



Application No: 230202000950

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



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ACRONYMS

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

1. The Environmental Management Plan EMP

1.1.Purpose Of The Emp

This Environmental Management Plan (EMP) is a risk strategy that contains logical framework, monitoring programs, mitigation measures, and management control strategies to minimize potential environmental impacts to insignificant level. It further stipulates the roles and responsibility of persons involved in the project.

1.2.Compliance To The Emp

This EMP is a legally binding document as given under the provisions of the Environmental Management Act, 2007 (Act No. 7 of 2007). The project proponent and its contractors must therefore adhere to the framework of this document.

2. Roles & Responsibilities

2.1.Environmental Compliance Officer (ECO)

This is an individual that represent the governing authority, MEFT. Depending on his/her work schedule, the ECO shall visit the site at any time for environmental inspection and monitoring

2.2.The Proponent

Remerald Investment cc, hereinafter as the “proponent” shall assume overall responsibility to ensure full implementation of the EMP.

Further the proponent must ensure to;

- Appoint a site Manager
- Ensuring that all workers are inducted on safety
- Safer working environment
- Provide workers with Personal Protective Clothing

- Monitor the employees works with regard to safety
- Ensure employees understand the guidelines of the Environmental Management Plan (EMP) and,
- Ensure the environment is protected.

2.3.Site Manager (SM)

The Site Manager will be responsible for the monitoring of daily operations and ensure adequate adherence to the EMP. He / She must ensure that a copy of the EMP is always available at project premises. Further, an induction should be conducted with all employees to be made understand the provision of this EMP.

2.4.Employees

- Adhere to the EMP
- Ensure to wear personal protective clothing at all times when working
- Report worn out PPE and request for replacement
- Adhere to the Company rules and policies

2.5.Disciplinary Action

The EMP is a legally binding document. Non-compliance to the EMP may result in punitive measure to be taken against the proponent such as;

- Legal action, fines, and/or
- Suspension of work (Through issuance of compliance order as per the EMA),
- Financial penalties

3. The Environmental Social Management Plan (ESMP) table

The EMP is developed to address critical activities involved in industrial digging / mining of underground resource. The commonality of mining in general is that, it involves land clearing, removal of top soil, digging, excavation and pilling of mined materials, loading and transportation of materials.

Environmental / Social Impact	Objective	Proposes Mitigation Measures	Monitoring Indicator	Party Responsible
Conversant with the EMP	To ensure that all staff / employees are familiar with the requirements of the EMP	<ol style="list-style-type: none"> 1. All employees must attend a comprehensive induction course of health and safety 2. The EMP must be well explained to employees. 3. Staff operating specialised equipment and heavy vehicle must be properly trained and informed of the potential risks associated with their tasks 	<p>Induction Minutes and Attendance Register, Signed by each and every staff member.</p> <p>Training certificate for machine operators</p>	Site Manager
	Disciplinary	1. Company must adopt a disciplinary system to discipline staff for non-compliance with the EMP, such as driving heavy vehicle indiscriminately outside demarcated areas.	Disciplinary meetings and actions	Site Manager

Environmental / Social Impact	Objective	Proposes Mitigation Measures	Monitoring Indicator	Party Responsible
	Availability of the EMP on site for ease of reference	1. Ensure that a copy of the EMP is kept on site and accessible	Physical view of the EMP	Site Manager
Communication	To ensure effective communication throughout	1. Develop a communication strategy 2. Correspondences must be in writing 3. The contact numbers for the Site Manager must be available and displayed onsite in case of emergencies.	Communication Strategy Letters, e-mail, Notices, Minutes	Site Manager
Employment opportunities for Locals	Promote benefits to the local community	1. Recruit locals for unskilled labour 2. Keep good working relation in accordance with the law	Employee structure and proportion of local employment	Site Manager

Environmental / Social Impact	Objective	Proposes Mitigation Measures	Monitoring Indicator	Party Responsible
HIV / AIDS	Provide HIV / AIDS awareness to employees	<ol style="list-style-type: none"> 1. Provide HIV / AIDS awareness at induction 2. Avail Condoms at site 	<p>Availability of condoms at construction site</p>	Site Manager
Alcohol and Drug use	Prevent alcohol and drug use at the site	<ol style="list-style-type: none"> 1. Ban and warn the employees against the use of alcohol and drug at work 2. Provide awareness on the dangers and health impacts of alcohol and drug use 3. All employees must be screened with the breathalyser to avoid intoxicated personnel on site 	<p>Drunk / Misbehaving employees</p> <p>Breathalyser report</p> <p>Monitor presence of alcohol at the construction site</p>	Site Manager

Environmental / Social Impact	Objective	Proposes Mitigation Measures	Monitoring Indicator	Party Responsible
Security	Orientation of workers about security for equipment and themselves	1. Orientate all staff about the security of equipment and themselves & provide contact numbers for Police and other emergency services e.g. Ambulance	Proof of security orientation and emergency contact numbers	Site Manager

Environmental / Impact	Objective	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
Health and Safety	Ensure safety of workers	<ol style="list-style-type: none"> 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. Occupational health and safety measures must be implemented in accordance to the Health and Safety Regulations Government Notice 156/1997 (GG 1617) and other relevant laws and legislation 4. Train employees on personal safety and how to handle equipment and machinery 5. Provide protective eye glasses, dust masks and ear muffs to all 	<p>Health and Safety included and reflected in the Induction Minutes</p> <p>Adequate protective gear for all staff</p>	Site Manager

Environmental / Impact	Objective	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
		<p>employees operating in a dusty or noisy environment</p> <p>6. Provide sufficient fire extinguishers and train staff on how to use them and their applications thereof and must be well inspected at all time</p> <p>7. Provide an adequate first aid kit to well-trained employees</p> <p>8. No employees must be exposed to noise levels above the 85dB (A) limit over a period of 8 hours.</p> <p>9. Should the noise level be higher than 85dB (A), the employer must implement a hearing conservation program such noise monitoring, and a four hour shift</p> <p>10. Supply safe drinking water</p>	<p>Availability of fire extinguishers and evidence training (e.g. minutes, training pictures etc.</p> <p>Availability of the first aid kit onsite</p> <p>Mobile Toilet on site</p>	

Environmental / Impact	Objective	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
		11. Provide an ablution facility on site		
Community Health and Safety , Dust impact		<ol style="list-style-type: none"> 1. Trucks transporting sand must be covered during transportation 2. Use dust suppression measures such as water spraying to mitigate dust impacts. 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. 4. Avoid working during extreme windy times 5. Avoid unnecessary movement of vehicles on site 	<p>Records of complaints</p> <p>Accident records</p>	Site Manager

Environmental / Impact	Objective	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
		<ul style="list-style-type: none"> 6. Keep records of complaints to monitor community dissatisfaction 7. Operation must be limited to day hours only, from 05H00-18H00 8. Adequate safety signs must be put at designated places. 		

Environmental / Social Impact	Objective	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
Vehicle emissions	Reduce greenhouse gas (GHG) emissions from worn out equipment / vehicles / machinery	<ol style="list-style-type: none"> 1. All vehicles and equipment must be kept in good working condition and serviced frequently to prevent leakage and emission of poisonous smoke etc. 2. Switch off engines when vehicle is not operations 	<p>Vehicle servicing records</p> <p>Reports of smoke emissions from machinery</p>	Site Manager
Oil Leakages	Manage hydrocarbons, oils and lubricants leakages from construction vehicles and machinery to prevent pollution	<ol style="list-style-type: none"> 1. Servicing and fuelling of vehicles must be done at designated site with a proper bunded structure that would prevent spillage / seepage to the ground 2. No washing of vehicles and machinery on site 3. Soils contaminated with grease, oils and hydrocarbons must be collected and disposed of at approved site; 	Physical verification and routine monitoring	Site Manager

Environmental / Social Impact	Objective	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
		<ol style="list-style-type: none"> 4. Vehicle must be well serviced to prevent oil leakages 5. All stationary vehicles and machinery must have drip trays under to collect oils and lubricant leakages 6. If an oil leak occur, collect the contaminated soil, store in appropriate container and dispose of at appropriate waste disposal site 		
Solid Waste	To manage solid waste To prevent littering, pollution, contamination of water and general environmental health hazards	<ol style="list-style-type: none"> 1. Domestic Waste (Litter – cans, plastics, tissue, plastics etc.) must be disposed of at an appropriate site. 2. No onsite burying, dumping or burning of waste material shall be permitted. 	Scattered waste, Littering and any other unsightly waste at the site (eyesore)	Site Manager

Environmental / Social Impact	Objective	Proposed Mitigation Measure	Monitoring Indicator	Party Responsible
Water	To avoid possible water contamination	<ol style="list-style-type: none"> 1. Contaminated soils must be removed immediately and stored at a bunded designated area and only be disposed of at the approved waste disposal site 2. No washing of vehicles and machinery on site 3. Vehicle must be well serviced to prevent oil leakages 4. All stationary vehicles and machinery must have drip trays under to collect oils and lubricant leakages 5. 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 	Visual inspection	Site Manager

Environmental / Social Impact	Objective	Proposed Mitigation Measure	Monitoring Indicator	Party Responsible
Land Degradation	To prevent soil degradation and erosion	<ol style="list-style-type: none"> 1. Movement of heavy vehicles must be coordinated and restricted to be within the site and on access roads 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. 	Visual Monitoring	Site Manager

Environmental / Social Impact	Objective	Proposed Mitigation Measure	Monitoring Indicator	Party Responsible
Biodiversity Flora & Fauna	To protect trees	<ol style="list-style-type: none"> 1. Vehicles movement must be confined within the mining premises and on access roads only 2. Do not plant alien trees 3. Do not kill animals unless it poses eminent danger to human 4. Do not poach animals. Zero tolerance to poaching must be implemented 5. Do not allow snares and weapons on site 	Inspection report	Site Manager

Aspect	Objective	Action Required	Monitoring Indicator	Party responsible
Heritage Resources / artefacts	To preserve archaeological and heritage materials	<ol style="list-style-type: none"> 1. Workers must go through an induction course of the possible archaeological find possible in the area 2. Establish a “Chance Find Procedure” where if any archaeological finding (Heritage, human remains or artefacts) during site activities is encountered; <ol style="list-style-type: none"> a. The activity must be stopped immediately and the operation manager of that activity be informed b. The manager must oversee the cordoning off the area with a danger tape and take 	Sighting report/s of heritage resources / artefacts	Management or Site Manager

Aspect	Objective	Action Required	Monitoring Indicator	Party responsible
		<p>appropriate records and picture</p> <p>c. The manager must immediately report the findings to the National Museum (+264 61 276800) or the National Forensic Laboratory (+264 61 240461).</p> <p>3. No artefacts must be removed or be interfered with prior to authorisation from the Namibian National Heritage Council (NNHC)</p>		

4. 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.

5. Closure And Rehabilitation Plan

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.

5.1. 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.

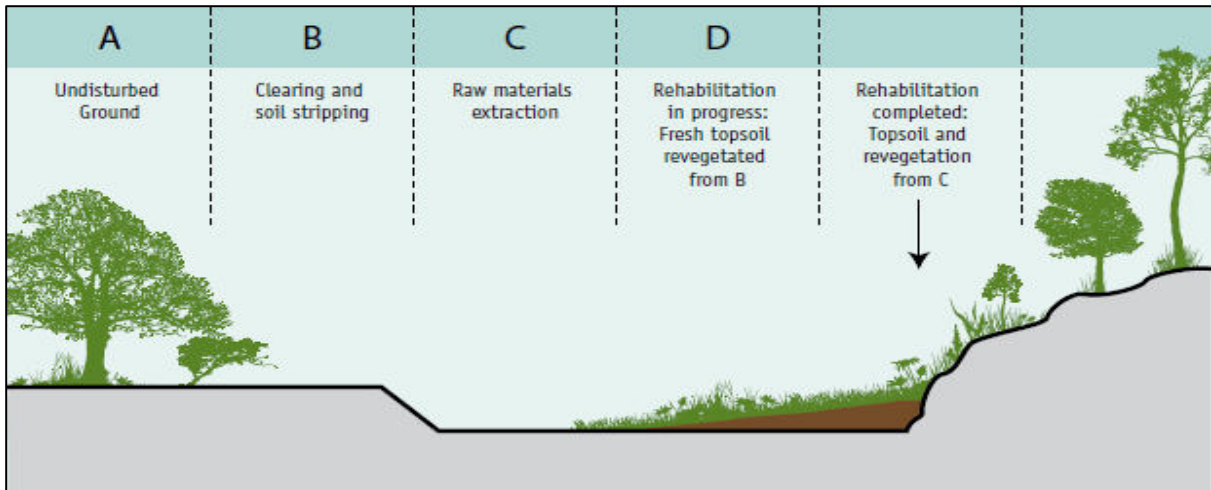


Figure 1. Progressive Rehabilitation (Source: Earth Resources 2015)

5.2. Rehabilitation guidelines

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 sloped at an angle that would prevent these risks. Conventionally, burrow pit are sloped to an angle 1:3 (Fig 8), where the slopes fall by one meter every three meter down.

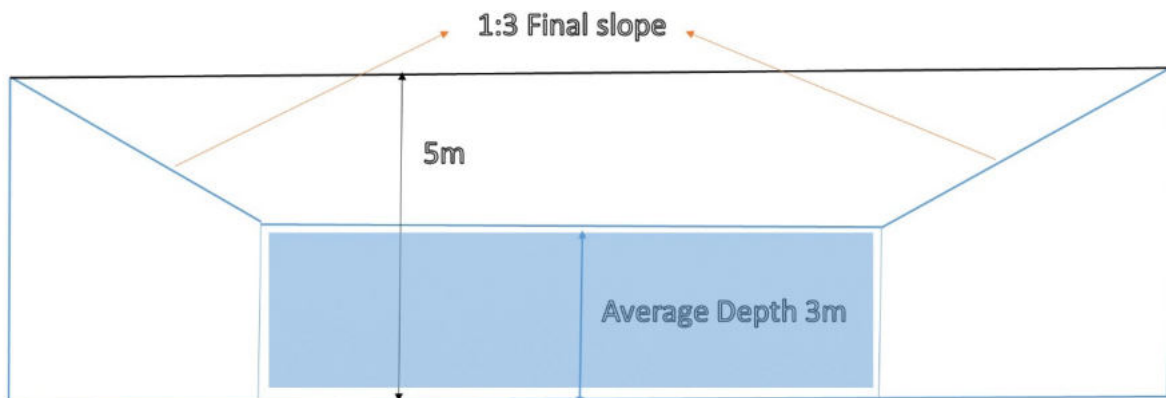


Figure 2. Illustration of the final slope (1:3 fall)

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

- b) 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.

6. Conclusion And Recommendations

6.1. Conclusions

The scope of this project was guided by site visit information, and comprehensive literature review to determine possible environmental impacts and the possible mitigation measure to the impacts concerning this project. Red-Dune believes that, analysis based on the collected information sufficiently addresses the environment and socio-economic aspects of the project. Further the project is expected to positively contribute to the socio-economic development for Gobabis local economy as well as at National level through contribution to the GDP.

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 showed negligible threat with the go ahead project” given that the proposed mitigation measure to possible social and environmental threats are adequately implemented. The Environmental Management Plan must be the logical framework for the project to mitigate environmental risks.

6.2. Recommendations

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;

7. Appendix 1. Sand Mining Conditions

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.