, the potential impact is found to not have a significant impact)
	L	Low (The presence of the impact's magnitude is expected to be temporal or localised, that may not require alteration to the operation of the project)
	M	Medium (This is when the impact is expected to be of short term moderate and normally regionally. In most cases, such impacts require that the projects is altered to mitigate the impact or alternative method of mitigation is implemented)
	H	High (The impact is definite, can be regional or national and in long term. The impact could have a no-go implication unless the project is re-designed or proper mitigation can practically be applied)
Duration	Time duration of the impacts	
	1	Immediate
	2	Short-term (0-5 years)
	3	Medium-term (5-15 years)
	4	Long-term (more than 15 years)
	5	Permanent
Scale	The geographical scale of the impact	
	1	Site specific
	2	Local

	3	Regional
	4	National
	5	International

9.2. Impact Risk Assessment Procedure

An illustration of an impact analysis is shown in Figure 8.

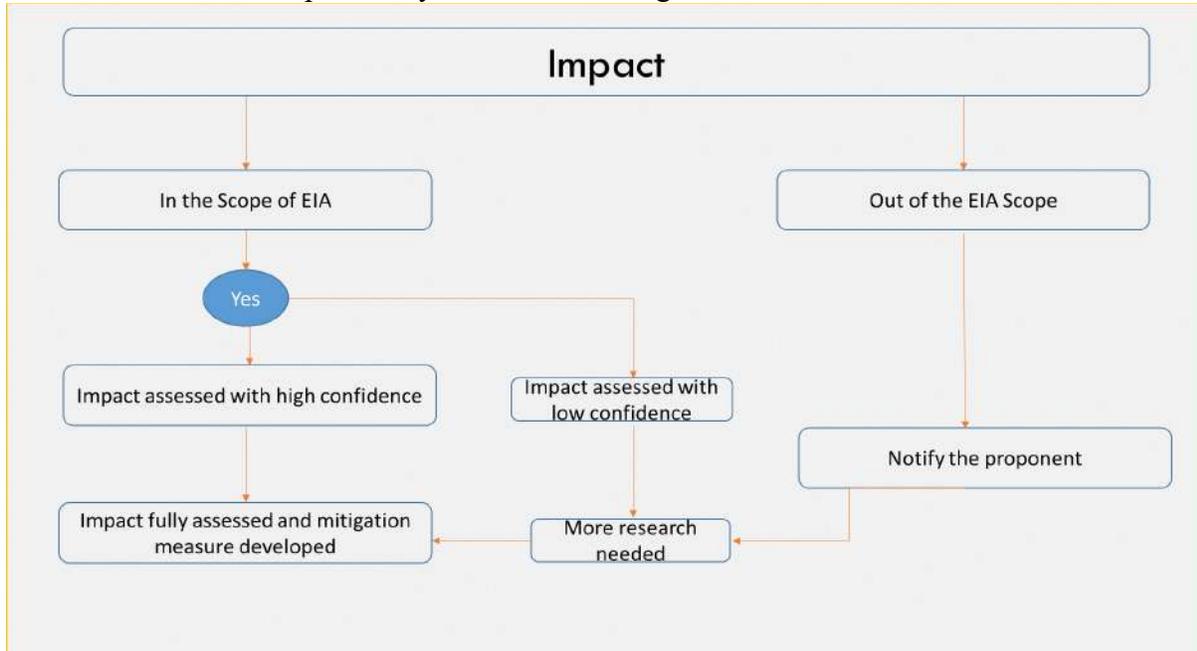


Figure 8. Matrix used for the impact assessment

9.3. Identified Impacts

The following negative and positive impacts were identified. An EIA is a living document, impacts that could not be identified during assessment and maybe identified later should be considered and adequate mitigation measures must be applied.

<i>Potential Negative Impacts</i>	<i>Potential Positive Impacts</i>
Noise and Dust pollution	Direct and indirect creation of employment opportunities
Soil disturbance	Knowledge and technology transfer.
Health and Safety risk	Increased economic activities
Noise and Dust pollution	Increase in national economy through payments of taxes

Risk of contamination of ground water from oil, grease and lubricants from heavy vehicles	Direct and indirect creation of employment opportunities
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10. Risk Assessment

10.1. Construction / Establishment of the project

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
10.1.1. Socio-Economic Impacts			
Employment / Socio-Economic advancement	<ol style="list-style-type: none"> Ensure that all general work is reserved for local people unless in circumstances where specialized skills are required. Fair compensation and labour practice as per Namibian Labour Laws must be followed Ensure skill transfer to the locals Use local supplier for good and service where possible 	Impact type	+VE
		Probability	Definite
		Confidence level	High
		Significance (Without Mitigation)	High
		Significance (With Mitigation)	Low
		Duration	Permanent
		Scale	Local
Lack of knowledge to operate machinery and with the EMP	<ol style="list-style-type: none"> All workers must undergo induction training to familiarize themselves with operating equipment and the dos and don'ts of the EMP 	Significance (With Mitigation)	Low
Public Safety Risks	<ol style="list-style-type: none"> Keep to minimal speed of 40km/h with heavy vehicle at areas surrounding the site 	Impact type	-VE
		Probability	Probable
		Confidence level	High

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
	2. All construction vehicle must be fitted with flushing lights	Significance (Without Mitigation)	Medium
		Significance (With Mitigation)	Low
	3. Ensure construction starts from 6am-5pm only and no night construction / movement of heavy vehicles is allowed	Duration	Project Life Span
		Scale	Local
HIV and AIDS, Alcohol and Drug abuse Namibia has high prevalence of HIV/AIDS and it is important to ensure that employees are sensitized about the pandemic.	1. Provide awareness to the employees on danger of alcohol and drug abuse 2. Provide Condoms at site	Significance (With Mitigation)	Low
Visual Impacts Movement of trucks could be exciting for children and may be a distraction and material stock piling	1. Construct a boundary wary to prevent visual of site activities 2. Ensure good housekeeping for material on site 3. Storage of material on site must be in a coordinated manner adhering to good house keeping	Impact type	-VE
		Probability	Probable
		Confidence level	High
		Significance (Without Mitigation)	Medium
		Significance (With Mitigation)	Low
		Duration	Project lifecycle
		Scale	Local
Heritage Archaeology	1. Employee must be trained on the	Impact type	-VE

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
<p>There are no registered heritage or archaeology materials on site apart from scattered protected palm trees. A chance found was developed.</p>	<p>possible find of heritage and archaeological material in the area;</p> <p>2. Implement a chance find and steps to be taken for heritage and archaeological material finding (Heritage (rock painting and drawings), human remains or artefacts) are unearthed by;</p> <ul style="list-style-type: none"> i. Stopping the activity immediately ii. Informing the operational manager or supervisor iii. Cordoned of the area with a danger tape and manager to take appropriated pictures. iv. Manager/supervisor must report the finding to the following competent authorities, National Heritage Council of Namibia (061 244 375) National Museum (+264 61 276800) or the National Forensic Laboratory (+264 61 240461). 	Probability	Possibly
		Confidence level	High
		Significance (Without Mitigation)	Medium
		Significance (With Mitigation)	Low
		Duration	Temporal
		Scale	Site specific

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
10.1.2. Bio-Physical Environment			
Flora The area is mainly covered with grass and two trees of Makalani trees and Mopane	1. Do not cut down the Makalani trees on site, unless unavoidable 2. Do not plant alien trees	Impact type	-VE
		Probability	Probable
		Confidence level	High
		Significance (Without Mitigation)	Low
		Significance (With Mitigation)	Low
		Duration	Temporaly
		Scale	Site specific
Fauna There area may be frequented by domestic animals that roams the town. There are no other fauna	1. Install a boundary fence to prevent domestic animal from coming on site	Impact type	-VE
		Probability	Possibly
		Confidence level	High
		Significance (Without Mitigation)	Low
		Significance (With Mitigation)	Low
		Duration	Temporary
		Scale	Site Specific
Water pollution Heavy vehicle and machinery may pollute water sources from leakages of oils, hydraulic fluids,	1. Fuelling of heavy vehicle on site must be well coordinated at designated places 2. Stationary vehicles must be provided with drip tray to capture oil, lubricants and hydraulic fluids leakages	Impact type	-VE
		Probability	Definite
		Confidence level	High
		Significance (Without Mitigation)	Moderate
		Significance (With Mitigation)	Low

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
lubricants and greases. These pollutants may reach underground water through seepage. Further surface water may be polluted from surface run off soils that is polluted.	3. All vehicle and machinery must be well service to avoid leakages 4. Provide and train on oil spill emergency response 5. Servicing of vehicles and machinery must take place at designated sites	Duration	Project Life Span
		Scale	Site Specific
Land Degradation The uncontrolled movement of heavy machinery at the project site as well as on access loads may cause land degradation.	1. Movement of heavy vehicles must be coordinated and restricted to be within the site and access roads	Impact type	-VE
		Probability	Definite
		Confidence level	High
		Significance (Without Mitigation)	Moderate
		Significance (With Mitigation)	Low
		Duration	Project Life Span
		Scale	Site Specific
Waste Generation General household waste management measures must be put in place.	1. Provide Skip bins to collect waste and be disposed of at an approved disposal site 2. Do not bury waste on site 3. Used oil, grease and lubricants cans must be collected in appropriate drums and disposed of at an approved site.	Impact type	-VE
		Probability	Definite
		Confidence level	High
		Significance (Without Mitigation)	Moderate
		Significance (With Mitigation)	Low
		Duration	Project Life Span

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
		Scale	Site Specific
<p>Dust Pollution</p> <p>During sand loading, hauling and offloading dust and particulate matters (PM10 and PM25) are expected to be produced. More dust is expected during windy conditions. During normal condition, dust concentrations is expected to be localised. However, high risk lies in the exposure of workers to dust.</p>	<ol style="list-style-type: none"> Trucks transporting sand must be covered during transportation Use dust suppression measures such as water spraying to mitigate dust impacts. Adhere to the Labour act, non-toxic human dust exposure levels may not exceed 5mg/m³ for respiratory dust and 15mg/m³ for total dust. Avoid working during extreme windy times Avoid unnecessary movement of vehicles on site Provide employees with personal protective equipment such as dust mask, protective glass wear etc. 	Impact type	-VE
		Probability	Definite
		Confidence level	High
		Significance (Without Mitigation)	High
		Significance (With Mitigation)	Low
		Duration	Project Life Span
		Scale	Site Specific
<p>Noise Pollution</p> <p>Noise is expected from the engines of heavy vehicles, especially from front end</p>	<ol style="list-style-type: none"> Engines must be switched off when machinery is not in use It is inevitable that noise level shall exceed the required maximum amounts, 	Impact type	-VE
		Probability	Definite
		Confidence level	High
		Significance (Without Mitigation)	High

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
loader during loading of sand, and from the tipper truck during offloading.	hence workers must have sufficient breaks and proper ear muffs for hearing conservation 3. Operation must be limited to day hours only, from 05H00-18H00	Significance (With Mitigation)	Low
		Duration	Project Life Span
		Scale	Site Specific

10.2. Operational Phase

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
10.2.1. Socio-Economic Impacts			
Employment	1. Implement similar to those above-mentioned during construction phase	Low	
Lack of workers knowledge	1. Implement similar to those above-mentioned during construction phase	Low	
Dust and air Pollution During sand transportation, rock crushing, hauling, and	1. Trucks transporting sand must be covered during transportation 2. Use dust suppression measures such as water spraying to mitigate dust impacts.	Impact type	-VE
		Probability	Definite
		Confidence level	High

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
<p>mixing, dust and particulate matters (PM10 and PM25) are expected to be produced. The labour act provision indicates that non-toxic human dust exposure levels may not exceed 5mg/m3 for respiratory dust and 15mg/m3 for total dust. More dust is expected during windy conditions. During normal condition, dust concentrations is expected to be localised. However, high risk lies in the exposure of workers to dust. Further, air pollution is expected from the burning of hydrocarbons</p>	<ol style="list-style-type: none"> 3. The end of the conveyor belt must be fitted with a funnel to ensure sand is directed to the pile and avoid being brown away 4. Adhere to the Labour act, non-toxic human dust exposure levels may not exceed 5mg/m3 for respiratory dust and 15mg/m3 for total dust. 5. Avoid working during extreme windy times 6. Avoid unnecessary movement of vehicles on site 7. Provide employees with personal protective equipment such as dust mask, protective glass wear etc. 8. Construct a boundary wall to curb dust from escaping during vehicle movement and offloading of sand/rock dust and aggregates 	Significance (Without Mitigation)	High
		Significance (With Mitigation)	Low
		Duration	Project life span
		Scale	Local

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
from vehicles and machineries			
Noise Pollution Heavy machinery such as trucks, brick machinery and a crusher are expected to produce noise.	<ol style="list-style-type: none"> 1. Vibrating table must be fitted with rubber material to ensure sound absorption 2. Vibrator Motor must be well maintained 3. Where metal are likely to collide, fit rubber material to avoid squeak noise 4. Proper maintenance and avoid friction against the floor 5. Where possible, a slicer must be fitted at the exhaust of equipment 6. Pellets must be removed manually, so that there is no possible collision of pellets 7. If automated, pellets edges must be fitted with an impact absorbing material such as rubber. 8. If possible, only use forklift to pack bricks in the yard 9. Switch off vehicles and machinery when not in use 10. The crusher plant needs proper sound absorption designs to limit the noise from escaping 11. Long term solution should be to enclose the crusher within a building with sound absorption quality 	Impact type	-VE
		Probability	Definite
		Confidence level	High
		Significance (Without Mitigation)	High
		Significance (With Mitigation)	Low
		Duration	Project life span
		Scale	Local

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
	12. Proper maintenance, to avoid squeak sounds etc.		
Public / Employees Health and Safety Risks	1. A compulsory induction safety induction course must be given to all employees 2. Adequate safety signs must be put at designated places. 3. Provide protective eye glasses, dust masks and ear muffs to all employees operating in a dusty or noisy environment 4. Employees must not stand for long hours near the crushing plant to protect their hearing 5. Ensure adequate, hygienic (clean) and user-friendly ablution facilities for all staff 6. Appoint a cleaner or rotate cleaning responsibilities among workers. 7. Segregate Male and female toilets 8. Inspect ablution facilities regularly 9. Employees must be properly trained in using machine to avoid fatalities 10. Maintain low vehicle speed on site and at surrounding areas All heavy vehicles must have a rotating lamp installed for visibility 11. All drives must be in possession of appropriated driver’s licenses	Impact type	-VE
		Probability	Definite
		Confidence level	High
		Significance (Without Mitigation)	High
		Significance (With Mitigation)	Low
		Duration	Project Life Span
		Scale	Local

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
	12. Only operate during day light from 06H00AM-17H00PM		
HIV and AIDS	Implement similar to those above-mentioned during construction phase	Significance (With Mitigation)	Low
Visual Impacts	1. Implement similar to those above-mentioned during construction phase	Significance (With Mitigation)	Low
Archaeology	1. Implement similar to those above-mentioned during construction phase	Significance (With Mitigation)	Low
10.2.2. Bio-Physical Environment			
Flora	2. Implement similar to those above-mentioned during construction phase 3. Do not plant alien trees on Site	Significance (With Mitigation)	Low
Fauna	1. Implement similar to those above-mentioned during construction phase 2. If an animal is spotted, it must not be killed	Significance (With Mitigation)	Low
Water	1. Do not waste water / use water sparingly	Impact type	-VE
		Probability	Definite

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
Water will be supplied NAMWATER		Confidence level	High
		Significance (Without Mitigation)	High
		Significance (With Mitigation)	Low
		Duration	Project Life Span
		Scale	Local
Land Degradation The uncontrolled movement of heavy machinery at the project site as well as on access	1. Movement of heavy vehicles must be coordinated and restricted to be within the site and access roads	Impact type	-VE
		Probability	Definite
		Confidence level	High
		Significance (Without Mitigation)	High

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
loads may cause land degradation		Significance (With Mitigation)	Low
		Duration	Temporary
		Scale	Site Specific
Waste Generation, It is expected for the project to produce other garbage, rubbles, cement bags, strips and other form of household waste	<ol style="list-style-type: none"> 1. The project must be equipped with ablution facilities for workers 2. Operations generate garbage, refuse and building rubbles. Waste generated from the construction should be classified into different categories, e.g., Material Waste (Wood, steel, corrugated iron, etc.), Building Rubble (concrete, bricks etc.), Garden Waste (tree stumps, branches, etc.), Domestic Waste (Litter – cans, plastics, tissue, plastics etc.) 3. Each category should be collected separated disposed of, in the most suitable and environmentally acceptable manner 4. All waste produced on site should be contained and disposed as at an approved waste disposal site 5. There must be sufficient skip containers for domestic waste collection 	Impact type	-VE
		Probability	Definite
		Confidence level	High
		Significance (Without Mitigation)	High
		Significance (With Mitigation)	Low
		Duration	Project Life Span
		Scale	Local

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact
	<ol style="list-style-type: none"> <li data-bbox="577 311 1476 399">6. No onsite burying, dumping or burning of waste material shall be permitted. <li data-bbox="577 412 1476 516">7. Ensure appropriate waste collection and removal from the site and dispose at appropriate waste disposal site. 	

11. Decommissioning and Rehabilitation

To ensure human safety and the environment, the following must be undertaken at the end of the project life cycle or demolition.

1. Develop a decommissioning and rehabilitation plan
2. There must be clear signs to the public about the closure of the project
3. Ensure that all contaminated equipment's are properly cleaned before their disposal
4. The work must be supervised by a qualified and competed persons. Further, it is recommended that an environmental specialist be hired to monitor any possible contamination during decommissioning
5. Workers must be provided with all necessary PPE
6. All wasted generated must be disposed of approved sites

12. Conclusions and Recommendations

12.1. Conclusions

The scope of this project was guided by site visit information, and comprehensive literature review to establish all possible environmental impacts and the possible mitigation measure to the impacts concerning this project. The analysis was based on the collected information and sufficiently addresses the environmental and socio-economic aspects that are within the scope of the EIA.

The project is expected to positively contribute to the socio-economic development of locals through employment creation while contributing to the Gross Domestic Product at national level. While analysis of the no project alternative showed that, the adverse impacts will be negative especially on the socio-economic aspects, threats to biodiversity, and other physical environment were negligible under the provision of the proposed mitigation measures. The Environmental Management Plan must be implemented adequately to mitigate the negative impacts that the project may cause.

12.2. Recommendations

On the basis of social and environmental consideration, and on the developed SEMP, Red Dune Consulting recommends to the office of the Environmental Commissioner, the issuance of the Environmental Clearance Certificate for this project with the following condition;

- Strick submission of biannual report to monitor environmental performance

13. Reference

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