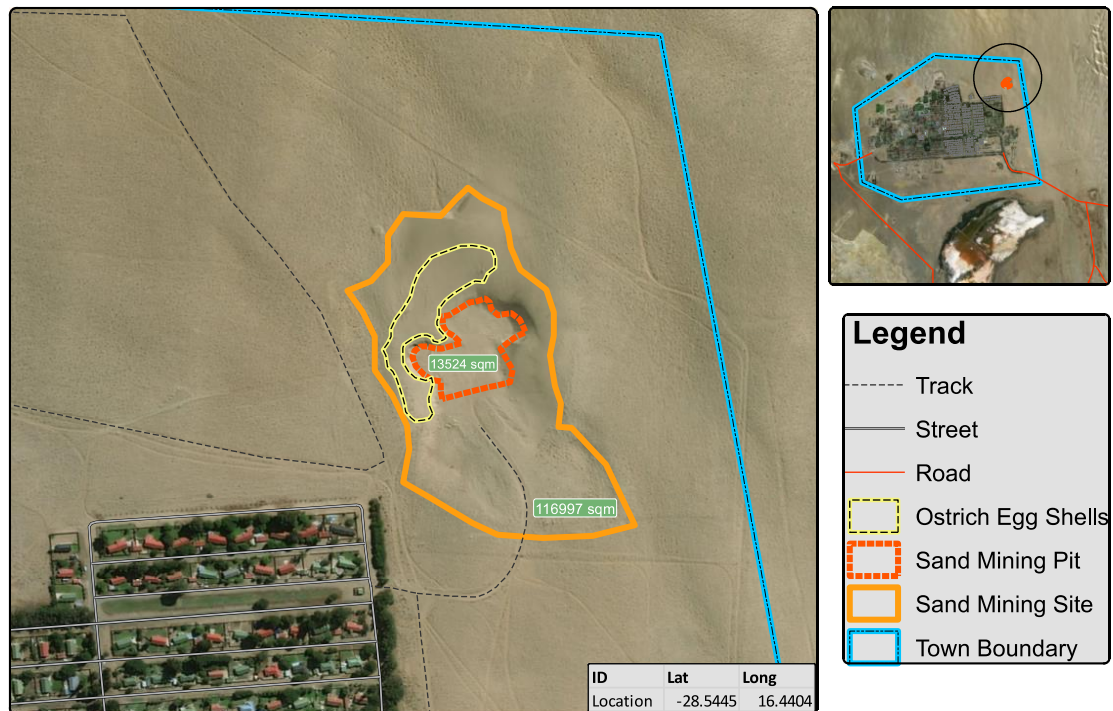


ENVIRONMENTAL MANAGEMENT PLAN (EMP)



ORANJEMUND SAND MINING SITE

0 87.5 175 350 525 700 Meters

Scale: 1:5,700

EXISTING SAND MINING ACTIVITIES, FOR THE ORANJEMUND TOWN COUNCIL, //KARAS REGION



June 2020



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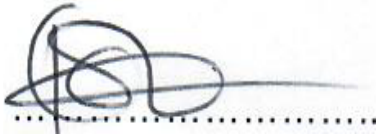
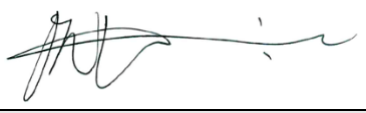



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DOCUMENT INFORMATION		
Title	Environmental Management Plan (EMP) for existing Sand Mining Activities	
ECC Application Reference number	APP: 001592	
Listed Activity	Activity 3: Mining and Quarrying Activities 3.2 The Other forms of mining or extraction of any natural resources whether regulated by law or not.	
Location	Oranjemund, //Karas Region	
Proponent	Oranjemund Town Council Contact person: Mr. Nestor Sheimi P.O. Box 178 Oranjemund Tel: +264 63 233 500 Mobile: +264 811 555 615 E-mail: health@ormdtc.com.na	
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Copy Right: <i>"This document is the intellectual property of TEC and may only be used for the intended purpose. Unauthorized use, duplication, plagiarism or copying without referencing is prohibited"</i>		
<div> <div> Office: +264 61 225 776 Mobile: +264 811 220 114 Email: info@tec.com.na Website: www.tec.com.na </div> <div> Tortoise Environmental Consultants (TEC)  One Step @ a time </div> <div> Unit 11, No 40 Elysium Fields Office Complex Berg Street Klein Windhoek </div> </div>		

Executive Summary

Sand is an important element for township development (construction of roads housing, landscaping, etc), and it is one of the key building blocks for socio-economic development, and hence sand mining is inevitable (cannot be avoided).

Socio-economic development is very important for our livelihood and provides services, income and employment opportunities, and hence activities such as sand mining are vital and necessary for development. However, such developmental activities should be conducted in a thoughtful and forward looking manner. In other words, such activities should consider the future land use after such activity has come to an end. Therefore to ensure that the land remains valuable for other land uses in the future, rehabilitation should be part and parcel of such developmental activity right from the beginning and throughout the project lifespan.

The Environmental Management Plant (EMP) recommends mitigation measures in order to ensure that the recommended sand mining activities and associated activities are conducted in an environmental friendly manner. Upon approval of the Environmental Clearance Certificate, the proponent (Oranjemund Town Council) should comply with the Environmental Management Act of 2007 and EIA regulations of 2012 and adhere to the recommended mitigation and rehabilitation measures as prescribed in the Environmental Management Plant (EMP). Furthermore, the EMP outlines specific roles and responsibilities for the proponent (ORTC and sub-contractors) and non-compliance is punishable.

At present, the existing borrow pit covers an area of approximately **1.4 ha** with an average depth of **3 meters**, and the recommended sand mining area is approximately **11.7 ha**. As part of the mitigation plan, it is relatively easier to rehabilitate a shallower borrow pit, as opposed to a deeper one. In other words, rehabilitation of the borrow pit becomes more difficult with increasing depth. It is therefore recommended that the depth of the borrow pit should not exceed 3.5 meters, to enable backfilling with the overburden (unwanted top soil) and to aid natural rehabilitation through sand deposits by the wind.

Henceforth, it is recommended that the continuation of the sand mining activities should rather extend over a larger area, as opposed to digging deeper and hence gradual expansion of borrow pit from the current **1.4 ha** to **11.7 ha** is recommended. With that approach, the excavated area has potential to recover and fill-up with wind-blown dune sand over time.

ACRONYMS

BID	Background Information Document
DEA	Department of Environmental Affairs
DSR	Draft Scoping Report
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
I&APs	Interested and Affected Parties
MEFT	Ministry of Environment, Forestry and Tourism
PPE	Personal Protective Equipment
SM	Site Manager
TEC	Tortoise Environmental Consultancy



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1. INTRODUCTION

1.1. Demand for Sand

Like many other towns in Namibia, the town of Oranjemund requires sand in-order to meet the demand for township and other developmental activities in the town. The borrow pit is located within the town boundaries, albeit on the outskirts of the current township infrastructure development (figure 2.1).

Pit location: GPS coordinates: Latitude: -28.5445 & Longitude: 16.4404

1.2. Ongoing Sand Mining Activities and EMP Scope

The sand mining activity is already taking place and hence the development of the Environmental Management Plan is more of a remedial action to ensure compliance to the Environmental Management Act (Act No. 7 of 2207) and EIA regulations (Government Notice no: 30, 2012).

1.3. Environmental versus Economic Development

Namibia's economy is highly dependent on a healthy environment and striking a balance in meeting demands for economic development (e.g sand mining) and maintaining biological diversity can be a challenge. Therefore, it is of utmost importance that the environment and development sectors should work together and identify synergies in order to ensure that natural resources are harvested in an acceptable and sustainable manner.

Development takes place on land (in the environment) and hence the quest for economic development requires a trade-off with certain parts of the environment in-order for the development to be realized. Meaning, for development to take place, some part of the environment will be affected. However, it is of utmost importance that such impacts are mitigated through the EMP.

The aim of environmental assessments is to guide the sustainable utilization of natural resources and to mitigate negative impacts that would otherwise compromise the environmental integrity and future ecosystem benefits.

1.4. Sand Mining Rationale

To supply sand for:

- **Township development:** Construction of houses and other buildings
- **Industrial:** Road construction and storm water control
- **Landscaping:** Back filling and levelling

1.5. Environmental management plan (EMP) Context

This document constitutes the Environmental Management Plan (EMP) for the continuation of the sand mining activities for the Oranjemund Town Council.

1.6. What is an EMP?

The Environmental Management Plan (EMP) is a tool used to mitigate potential environmental risks associated with the proposed project / activity, and provides a risk management strategy and logical framework for implementation of the proposed sand mining activities, in order to mitigate potential environmental and social impacts identified during the EIA process, in accordance with the provisions of the Environmental Management Act (Act No.7 of 2007), EIA Regulations of 2012 and any other relevant / applicable legislation.

As a result, the EMP recommends mitigation measures in order to ensure that the recommended sand mining activities and associated activities are conducted in an environmental friendly manner, and in accordance with the provisions of the Environmental Management Act and EIA regulations

Furthermore, the EMP outlines specific roles and responsibilities for role-players against which they can be evaluated and non-compliance is punishable.

1.7. Purpose of the EMP

The purpose of the EMP is to identify potential environmental and social impacts associated with the sand mining activities, in-order to ensure compliance to the EMA.

The aim of the EMP is to ensure that the activities undertaken during the renewal of the sand mining activities are conducted in accordance with the following:

- i. Environmental Management Act (No. 7 of 2007),
- ii. EIA regulations of 2012 (GN: 30), and
- iii. Best environmental practices (benchmarks)
- iv. Any other applicable legislation (*as presented in Table 3.1 to 3.3*)

The EMP provides environmental guidelines to be followed throughout the lifespan of the sand mining activities and comprise of the following:

- a) Environmental Aspects,
- b) Management Objective,
- c) Mitigation Measures / Actions Required,

- d) Monitoring Indicators, and
- e) Party Responsible

1.8. Objective

The objective of the EMP is to prevent / minimize (where possible), unacceptable and adverse environmental, social or economic impacts that may arise from the proposed development. Overall, the EMP aims to minimise negative impact/s (real, potential or perceived) that may result from the proposed sand mining activities.

1.9. EMP Scope

The EMP does not only focus, and it is not limited to the sand mining borrow pit, but it includes the bigger picture, and serve as the guiding tool to protecting the natural, bio-physical and socio-economic environment on both the specific site and the surrounding area. The bigger picture is important because, some impacts may not be confined to the margins of the borrow pit.

1.10. Possible adjustments to the EMP

The EMP is an open-ended document and maybe considered inconclusive. In other words, the EMP should allow room for adjustments if new information becomes available at a later stage, in which new / additional mitigation measures may become necessary.

The necessity of possible adjustments to the EMP at a later stage may be attributed to:

- a) Lack of information at the time of drafting the initial EMP,
- b) Evolution or addition of new activities, or
- c) Unintended omission of potential impacts during the initial EIA scoping exercise and development of the initial EMP.
- d) Development of industry best practice.

This implies that, in-addition to the information contained herein, any other relevant information that may surface during the construction operations, through internal monitoring or auditing by the Environmental Compliance Officers (ECOs), can be added to the EMP (evolution of activities), and such changes or inclusions will be binding to the proponent and all contractors / sub-contractors.

1.11. Implementation Framework and Accountability to the EMP

For effective implementation of the EMP, the Institutional roles are presented below. However, the specific roles and responsibilities are defined and broken down as presented in Sections 4 and 5, respectively.

Table 1-1: Role players, Institutional Framework

Role-player	Company / Institution	Role
Proponent	Oranjemund Town Council	Compliance to the EMP
Environmental Consultant	Tortoise Environmental Consultants (TEC)	Development of the EMP
Environmental Compliance Officer/s (ECO)	Ministry of Environment & Tourism (MET) – Department of Environmental Affairs (DEA)	Monitoring Compliance to EMP: <ul style="list-style-type: none"> ➤ Un-announced spot checks, ➤ Corrective measures, warning, penalties / fines, license suspension, etc
Public	Interested and affected parties (I&APs)	Report to the ECOs, any activity of environmental concern (e.g Pollution, safety risks, etc)

2. PROJECT INFORMATION

2.1 Project Location

The sand mining borrow pit is located within the town boundaries, albeit on the outskirts of the current township infrastructure development (figure 2.1).

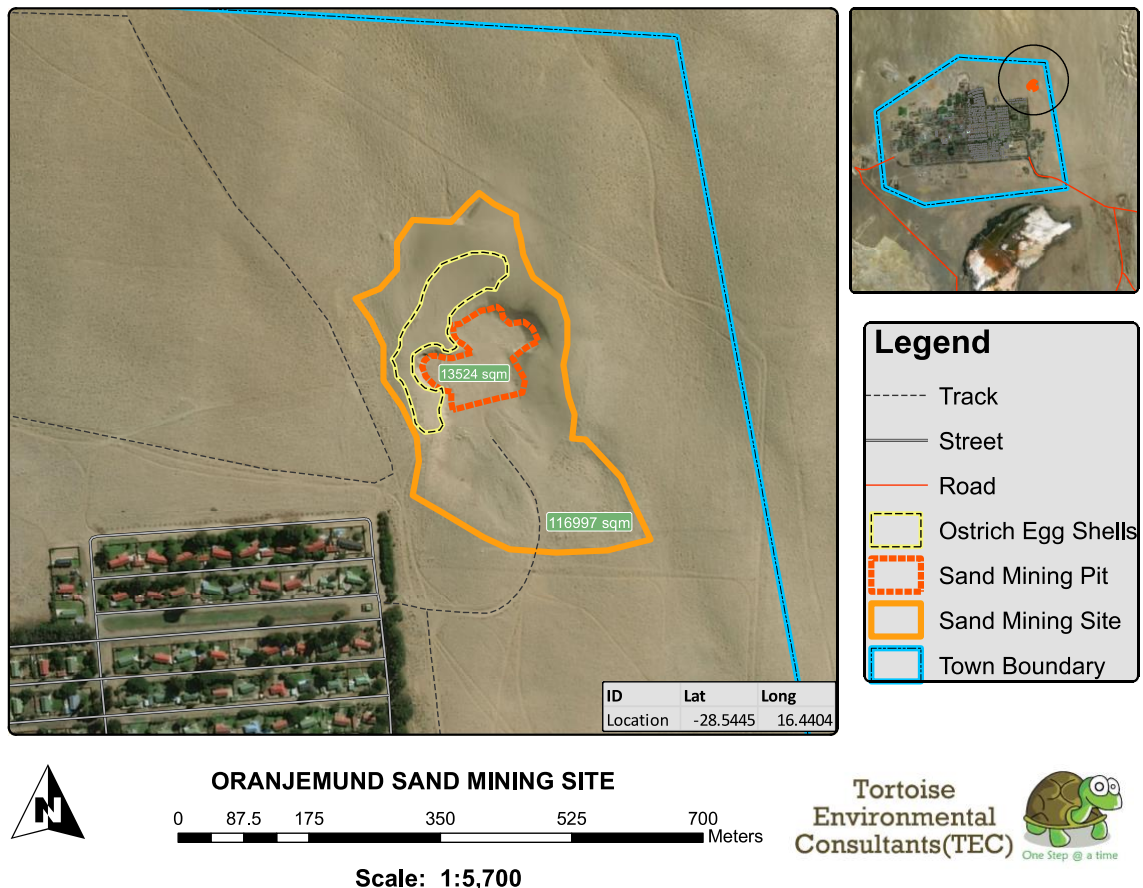


Figure 2-1: Location of the sand mining borrow pit (existing)

2.2 Biodiversity and ecology of the area

2.2.1 Succulent Karoo Biome

The Oranjemund town falls within the Succulent Karoo Biome, which is renowned for its high species richness, of which 13.5% are endemic and it is one of the 35 globally recognized biodiversity hotspots (Burke, 2006). Endemic implies that such species are restricted to a particular area and does not occur anywhere else in the world.



Figure 2-2: Succulent Karro has high species richness & endemism

Due to the high species richness and high level of endemism, the Succulent Karoo biome is fragile to developmental activities and reckless developmental activities can cause irreversible damage to the environment (particularly endemic plant species), and hence precautionary measures should be applied in order to minimise potentially negative impacts, at all times.

2.2.2 Vegetation – Sand Mining Site

Despite the high species richness and endemism in the Succulent Karoo, sand mining site is comprises of sparsely distributed and limited vegetation cover, and mostly consist of sand dunes (Figure 2.3).



Figure 2-3: The Sand Mining Borrow pit and surrounding area comprises of sparsely distributed vegetation and mostly consist of sand dunes

The lack of vegetation within and around the borrow pit, implies that no vegetation will be affected by the sand mining activities.

2.2.3 Wildlife

Wildlife species such as gemsbok, springbok and ostrich occur in and around the town of Oranjemund, with minimal or no apparent disturbance from the sand mining activities.

2.2.4 Climatic Conditions (rainfall and wind)

The Succulent Karoo climate and particularly the area surrounding the town of Lüderitz is very arid and is dominated by prevailing wind as a result of its proximity to the South Atlantic high pressure system and wind is very important element for the rehabilitation of the borrow pit, as outlined in the section 4 (rehabilitation).



The Succulent Karoo is characterized by low winter rainfall (average 40-90 mm per year). The amount of rainfall may vary from year to year. Because rain falls in the colder half of the year, the effect of evapo-transpiration is reduced, plants and animals can thrive at relatively low rainfall levels that would be too low to support similar populations in summer rain falls areas. Being a coastal town, the low rainfall is also completed by fog (which occurs more frequent the rain).

2.2.5 Affected Area (Sand Mining)

The sand mining site measures $116,997 \text{ m}^2 / 10,000 = \mathbf{11.7 \text{ ha}}$ and the existing borrow pit (mined area), measures $13,524 \text{ m}^2 / 10,000 = \mathbf{1.4 \text{ ha}}$ and. The total surface area of the Tsau //Khaeb (Spergebied) National Park equals to $26,000 \text{ km}^2 \times 100 = \mathbf{2,600,000 \text{ ha}}$ (2.6 million ha). Therefore, proportionally, the affected area is only $11.7 \text{ ha} / 2,600,000 \text{ ha} = \mathbf{0.000005\%}$ for which biodiversity loses may occur. The affected area is very small and in comparison to the entire landscape with similar characteristics and can be considered insignificant. Nonetheless, The Succulent Karoo Biome is a global biodiversity hotspot and necessary precautions should be taken throughout the sand mining lifespan.

3. COMPLIANCE AND LEGAL FRAMEWORK

This chapter outlines the regulatory framework applicable to the proposed project. Table 2 provides an overview of applicable policies, plans and strategies and Table 3.1 provides a list of applicable national legislation.

3.1 Compliance to the EMP

The EMP is binding to the proponent, and all contractors / sub-contractors. This implies that each and every entity that may have any kind of engagement or involved in / with the activities of the renewal of the sand mining activities should comply with the EMP throughout the project lifespan. Non-compliance may have serious consequences e.g License withdrawal.

3.2 Environmental Management Act (No.7 of 2007)

Section 27 of the Environmental Management Act 2007 (Act No. 7 of 2007) (EMA) provides a list of activities that may not be undertaken without an Environmental Clearance Certificate (ECC) (herein referred to as: listed activities). The proposed expansion of the hospital triggers the following listed activities.

The EMP should conform to the provisions of the Environmental Management Act (EMA), Act No. 7 of 2007 and EIA regulations of 2012 (Government Notice: 30).

The EIA Regulations defines a '*Management Plan*' as:

"...a plan that describes how activities that may have significant impacts on the environment are to be mitigated controlled and monitored."

3.3 EMP Requirements

Table 3-1: EMP Requirements as outlined in Section 8 of the EIA Regulations

Requirement
<p><i>(j) a draft management plan, which includes –</i></p> <p><i>(aa) information on any proposed management, mitigation, protection or remedial measures to be undertaken to address the effects on the environment that have been identified including objectives in respect of the rehabilitation of the environment and closure;</i></p>



(bb) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of the activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and

(cc) a description of the manner in which the applicant intends to modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation remedy the cause of pollution or degradation and migration of pollutants.

3.4 Listed Activities

Listed Activities may not be undertaken without an Environmental Clearance Certificate (ECC), and hence an Environmental Impact Assessment (EIA) is required.

As the organ of state responsible for management and protection of its natural resources, the MET: DEA is committed to pursuing the principles of environmental management. The EMA provides a list of activities that require an EIA and the proposed sand mining is among the listed activities or activities that may not be conducted without at ECC. The purpose of listed activities for projects is to ensure that the associated impacts on the environment are carefully considered.

The proposed continuation of sand mining triggers a number of Listed Activities as set out in the Environmental Management Act, 2007 (Act No. 7 of 2007) (herein referred to as the EMA) and the Environmental Impact Assessment Regulation, 2007 (No. 30 of 2011) (herein referred to as the EIA Regulations).

Table 3-2: Listed Activities triggered by the proposed project

Activity	Applicability
3. Mining and Quarrying Activities	The project entails Sand Mining activities to support industrial and developmental activities in Oranjemund
3.2 The Other forms of mining or extraction of any natural resources whether regulated by law or not.	

3.5 Extended developmental and Legal Framework

In addition to the EMA and the Environmental Assessment Policy, there exists a host of legal and policy documents and guidelines that must be considered when undertaking an EIA as indicated in table 3.2, below. The proponent has the responsibility to ensure that the sand mining operations conforms to all other National developmental plans and legal framework.

Table 3-3: Policies, Plans and Strategies

Policy / Plan	Relevance	Applicability to the Proposed Project
5th National Development Plan (NDP) and Vision 2030	Outlines the country's National Development Plans (NDPs), in line with the Harambee Prosperity Plan (HPP) and vision 2030	<p>The proposed project is a development that forms part of the bigger picture of achieving economic progression, social transformation and environmental sustainability.</p> <p>Agriculture as a pillar for social well-being, through food production, household income and improved livelihoods</p>

Table 3.2: Other Legal Instruments / National Statutes

National Statutes	Relevance	Applicability to the Proposed Project
Environmental Assessment Policy (1995)	Promotes Sustainable development and Environmental Conservation emphasize the importance of environmental assessments as a key tool towards environmental sustainability	Environmental Protection
Soil Conservation, 1969 (Act 76 of 1969) and the Soil Conservation Amendment Act (Act 38 of 1971)	Makes provision for the prevention and control of soil erosion	Monitor and apply the soil conservation mechanisms
Forest Act 12 of 2001 Forest Act Regulations 2015	To provide for the protection of the environment and the control and management of forest. Relevant sections: - Approval required for the clearance of vegetation on more than 15	Forestry permits maybe required for vegetation clearing



National Statutes	Relevance	Applicability to the Proposed Project
	<p>hectares (Section 23, subsection 1 (b)).</p> <ul style="list-style-type: none"> - Tree species and any vegetation within 100m from a watercourse may not be removed without a permit (Section 22, subsection 1 (b)) 	
Public Health Act (Act No. 36 of 1919)	Advocates for Public Health and safety	Protective clothing
The Occupational Safety and Health Act No. 11 of 2007	Advocates for employee and public safety, health	In the working context "SAFETY" implies "free from danger"
National Heritage Act, No. 27 of 2004.	The Act provides provision of the protection and conservation of places and objects with heritage significance.	Refer to handling procedures presented in the Scoping Report

4. ROLES AND RESPONSIBILITIES

This section outlines the roles and responsibilities of the key personnel responsible for the day to day management of activities to ensure effective implementation of the EMP.

4.1 Roles and Responsibilities

Assignment of responsibilities is necessary to ensure that key procedures are followed. Ultimately, the overall responsibility for the implementation of the EMP lies with the proponent (ORTC).

To ensure accountability, it is necessary to assign responsibilities. The key role-players for project implementation are;

- a) The **Environmental Compliance Officer (ECO)** representing the Ministry of Environment, Forestry and Tourism (MET), or an appointed independent environmental officer, who is responsible for monitoring and auditing.
- b) **The Proponent: (ORTC).**
- c) **The Site Manager** the person responsible for the management of the sand mining activities project.

4.1.1 The Environmental Compliance Officer (ECO):

The ECO refers to the party responsible for the environmental monitoring and auditing to ensure that the provisions of the EMP are complied with.

The ECO shall have adequate environmental knowledge to understand and interpret the EMP and pertaining environmental aspects associated with the project. The specific tasks of the ECO are as follows:

- To undertake all monitoring and auditing activities in-order to ensure compliance with the EMP.
- Conduct inspections and monitoring at reasonable intervals (e.g. every month, quarterly or annually), throughout the duration of the project. Depending on the risks, some projects may require regular inspections.
- Issue compliance or non-compliance orders to the proponent, contractors / sub-contractors.
- Compile compliance Reports pertaining to any non-compliance incident/s, and a Rehabilitation Report following the conclusion a specific activity.

- Liaise closely with all key stakeholders i.e. the Site Manager and the Environmental Commissioner.
- Provide guidance on any environmental management issues, incidents or emergencies that may arise throughout the project lifespan.
- Assist in providing recommendations for remedial action in the event of non-compliance.
- Auditing or monitoring activities may involve investigation, as well as structured observation, measurement, and evaluation of environmental data over a period of time.

4.1.2 The Proponent:

The proponent, hereinafter referred to as ORTC, shall assume overall responsibility to ensure implementation of the EMP and will be held accountable against the remedial measures outlined herein. It is recommended that the client should appoint a Site Manager who will be responsible for monitoring of daily operations.

The specific responsibilities of The Proponent are as follows:

- Appoint a Site Manager (SM) to oversee the daily onsite activities.
- Liaise closely with the SM and ECO on any environmental management issues, incidents or emergencies.
- Ensure that all activities on and around the site are conducted in accordance with the requirements of the EMP at all times.
- Ensure that all sub-contractors and visitors to the site are conversant with the requirement of the EMP, relevant to their roles on site.
- Shall develop a **communication strategy** between The Proponent, Project Manager, workers, the ECO and any other relevant stakeholder.
- Shall develop an **organisational structure** to ensure that:
 - There are clear channels of communication;
 - There is an organisational hierarchy for effective implementation of the EMP; and
 - Conflicting or contradictory instructions are eliminated;
 - Ensure that all instructions and official communications regarding environmental matters shall follow the organisational structure as determined
 - Ensure that that EMP requirements are assigned to specific people / positions with the capacity and experience required for implementation.

4.1.3 The Site Manager:

The **Site Manager (SM)** should:

- Ensure that each team recruited to work at the sites, adheres to the EMP;
- Ensure that a **copy of the EMP is kept on site at all times and as it may be requested by authorities conducting spot checks at any time.**
- Ensure that all staff attend an induction session before commencement of any work on site and that they are adequately informed of the requirements of the EMP;
- Take special care to prevent irreversible damage to the environment

4.2 Instructions

All instructions and official communications shall follow the organisational structure as determined by the Proponent. Based on the adopted structure, it is essential that responsibilities outlined are assigned to specific parties with adequate capacity and experience required to implement the EMP.

4.3 Disciplinary Actions

The EMP is a legally binding document. Non-compliance with the EMP may result in disciplinary action being taken against the Proponent. Such actions may take the form of;

- Financial penalties, Legal action, fines, and/or Suspension of work.

The disciplinary action shall be determined according to the nature and extend of the non-compliance, and exact penalties are to be weighed against the severity of the incident.

5. POTENTIAL IMPACTS AND MITIGATION MEASURES

5.1 Approach to mitigation measures

To enable a systematic approach to impact identification, specific aspects have been identified and for each aspect, specific mitigation measures have been recommended Table 5. It is important to note that this EMP is for the continuation of sand mining activities from existing borrow pit to meet the township development requirements of the ORTC.

Table 4. EMP Impact Identification Section and Associated Aspects

EMP Implementation / Potential Impact Category	Specific Aspects
A. Staff Induction	EMP Provisions (Do's and Don'ts)
	HIV / AIDS
	Communication Channels
B. Operational Phase	Access Roads
	Site Demarcation
	Notice Board
C. Environment and Pollution	Vehicle emissions
	Oil Spills
	Soil Erosion
D. Health and Safety	Safety at Work Place
	Dust
	Noise
E. Socio Economic	Employment opportunities for locals
	Drug and Alcohol abuse
	Working hours
	HIV / AIDS
F. Cultural Heritage	Heritage resources / artefacts

SECTION A: STAFF INDUCTION

Aspect	Objective	Proposes Mitigation Measures	Monitoring Indicator	Party responsible
Staff induction	To ensure that all staff / employees are conversant with the requirements of the EMP	<ul style="list-style-type: none"> Induction for all staff / employees on the provisions of the EMP before work commencement, covering but not limited to: environmental awareness, emergency response, Reporting of incidents, HIV/AIDS awareness, alcohol and substance abuse, and Safety, Health and Environment (SHE) measures Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks Quarterly induction reviews 	Induction Minutes and Attendance Register, Signed by each and every staff member Staff members appointed at a later stage should also undergo induction Quarterly minutes	Site Manager
	Punitive measures for staff, to ensure compliance	<ul style="list-style-type: none"> Adopt a disciplinary system to discipline staff for non-compliance, such as littering, speeding, safety risk both to themselves and to others, not using ablution facilities, etc. 	Number of fines/warning issued daily/Monthly	Site Manager
	Availability of the EMP on site for ease of reference	<ul style="list-style-type: none"> Ensure that a copy of the EMP is kept on site and accessible to team leaders 	Availability of EMP on site and accessibility to team leaders	Site Manager
Communication	To ensure effective communication throughout the project lifespan	<ul style="list-style-type: none"> Develop a communication strategy (Channel and medium of communication) All correspondence should be written and signed off by witnesses (e.g. Site manager) The contact numbers for the Site Manager or Site Foreman must be available onsite (displayed) in case of emergencies. 	Communication Strategy Letters, e-mail, Notices, Minutes	Site Manager

SECTION B: OPERATIONAL PHASE

Aspect	Objective	Action Required	Monitoring Indicator	Party responsible
Access Roads	Prevent driving all over the place	<ul style="list-style-type: none"> Access road are established already New roads may only be established if extremely necessary (An amendment to the EMP must be done) Access roads should be repaired and maintained at acceptable standards All driving must strictly be on access roads 		Site Manager
Site Demarcation	Contain all project activities within the site boundaries	<ul style="list-style-type: none"> The mining area must be clearly demarcated by means of pegs/markers at all corners of the site and along its boundaries (where practical). Permanent pegs/markers must be firmly erected and maintained in their correct position throughout the life of the operation. The sand mining site must be fenced off, to ensure public and wildlife safety 	Visible fence around the project site	Site Manager
General Notice Board	To notify and warn the public of the project activities	<ul style="list-style-type: none"> A general notice board is on site, and must be well maintained 	Notice Board – Visible and Clear	Site Manager

SECTION C: ENVIRONMENT AND POLLUTION

Aspect	Objective	Action Required	Monitoring Indicator	Party responsible
Vehicle emissions	Reduce greenhouse gas (GHG) emissions from poorly maintained or malfunctioning equipment (vehicles / machinery	<ul style="list-style-type: none"> All vehicles and equipment shall be kept in good working condition and serviced regularly (in accordance with the servicing frequency of the specific machinery), in order to prevent leakage and emission of poisonous smoke etc. Switch off engines when vehicle is not operations 	<p>Vehicle servicing records</p> <p>Reports of smoke emissions from machinery</p>	Site Manager
Oil Spills	Manage oil spills and leak from heavy vehicles and Machinery	<ul style="list-style-type: none"> Provide drip trays to prevent potential oil leakage Re-fuelling of machinery (e.g excavator / front loader) must be done at appropriate site with impermeable concrete bunding There must be an immediate spill response kit on site and ff an oil spill occurs, collect the contaminated soil, store in drums and dispose at appropriate waste disposal site (e.g. ORTC disposal site) 	Observation of soil contamination	Site Manager
Soil Erosion	To mitigate soil erosion	<ul style="list-style-type: none"> Only use the existing access road to and from the site, do not form other tracks Implement continuous rehabilitation measures, by trimming and smoothing the slopes to be less than one third of the initial slope (1:3). 	Physical Observation	Site Manager
Solid Waste	To prevent littering, pollution, contamination of water and general environmental health hazards	<ul style="list-style-type: none"> All waste produced on site should be contained and disposed as required by law. There must be sufficient temporally ablution facility at the site for designated for males and female. 	Scattered waste, Littering and any other unsightly waste at the site (eyesore)	Site Manager

SECTION D: HEALTH AND SAFETY

Aspect	Objective	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
General Safety at Work Place	Ensure that the safety of workers is not compromised and adhere to the Health and Safety Regulations, Government Notice 156/1997 (GG 1617)	<ul style="list-style-type: none"> Develop a Health and safety Plan (should be part of the induction) Ensure that every employee goes through a safety induction; Employees must be equipped with all necessary Personal Protective Equipment (PPE). These includes, Helmet, Overall, Safety Shoes, Safety Glasses, Gloves, Welding shield, Earmuff etc; Provide first aid kits to operators; Only qualified personnel must be allowed to operate special machinery (e.g earthmoving machinery) Adequate safety signs must be displayed on site. 	<p>Health and Safety included and reflected in the Induction Minutes</p> <p>Adequate protective gear for all staff</p> <p>Availability of the first aid kit onsite</p> <p>Record of warnings</p> <p>Visible safety signs on site</p>	Site Manager
Dust	Mitigate dust and noise impacts to both employees and the public	<ul style="list-style-type: none"> Provide dust masks and ear muffs to all employees operating in a dusty or noisy environment Reduce vehicle speed on gravel roads All vehicles transporting sand or gravel should be covered with a tarpaulin, or any other suitable material, and, Industrial speed limits of 30 – 40km/h must be maintained 	<p>Incident Report</p> <p>Public Complains</p>	Site Manager
Noise		<ul style="list-style-type: none"> Employees must NOT be exposed to noise levels above the required -85dB (A) limit over a period of 8 hours. Should the noise level be higher than 85dB 		

Aspect	Objective	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
		<p>(A), the employer must implement a hearing conservation program such as noise monitoring;</p> <ul style="list-style-type: none"> • Provide worker with earmuffs • Vehicles and machines must be well serviced to avoid unnecessary noise emission • Limit the movement of earth moving machinery and heavy vehicles (tipper trucks) to daylight: 06:00AM – 18:00 PM 		
Ablution	Reduce health risks and environmental pollution	<ol style="list-style-type: none"> 1. Ensure adequate, hygienic (clean) and user friendly ablution facilities for all staff. 2. Inspect ablution facilities regularly 	availability, cleanliness and hygienic ablution facilities	Site Manager

SECTION E. SOCIO ECONOMIC ASPECTS

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
Employment opportunities for Locals	Promote benefits to the local community	<ul style="list-style-type: none"> Recruit locals for unskilled labour Where possible, procure materials from local suppliers 	Employee structure and proportion of local employment	ONPTC
Alcohol and Drug use	Prevent alcohol and drug use at work	<ul style="list-style-type: none"> Ban and warn the employees against the use of alcohol and drug at work Provide awareness on the dangers and health impacts of alcohol and drug use 	Drunk / Misbehaving employees Monitor presence of alcohol at work	Site Manager
Working hours	Adhere to the Labour Act No. 11 of 2007	<ul style="list-style-type: none"> Operate within the prescribed working days and hours as per the Namibian Labour laws and regulations 	Verification of working hours against the labour Act	Site Manager
HIV / AIDS	Provide HIV / AIDS awareness to employees	<ul style="list-style-type: none"> The Ministry of Health and Social Services provides free condoms to all public amenities and health care centers. Arrange for HIV awareness for employees; 	Availability of condoms at work Minutes for induction course	Site Manager

SECTION F. HERITAGE AND ARCHAEOLOGY

Aspect	Objective	Action Required	Monitoring Indicator	Party responsible
Heritage Resources / artefacts	Reduce the impacts borehole drilling and associated earthworks on heritage resources / artefacts	<ol style="list-style-type: none"> Heritage remains or artefacts discovered on site must be reported to the National Museum (+264 61 276800) or the National Forensic Laboratory (+264 61 240461). No artefacts must be removed or be interfered with prior to authorisation from the Namibian National Heritage Council (NHC) Recovery of heritage remains or artefacts discovered and removal thereof should be directed by the National Museum 	Sighting report/s of heritage resources / artefacts	Site Manager

6. REHABILITATION PLAN

Socio-economic development is very important for our livelihood and provides services, income and employment opportunities, and hence activities such as sand mining are vital and necessary for development. However, such developmental activities should be conducted in a thoughtful and forward looking manner. In other words, developmental activities, such as sand mining should consider the future land use after such activity has come to an end. Therefore to ensure that the land remains valuable for other land uses in the future, rehabilitation should be part and parcel of such developmental activity right from the beginning and throughout the project lifespan.

The aim of the rehabilitation plan is to ensure soil conservation, prevent soil erosion, re-vegetation and to reduce safety risk (safety for both animals and people, particularly children) and to ensure that the borrow pit does not become an eye shore.

6.1 What is Rehabilitation?

Rehabilitation is the process of repairing and taking all necessary actions to limit the damage caused by the developmental activity, to minimise potential danger, to make the land suitable for other uses or simply to beautify the affected area (so that it does not become an eyesore). Rehabilitation can also be referred to as the measures taken to repair damaged environments (example refilling of borrow pits with the overburden, re-vegetating, removal of unwanted infrastructure / cleaning up, etc).

6.2 Designing a Rehabilitation Plan

A rehabilitation plan refers to a set of steps or measures to be taken in-order to ensure that negative impacts associated with the development at hand are mitigated. This however requires prior planning and integration of rehabilitation activities throughout the project lifespan. Meaning, rehabilitation measures should be taken right from the beginning of the project.

The environmental characteristics of an area where a project is located plays a vital role in designing a rehabilitation plan.

6.3 Rehabilitation Approach

The borrow pit is situated in an area that is characteristic of wind occurrences. Wind often carries along and blows sand around (from place to another).

The ecological sensitivity of the area and the potential capacity as a touristic area requires that the sand mining activities be undertaken in a responsible and environmental friendly manner. Balancing the demands of progressive development with that of nature is not always clear cut. The importance of minimal disturbance to the general area surrounding the borrow pit is therefore highly recommended in order to safeguard the environment.

Although the site seems barren and devoid of living organisms, the special characteristics of desert life supports a diverse animal life of which most are nocturnal (active during the night). Mining and all associated activities should therefore be restricted to the borrow pit and recommended sand mining area.

6.4 Recommended Measures

At present, the existing borrow pit covers an area of approximately 1.4 *ha* with an average depth of 3 meters and the recommended sand mining area is approximately 11.7 *ha*.

As part of the mitigation, it is relatively easier to rehabilitate a shallower borrow pit, as opposed to a deeper one. In other words, rehabilitation of the borrow pit becomes more difficult with increasing depth. It is therefore recommended that the average depth of the borrow pit should not exceed 3.5 meters, to aid natural rehabilitation through sand deposits by the wind, which occurs in Oranjemund rather frequently.

In other words, it is recommended that the continuation of the sand mining activities should rather extend over a larger area, as opposed to digging deeper and hence gradual expansion of borrow pit from the current 1.4 *ha* to 11.7 *ha* is recommended. With that approach, the excavated area has potential to recover and fill-up with wind-blown dune sand over time.

Table 6-1: Rehabilitation Plan

Aspect	Management Objective	Management Action	Action Frequency	Indicator / Data Source	Party responsible for implementation
Rehabilitation	To ensure disturbed areas are rehabilitated	All areas disturbed as a result of the mining activities, irrespective of whether they occur within the defined Working Area or not, shall be subject to the requirements outlined in this EMP.	Monthly report by borrow pit manager and/or Town Engineer	Physical verification and routine monitoring	Oranjemund Town Council (ORTC)
	Access roads to borrow site areas	All access roads to borrow sites shall be rehabilitated and closed off to prevent entry upon the closure of the project			
	Although land can rarely be rehabilitated back to its former natural state, every effort shall be made to address resultant impacts.	Ensure that the borrow pit depth does not exceed two (2) meters.			
		A shallow borrow pit, is easier to rehabilitate and rehabilitation can be aided by natural processes (wind).			
		The borrow pit edges and all steep slopes should be flattened, so that it does not become dangerous to animals			
		Remove any oil spills or any other pollutant and all foreign objects from the borrow pit itself and surrounding areas. Oil spills can lead to underground water pollution, can affect both plants and animals.			
		The overburden (unwanted sand, usually the top soil) should be collected and piled up so that it can be used for re-filling.			
		Landscaping – refers to re-shaping man-made landforms to blend in with the natural environment and all activities should be done in a gentle manner in order to limit the damage to the environment and the landscape at large.			

7. CONCLUSION

The EMP has identified and recommended measures to be adopted by the by the Oranjemund Town Council (ORTC) to manage the sand mining activities in accordance with the recommended measures and rehabilitation plan.

Currently, the borrow pit is the only source of construction material to meet the developmental requirements of the town. The town council would like to conform to the Environmental Management Act of 2007 and EIA regulations of 2012 and hereby commits itself to abide to the recommended mitigation and rehabilitation measures as prescribed in the Environmental Management Plan (EMP).

The Oranjemund Town Council intent to continue with the sand mining activities within the recommended mitigation and rehabilitation parameters. The continuation of sand mining activities is vital as it is the only source of sand to meet the development requirements of the town.

It is recommended that an Environmental Control Officer (ECO) and the town engineer, monitors the preparation, operational and rehabilitation of the borrow pit so as to ensure that the mitigation and rehabilitation measures prescribed in this report are adhered to.

The aim of the EMP is to ensure legal compliance to prevent environmental fatal flaws. Non-compliance against the EMP is punishable and specific responsibilities has been assigned to role players in-order to ensure that the EMP is implemented. The key role-players are defined under section 4 should:

- **Read** the EMP (particularly the Project Manager) and ensure that they are fully conversant with provisions of the EMP,
- If need be, **Ask for clarity** from the Environmental Assessment Practitioner (EAP), Environmental Compliance Officer (ECO) or relevant authority,
- Ensure implementation of the recommended mitigation measures, and
- Communicate defaults / challenges to the ECO as soon as possible.

The ECO should monitor (conduct periodic and unannounced EMP audits) in-order to ensure compliance against the recommended mitigation measures.

8. REFERENCES

Burke, A. (2011). Eleven Steps to Mining Rehabilitation, Windhoek, Namibia