



RED-DUNE CONSULTING CC

Application No: 230202000950

**Environmental Scoping Report For The Proposed Sand Mining By
Remerald Investment Cc At Area Close To Arandis, Erongo Region**



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PROJECT CONSULTANT	Mr. Ipeinge Mundjulu
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ABBREVIATIONS

ATC	Arandis Town Council
DEA	Department of Environmental Affairs
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
ECO	Environmental Compliance Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act (No. 7 of 2007)
EMP	Environmental Management Plan
MEFT	Ministry of Environment Forestry and Tourism
RD	Red-Dune Consulting CC
RI	Remerald Investments cc
SM	Site Manager
TA	Traditional Authority

EXECUTIVE SUMMARY

Project Background

Sand is a pre-requisite for the construction of many infrastructures such as, bricks houses, shopping centres, roads and many others. Remerald Investments cc (RI) is a wholly-owned Namibian close corporation with interest in manufacturing bricks and concrete related products as well supplying sand. RI plans to mine sand, for its business operations. The mining activities will include a conventional excavation, loading and transportation.

Environmental Impact Assessment

To ensure environmental sustainability, impacts associated with sand mining were identified such as; land degradation, water pollution, soil erosion, dust and noise pollution, health and safety impact. These impact were studied and practical mitigation measures were developed. This impact assessment was extensively guided by Sand Mining Conditions developed by the Ministry of Environment Forestry and Tourism (MEFT) (Annex 1).

Conclusion and Recommendations

This study was undertaken with a high degree of confidence. All identified impact were addressed successfully. Henceforth the study is recommending to approving authority for the issuance of Environmental Clearance Certificate.

1. INTRODUCTION

1.1. Background

Building sand is a pre-requisite for the construction of many infrastructures such as, bricks houses, shopping stores roads etc. These developments contribute immensely to employment creation and promote economic growth. Thus it is unavoidable that Sand mining would take place. The acquisition of sand, if not properly done / managed, causes severe land degradation. Namibia has a fair share of challenges by sand mining. There has been reports of loss of human and animal life due falling and drowning in illegal sand mine pits, sever land degradation which threatens national infrastructure such as roads. Therefore, it is important for sand mining to be carried out in a managed way and within the confines of law.

1.2. Regulatory Requirements

In 2007, the Environmental Management Act 2007 (Act No. 7 of 2007) ‘EMA’ was enacted and came into force on 6th February 2012. Part VII, Section 27 of EMA has listed activities that may not be undertaken without an Environmental Clearance Certificate (ECC). Sand Mining and Quarrying are amongst the listed activities under Section 27 of EMA and the annexure of EIA regulation that may not be undertaken without an Environmental Clearance Certificate (ECC) (Table 1).

Table 1. Listed activities in relation to the sand mining and aggregate quarrying

Activity	Listed Activity under EMA
• Activity 3: Mining and quarrying Activities	3.2 Other forms of mining or extraction of any natural resources whether regulated by law or not

It is against the above background of this statutory requirement that RI has appointed Red-Dune Consulting to develop undertake an Environmental Impact Assessment and develop an Environmental Management Plan for their proposed sand mining and related activities.

1.3. The Need and Desirability of the Project

Building sand and aggregates are primary inputs for construction of many infrastructures such as, bricks houses, shopping malls, roads etc. The developments of infrastructures contributes immensely on economic growth and provide employment to thousands of people. It is therefore unavoidable that sand will have to take place.

1.4. Terms of reference

The Terms of Reference (TORs) of this EIA is in accordance with the Environmental Management Act 2007 and its Regulation Section 9 (a-b). It further 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. The TORs of this project includes, but not limited to the following;

- Provide a comprehensive description of the proposed Project;
- 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

1.5. Scope

The scope of this project is guided by the Environmental 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. This EIA shall strive to address issues major impact associated with sand mining such as land degradation, soil erosion, dust and noise pollution, health and safety impact. In the end, Red-Dune (RD) believes the EMP provides practical mitigation measures that ensure environmental sustainability.

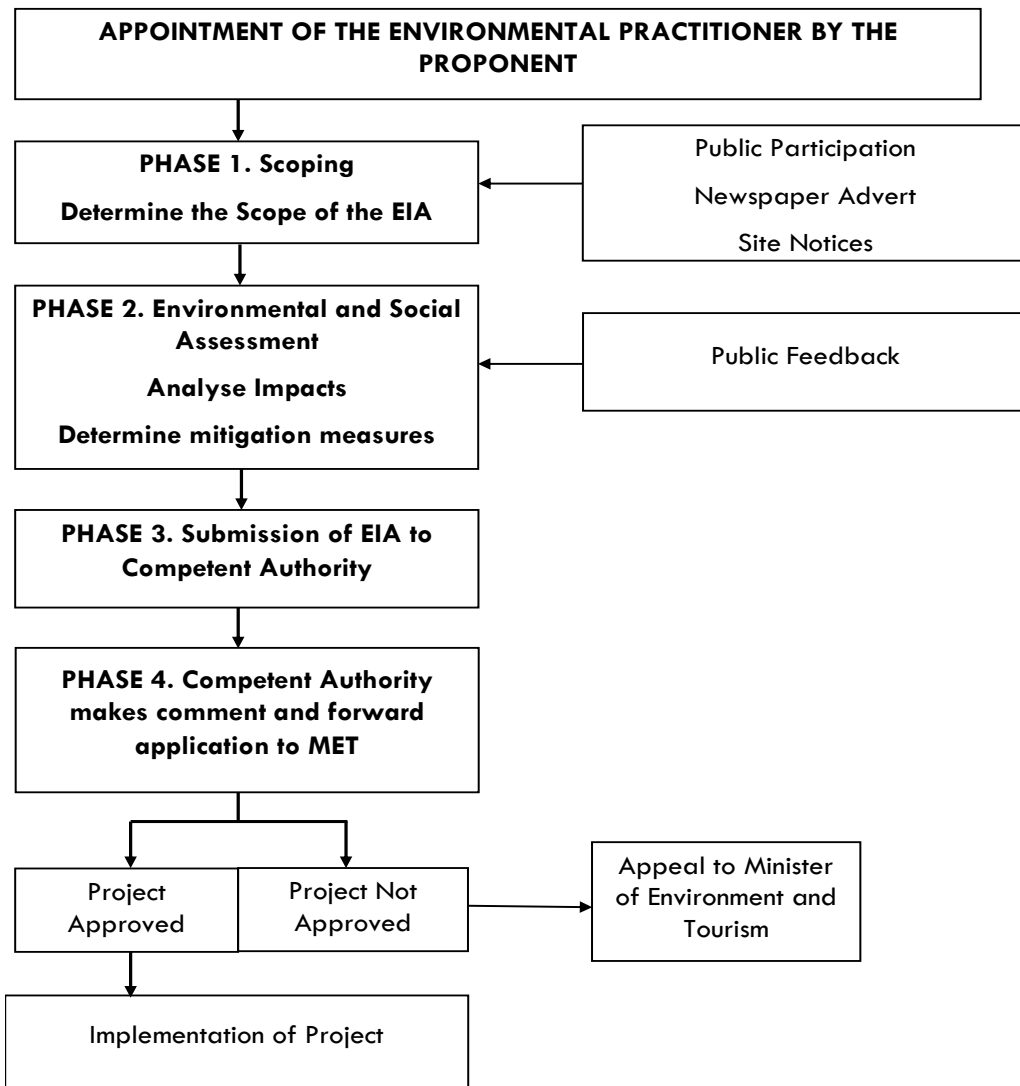


Figure 1. The EIA Process in Namibia

2. PROJECT DESCRIPTION

2.1. Location

The proposed sand mining activities will be undertaken at Arandis areas, in Erongo Region in a small river stream located approximately 6.5km west of Arandis town(-22.403213S, 14.909929E). The area is not within Arandis town boundaries and is also outside the Dorob National Park, thus falling within the jurisdiction of !Oe-#Gân Traditional Authority (fig 2) (Appendix 1 consent letter). The project site is accessible through an existing road that is frequently used by the locals, no new roads will be required.

Table 2. Coordinates for Proposed sand mining site

1	-22.40080°S, 14.910933°E	3	-22.403783°S, 14.913048°E
2	-22.402905S, 14.913125°E	4	-22.405668°S, 14.906418°E
5	-22.403330°S, 14.905915°E		



Figure 2. Proposed sand mining site near Arandis, Erongo Region

2.2. Site description

There are no activities in the surrounding. There is a railway ~8km in southern direction, while in the east, the project is bordering Arandis Townland where the municipal waste disposal site and municipal sewerage works are approximately 5km kilometres southeast of the project site.



Figure 3. Physical site view

2.3. Project Operation

2.3.1. Excavation

Front end loader will be used to scrap of top soil which will be stored well for purposes of rehabilitation. A front end loader will also be used to dig up sand and place it onto the sieve which separates larger unwanted deposits from the fine sand. Excavators may also be used to dig and load the sand on the tipping / dump trucks.

2.3.2. Loading

The front end loaders will be used to load the sieved sand on to the tipping / dump trucks, which then transport the sand to construction sites and to clients.

2.3.3. Transportation

The tip trucks will use gravels road in the area, through the town of Arandis and onto the B2 road for further distribution to nearby towns such as Swakopmund and Walvis Bay.

2.4. Supporting Infrastructures

2.4.1. Access roads

No need to construct new roads as there are existing gravel road / track which will only require scraping and maintenance during the project phase.

2.4.2. Electricity

Energy supply will not be required on site.

2.4.3. Solid waste Disposal

It is anticipated that general household refuse will be generated during the operational phase. All solid waste will be contained in refuse bins and disposed of at the Arandis Municipal waste disposal site.

2.4.4. Ablution facilities

Mobile toilets will be elected on site. Their waste water and sludge will be disposed Arandis Town Council sewerage facility.

2.4.5. Water, telephones etc.

A water tank will be provided for employees which is very critical due to extreme heat in the desert. Employee will be using cellular phones for communication.

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1. Land Use

There are no activities in the surrounding. There is a railway ~8km south, while in the east, the project is bordering Arandis Townland with the municipal waste disposal site and municipal sewerage works located approximately 5km kilometres southeast of the project site.

3.2. Climatology

Arandis areas is in the dry and arid Namib desert. The area receive little to no rainfall with an average rainfall of less than 50 mm per year. The biodiversity in the areas relies on fog for their water needs. There are extreme temperature variations, due to weather fluctuation that is influence by the sea.

3.3. Biodiversity

3.3.1. Flora

The composition of plant communities within the Namib depends on numerous factors including soil types, climate and habitat for survival. The seven major habitats in the region are gravel plains, coastal hummocks, sand dunes, washes, river beds, rocky ridges, and inselbergs. The uniqueness and sense of place of the region derives from the richness of all these habitats. Vegetation in the area is not regarded as sensitive in terms of supporting protected species.

3.3.2. Fauna

No animal sightings or evidence of animals were observed during the site visit.

3.4. Population Demography

According to the latest Labour Survey of 2016, Namibian total population stood at 2,324,388 million people with the total labour force of 1,026,268 million people. Of the total labour force, 69.4% are employed while 34.0% are unemployed. Erongo region has a total population of 182,402 thousand people with a total labour force of 107,523. Of the total workforce in the region, 78.1% and 21.9% are employed and unemployed respectively.

Arandis has a total population 10,200 comprising of 4900 males and 5300 females. The area cover an areas of 13,490 km² with a low population density of 0.8/km². The town of Arandis has a population of 5100 people, which is set to directly benefit from the project.

4. PROJECT ALTERNATIVE

The provision of EMA requires an EIA to explore various project alternative to ensure that environmental impacts are minimized to insignificant level. For examples, if the proposed project site has important archaeological value, then an alternative site must be considered or if the technology to be used poses danger to the environment, then an alternative technology must be considered. In cases where the project possesses grave environmental risk, a no go option maybe considered. Lastly, a no go option maybe considered where there is lack of scientific knowledge about the impacts of the proposed project by applying a precautionary approach. The description of alternative is given in the table 3 below.

Table 3. Project alternatives

Alternative	Description	Advantages	Disadvantage	Chosen Option after mitigation measures
Project Area	In 2015, RI was granted an area for sand mining within the jurisdiction of Arandis Town Council. This was change in 2022 due to proposed new township development / town expansion projects and the project was moved outside the town boundary to the communal land where it is now.	<ul style="list-style-type: none"> • Less conflict with Arandis Town Council • Safe investment 	<ul style="list-style-type: none"> • Increase in operational cost due to long distance drive from the new project site 	Project moved to new site

Alternative	Description	Advantages	Disadvantage	Chosen Option after mitigation measures
No Project	This alternative considers a NO project option. With this option, status quo is maintained, no development shall take place. That means all possible impacts (positive & negatives) would not occur. In case of the proposed project, there shall be no environmental threats such as Water, Air, Soil Pollution Land Degradation, Soil Erosion and Safety and Health Risks.	<ul style="list-style-type: none"> • The site would not be disturbed 	<ul style="list-style-type: none"> • This is not the best option since all benefit that were supposed to be derived from this development would be lost, such as employment, environmental conservation through legal sand mining, and accelerated development of ETC. 	No
Implement project	This entails the implementation and operation of the project	<ul style="list-style-type: none"> • The site would curb illegal sand mining by contractors and other development close to town • The project will provide employment opportunities 	<ul style="list-style-type: none"> • The area will be disturbed 	Yes

5. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

The project approval and operation shall be subject by the following national and international laws (Table 4).

Table 4. Policy and legal framework governing 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
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

REGULATORY FRAMEWORK	SUMMARY	APPLICABILITY
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 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.
Water Act No, 54 of 1956	All water resources belongs to the State. It prevents pollution and promotes the sustainable utilization of the resource	Hydrocarbons from machinery has the potential to pollute water resource
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

REGULATORY FRAMEWORK	SUMMARY	APPLICABILITY
Water Resource Management Act No.11 of 2011	The Act stipulates the prevention of both Surface and Ground water sources.	Oil spillage coming from machines and transporting vehicles need to be prevented 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. A chance find shall be implemented
Local Authority Act No. 23 of 1992 Government Notice of No.116 of 1992.	This Act underlines the duties and functions of the	All stakeholders affected by the operations of the project have been informed of the developments including that of undertaking the EIA.
Traditional Authorities Act, 25 of 2000	Provides for the establishment of traditional authorities and defines their powers, duties and obligations with the governance of the communal land	Traditional Authorities Act, 25 of 2000

6. 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 because of the project. Further, it solicits crucial local knowledge that the Environmental Assessment Practitioner may not have. The process was undertaken as follows.

6.1. Notice board

In accordance with Section 21 (a) a notice board was placed at Arandis Community Hall to inform public about the project and the application of ECC .

6.2. Written notice

In accordance with Section 21 (b) written notice was given to the Arandis Town Council and the !Oe-#Gan Traditional Authority which has jurisdiction of the land informing them about the project and the application of ECC. The !Oe-#Gan Traditional Authority gave a consent letter for the project (fig 4).



Date: 09 December 2022

The Manager: Victor Maletzky
Remerald Investment CC
PO Box 12
Arandis
NAMIBIA

Dear Mr. Maletzky

CONSENT FOR SAND MINING/EXPLORATION – REMERALD INVESTMENT CC

Herewith, I acknowledge receipt of your request for exploration and sand mining works in the areas of our jurisdiction, i.e. under the !Oe-#Gan Traditional Authority, in Erongo Region.

Your application is considered favorable in principle, and on condition that formal processes are fulfilled as outlined by the Traditional Authority Act and the Ministry of Environment and Tourism including the provisions of the Ministry of Mines and Energy.

With this consent, it is required to show mutual understanding and cooperation and all parties involved are thus willing to build on such character. It is further expected that social responsibility programs including employment and business opportunities are considered first for the neighboring and affected local communities to improve the local socio-economic conditions.

It is an obligation to maintain regular consultations and to keep the !Oe-#an Traditional Authority abreast of any developments so as to avoid surprises or social actions. In this regard, it is important to hold local community consultative meetings with immediate communities before any activities are undertaken.

For more information regarding this please don't hesitate to contact me at the above mentioned contact numbers.

Yours in community development.



Councillor, Hermann /Honeb
!Oe #an Traditional Authority
Spitzkoppe

Figure 4. Consent letter by !Oe-#Gan Traditional Authority

6.3. 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, and Confidante Newspapers (table 5). The proof adverts is uploaded as a separate filed.

Table 5. Days of Newspaper Adverts

Newspaper	Date advertised
NewEra Newspaper	4 th & 11 th November 2022
Confidante Newspaper	3 rd & 9 th November 2022

6.4. Public Meeting

In accordance with Section 21 (5,6) a public meeting was held in Arandis, at Arandis Town Council Town hall. The presentation focused on the proposed site, potential impacts emanating from the activities and the mitigation measures that will be implemented to limit negative impacts.

Arandis TC indicated, the town has recently extended it boundaries which caused the preferred site to fall within the town boundaries. Consequently, ATC recommended the project to be moved to an alternative site. The attendance register and official letter from ATC is uploaded in the proof of public consultation folder.



Figure 5. A public meeting at Arandis Town Hall.

7. IMPACT IDENTIFICATION AND RISK ASSESSMENT

7.1. 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 6 below. 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 6. 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

7.1.1. Main impacts associated with Sand Mining

Activity	Description
Health and Safety	Safety from operation of machinery /vehicle and occupational health related such as subject to noise and dust
Land Clearing	Removal of Vegetation
Top Soil Removal	Removal of unwanted topsoil
Excavating of and Piling	Stock piling of Sand
Loading of Sand onto haul Trucks	Loading of Sand to tipper trucks
Transportation of Sand to the Stock yard	Transporting of sand from the pit to the stock yard
Land and water pollution	Potential spill / leakage of hydro-carbons

7.2. Impact Risk Assessment Procedure

An illustration of an impact analysis is shown in Figure 6.

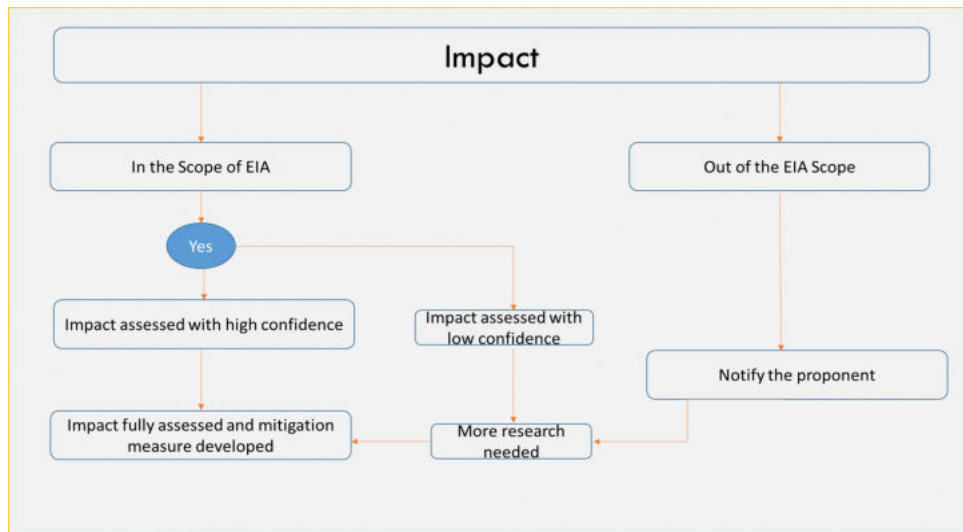


Figure 6. Matrix used for the assessment of impacts

7.2.1. Risk Assessment

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
Socio-Economic Impacts			
Employment / Socio-Economic advancement Remerald Investments plans to employ about 12 young people. Unemployment, especially among the youth is a major concern that contribute to high level of poverty.	1. Ensure that all general work is reserved for local people unless in circumstances where specialized skills are required. 2. Fair compensation and labour practice as per Namibian Labour Laws must be followed 3. Ensure skill transfer to the locals 4. 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	1. 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	1. Keep to minimal speed of 40km/h with heavy vehicle at areas surrounding the site 2. All heavy vehicle must be fitted with flashing lights 3. Ensure construction starts from 6am-5pm only, night operation is prohibited	Impact type	-VE
		Probability	Probable
		Confidence level	High
		Significance (Without Mitigation)	Medium
		Significance (With Mitigation)	Low

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
		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 may cause excessive dust which impact visibility of gravel roads	1. Apply dust preventative measures such as water spraying. 2. Trucks transporting sand must maintain intervals of 10-20minutes to allow dust to subside. 3. Avoid transporting of sand during excessive / heavy winds.	Impact type	-VE
		Probability	Probable
		Confidence level	High
		Significance (Without Mitigation)	Medium
		Significance (With Mitigation)	Low
		Duration	Project lifecycle
		Scale	Local
Heritage Archaeology There are no registered heritage or archaeology materials on site apart from	1. Employee must be trained on the possible find of heritage and archaeological material in the area; 2. Implement a chance find and steps to be	Impact type	-VE
		Probability	Possibly
		Confidence level	High
		Significance (Without Mitigation)	Medium

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
scattered protected palm trees. A chance found was developed.	<p>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). 	Significance (With Mitigation)	Low
		Duration	Temporal
		Scale	Site specific
Bio-Physical Environment			
Flora	1. Only clear the area of operations	Impact type	-VE
		Probability	Probable

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
	2. Movement of trucks must strictly be confined to the project site and on the access roads 3. Do not plant alien trees	Confidence level	High
		Significance (Without Mitigation)	Medium
		Significance (With Mitigation)	Low
		Duration	Project lifecycle
		Scale	Site specific
Fauna The desert environment contains reptiles and various small crawling animals. These will eventually leave the area due to movements	1. Do not kill animals unless it poses eminent danger to human 2. Do not poach animals. Zero tolerance to poaching must be implemented 3. Do not allow snares and weapons on site	Impact type	-VE
		Probability	Possibly
		Confidence level	High
		Significance (Without Mitigation)	Medium
		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, lubricants and greases. These pollutants may reach	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 3. All vehicle and machinery must be well service to avoid leakages	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	
underground water through seepage. Further surface water may be polluted from surface run off soils that is polluted.	4. Provide and train on oil spill emergency response 5. Servicing of vehicles and machinery must take place at designated sites 6. Soils contaminated with grease, oils and hydrocarbons must be collected and disposed of at approved site; 7. Provide and train on oil spill emergency response 8. No washing of vehicles and machinery on site 9. Vehicle must be well serviced to prevent oil leakages 10. If fuelling is to be done on site, it must be done at designated place with a proper structure that would prevent spillage to the ground.	Scale	Site Specific
Land Degradation The uncontrolled movement of heavy machinery at the	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

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
project site as well as on access loads may cause land degradation.	2. Continuous rehabilitation of the burrow pit must be conducted by proper profiling and smoothing of the slopes to be less than 1 to 3 to improve slope safety by allowing easy access of animals into the pit (after use) and to allow smooth runoff of storm water hence preventing soil erosion.	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
		Scale	Site Specific
Dust Pollution / Air Pollution	1. Trucks transporting sand must be covered during transportation	Impact type	-VE
		Probability	Definite
		Confidence level	High

Potential Environmental / Social Impact	Mitigation Measures	Significance of the Impact	
<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>	<p>2. Use dust suppression measures such as water spraying to mitigate dust impacts.</p> <p>3. 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.</p> <p>4. Avoid working during extreme windy times</p> <p>5. Avoid unnecessary movement of vehicles on site</p> <p>6. Provide employees with personal protective equipment such as dust mask, protective glass wear etc.</p>	Significance (Without Mitigation)	Moderate
		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 loader during loading of sand, and from the tipper truck during offloading.</p>	<p>1. Engines must be switched off when machinery is not in use</p> <p>2. It is inevitable that noise level shall exceed the required maximum amounts, hence workers must have sufficient breaks and proper ear muffs for hearing conservation</p> <p>3. Provide ear muff to employees</p>	Impact type	-VE
		Probability	Definite
		Confidence level	High
		Significance (Without Mitigation)	High
		Significance (With Mitigation)	Low
		Duration	Project Life Span
Scale	Site Specific		

8. CUMULATIVE IMPACTS

Cumulative Impact are possible environmental and social impacts on the receptor caused by the combination effects of more than one project/development. Cumulative impact assessment aims to identify the environmental threats of the proposed project in combination with the existing similar project in the area. This project is the only sand mining activities in the area. Thus all related activities will not have a cumulative effect.

9. CLOSURE AND REHABILITATION PLAN/GUIDELINES

This chapter outline the envisioned closure plan and rehabilitation guidelines that should be undertaken after the depletion of sand resource. Once the sand is depleted, the result is an open pit. The pit is usually a health and safety hazard to the environment, hence a need for a closure plan. A closure plan is a detailed document that forms part of the Environmental Management Plan. This plan is a guiding framework for the provisions of rehabilitation and for long term management and monitoring and maintenance of the pit. A progressive rehabilitation is recommended for the operation which considers rehabilitation at depleted site.

9.1. Progressive Rehabilitation

This type of rehabilitation refers to rehabilitation of depleted part of the pit while operation continues on the other part of the pit (Fig 7). Excavated top soil must be filled back into the excavated area where slopes has been smoothed to 1:3 fall. The advantage of this rehabilitation is that, it reduces the total disturbed area, it is less costly in a sense that avoid double handling of filling materials and preserve top soil.

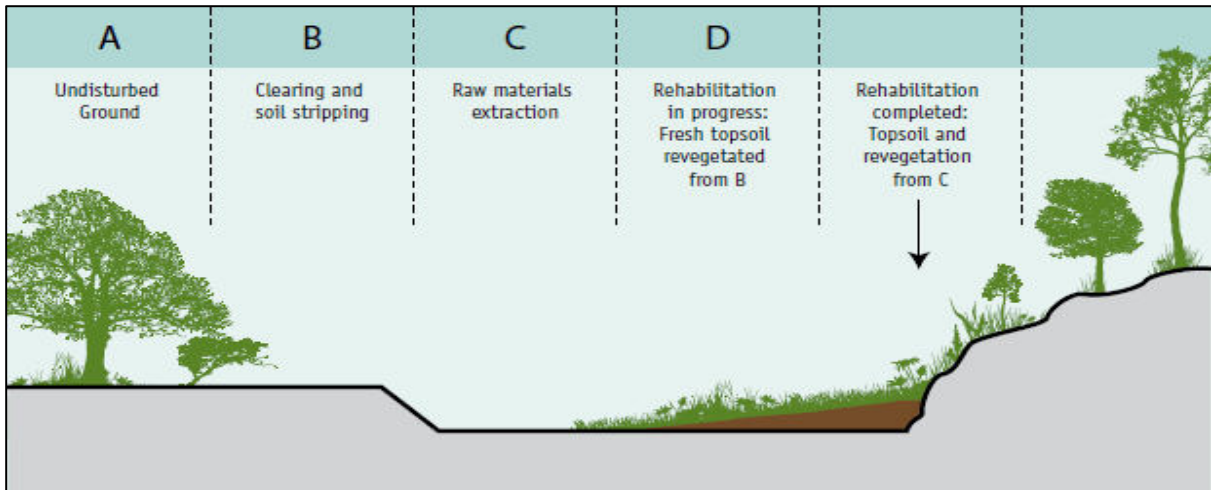


Figure 7. Progressive Rehabilitation (Source: Earth Resources 2015)

9.2. Rehabilitation guidelines

9.2.1. The Slope

During excavation, pits slopes are usually steep and pose several risk such as collapsing edge walls, gullies formation and consequently increase of soil erosion and land degradation. It is therefore crucial for the slopes of the borrow pit to be slopped at an angle that would prevent these risks. Conventionally, burrow pit are slopped to an angle 1:3 (Fig 8), where the slopes fall by one meter every three meter down.

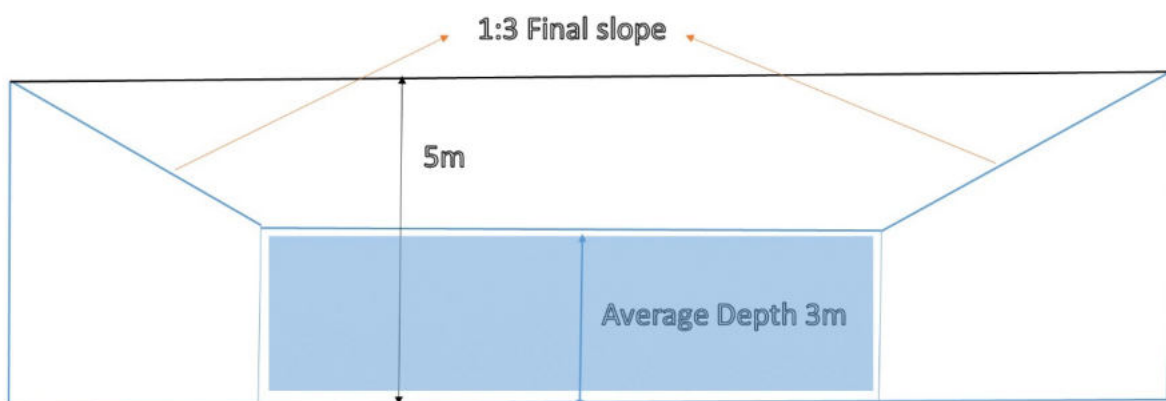


Figure 8. Illustration of the final slope (1:3 fall)

The following guidelines must be followed to ensure adequate rehabilitation of the pit.

1. Site Clean up
 - a. All foreign material brought during the operation must be removed. There must not be burying of waste material in the pit. All contaminated soils must be removed and disposed of to appropriate site
2. Leave a buffer zone of 5m from the boundary of the mining area
 - a. This will ensure that trimming occurs within boundaries of project
3. Trimming and Shaping of the pit
 - a. The final rehabilitation must ensure that the borrow pit does not have sharp angles of corners that may exacerbated formation of gullies and consequently soil erosion.
 - b. The pit contours must be even and slopes smoothed and not steeper than 1:3. This would allow for smooth natural filling up of the pit.
 - c. After sloping the pit, the mouth of the pit must face the drainage direction to ensure water runs in smoothly to prevent the formation of gullies which ultimately increase soil erosion.
4. Waste material / Overburden
 - a. It is not expected for the operation to produce huge amount of excess overburden. However, those that are produced must be used during contouring or placed back into the pit.
5. Compaction of disturbed surrounding
 - a. The surrounding disturbed area from the movement of heavy vehicle must be compacted to prevent run off and wind erosion. The compacted soil must be shallowly ripped to allow regrowth of vegetation.
6. Access roads
 - a. As described above, all access road that were made for this operation and are no longer necessary, must be rehabilitated. The surface of these roads must be ripped to enable regrowth of vegetation.

10.CONCLUSION AND RECOMMENDATIONS

10.1.Conclusions

Sand is fast becoming a rare commodity worldwide and Namibia is no exception. The increasing in settlement and town requires huge infrastructure development. These developments required sand for construction. Land degradation is mostly evident at places near towns and settlement due to unregulated sand mining. Impacts associated with sand mining were identified and mitigation measures developed. There were no major environmental or social impacts that may prevent to approval and consequently the operation of the project. Red-Dune Consulting believes that, this EIA has sufficient information for the Environmental Commissioner to make an informed decision.

10.2.Recommendation

It is recommended to the approving authority that;

- The project is approved and be issued with an Environmental Clearance Certificate (ECC),
- Bi-annual environmental audits are undertaken to monitor the environmental performance;

11.ANEX 1: CONDITION OF SAND MINING

1.	In the case of private land not owned by the lease holder an affidavit should be obtained regarding consent of the concerned land owner (s) for carrying out the mining operation.
2.	Valid permit from the Relevant Competent Authority to be obtained for riverbed sand mining, vegetation clearing of protected plant species and boreholes drilling prior to commencement of the project.
3.	All conditions provided by the Relevant Competent Authority with regards to riverbed sanding mining must be complied with.
4.	The Holder shall erect a signboard not smaller than 70 cm in height and 100cm in width, at the major entrance/s to each of its Sand Mining Site /Area, specifying the duration of the EC validity and the name of the EC holder, and a contact name and number for enquiries.
5.	Mining shall be done in layers of 1 m depth to avoid ponding effect and after first layer is excavated, the process will be repeated for the next layers; All possible precaution as identified in the Environmental Management Plan shall be complied with to prevent and mitigate potential impacts.
6.	No exposure of groundwater should take place in respect of Sand mining activities undertaken within a riverbed.
7.	Depending upon the location, thickness of sand, deposition, agricultural land/river bed, the method of mining may be manual, semi-mechanized or mechanized; however, manual method of mining shall be preferred over any other method.
8.	The EC holder shall keep a correct account of quantity of sand mined out, dispatched from the site, mode of transport, registration number of vehicle, person in-charge of vehicle and site plan. This should be produced before inspectors at any time.
9.	Restricted working hours: Sand mining operation has to be carried out between 7 am to 5 pm.
10.	Pollution due to dust, exhaust emission or fumes during mining and processing phase should be controlled and kept in permissible limits specified under environmental laws.
11.	Restoration of flora affected by mining should be done immediately. Twice the number of trees destroyed by mining be planted preferably of indigenous species;
12.	No overhangs shall be allowed to be formed due to mining and mining shall not be allowed in areas where subsidence of rocks is likely to occur due to steep angle of slope.
13.	No extraction of stone / boulder / sand in landslide prone areas.
14.	Dumping of waste shall be done in earmarked places as approved in the plan;
15.	Sand mining sites should not be located within 100 meters from the edge of National Highway and railway line, 60 meters from water reservoir, 25 meter from the edge of other roads except on special exemption from relevant authority.
16.	Junction at take-off point approach road with main road be properly developed with proper width and geometry required for safe movement of traffic by lease holder at his own cost.