ENVIRONMENTAL MANAGEMENT PLAN

SAND MINING FROM AN EXISTING BORROW PIT FOR CONSTRUCTION MATERIALS, LÜDERITZ TOWN COUNCIL

LÜDERITZ TOWN COUNCIL

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Tortoise Environmental Consultants (TEC)
One step @ a time

DOCUMENT INFORMATION	
Title	Environmental Management Plan (EMP) for an existing borrow pit used by the Lüderitz Town Council to source construction material
Activity	Sand Mining
Location	About 35 km northeast of Lüderitz, Namib Naukluft Park
Proponent	Lüderitz Town Council P. O. Box 19 Lüderitz Tel: +264 63 207800 Fax: +264 63 202971

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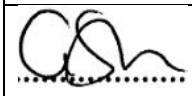

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ABBREVIATIONS

DEA	Department of Environmental Affairs
EAP	Environmental Assessment Practitioner
EC	Environmental Commissioner
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EO	Environmental Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act (No. 7 of 2007)
EMP	Environmental Management Plan
LTC	Lüderitz Town Council
MAWF	Ministry of Agriculture, Water and Forestry
MET	Ministry of Environment and Tourism

1 INTRODUCTION

This document constitutes the Environmental Management Plan (EMP) for an existing borrow pit. The borrow pit is used by the Lüderitz Town Council (LTC) to source construction materials for developmental projects within the townlands. The borrow pit has been used by the town council since independence, long before the enactment of the Environmental Management Act of 2007 and EIA regulations of 2012.

The Ministry of Environment and Tourism regional Office in Lüderitz alerted the Luderitz Town Council that it is illegal to continue with the Sand Mining without an Environmental Clearance Certificate and suspended the use of the borrow pit until the town council obtains approval from the Environmental Commissioner (EC). As a result the Luderitz Town Council enlisted the services of Tortoise Environmental Consultants (TEC) to develop and Environmental Management Plan (EMP) as part of the application for an Environmental Clearance Certificate (ECC).

The contents of this EMP will be binding on all parties who will have a role to play in the sand mining activities as stipulated in *Section 3* and will be liable for the rehabilitation measures recommended in *Section 4.*

1.1 PURPOSE OF THE EMP

The aim of the EMP is to ensure that the sand mining by Lüderitz Town Council is conducted as per the requirements of the Namibian Environmental Management Act (No. 7 of 2007) and EIA regulations of 2012. The EMP provides a sand mining guideline, rehabilitation on how the activity should be undertaken and also provides a monitoring framework to ensure compliance against the recommended mitigation measures to avert any possible negative impacts.

The 2012 EIA Regulations defines a '*management plan*' as:
"…a plan that describes how activities that may have significant environments effects on the environment are to be mitigated controlled and monitored."

1.1.1 EMP Requirements

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

Requirement
(j) a draft management plan, which includes – *(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;*

(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.

1.1.2 Compliance to the EMP

The EMP and particularly the remedial and mitigation measures recommended for rehabilitation (section 4) is binding to the Lüderitz Town Council (LTC), and all contractors / sub-contractors to be engaged in the sand mining activities should adhere and comply to the EMP throughout the lifespan of the project.

In-addition, the EMP does not only focus and it is not limited to the boundaries of the borrow pit, but it encompassess the bigger picture and serve as the guiding tool to protecting the natural, bio-physical and socio-economic environment at large.

1.1.3 Proponent's Responsibility to the EMP

As the proponent, the Lüderitz Town Council (LTC) holds the mandate and sole responsibility of managing the sand mining activities and to ensure that any other person (its own staff, contractor / subcontractor) adheres to the EMP.

Therefore, the LTC should ensure that each and every team (its own staff, contractor / subcontractor) to be enganged in the sand mining activity should be given a copy of the EMP and an induction should be conducted with the each team before deployment and commencement of excavation activities at the borrow site.

Each team leader should have a copy of the EMP available at all times and should be able to furnish the EMP to MET or any other law enforcement official during the environmental audit or any other random inspection.

1.1.4 Possible adjustments to the EMP

The EMP is an open ended document and can be considered inconclusive. This implies that, in-addition to the information contained in the EMP, any other relevant information gained during the actual sand mining activities, internal monitoring or auditing by MET can be added to the EMP (evolution of activities), and such changes or inclusions will be binding to the LTC and all contractors / sub-contractors.

2 PROJECT INFORMATION

2.1 PROJECT LOCALITY

Lüderitz Town Council has been sourcing construction material from an existing borrow pit that is located approximately 35 km northeast of Lüderitz towards Aus. The borrow pit lies along the B4 road and it falls within the boundaries of the Namib Naukluft National Park (see Figure 2:1 overleaf). Sand mining from this borrow pit has been conducted long before the enactment of the Envrionmental Management Act (No.7 of 2007), and implementation of the EIA Regulation of 2012.

The LTC has been using this specific site for sand mining as it was found to contain the required grades for multiple construction projects within the Lüderitz Town lands.

2.2 BIODIVERSITY AND ECOLOGY OF THE AREA

2.2.1 Succulent Karoo Biome

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

Due to the high species richness and high level of endemism, the Succulent Karoo biome is fragile to developmental activities, because lack of control and reckless developmental activities can cause irreversible damage to the environment (paricularly endemic plant species) and therefore, the Succulent Karoo requires special attention and precautionary measures should be applied in order to minimise negative impacts.

2.2.2 Environmental versus Economic Demands

Namibia's economy is highly dependent on a healthy environment. The Succulent Karoo Biome is a unique and fragile environment and balancing the demands of economic development (such as sand mining or mining in general) with the demands of 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. Therefore, it is of utmost importance that such impacts are mitigated as guided by the EMP.

2.2.3 Climatic Conditions (rainfall and wind)

The Succulent Karoo stretches along the coastal strip of southwestern Namibia and South Africa's Northern Cape Province, where the cold Benguela current offshore creates frequent fogs.

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. In particular, the area around Luderitz is characterised by prevailing wind throughout the year (more than 180 days per annum) and wind is very important for rehabilitation of the borrow pit as outlined in the section 4.

The Succulent Karoo is characterised 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 and plants and animals can thrive at relatively low rainfall levels that would be too low to support similar populations in areas where the rain falls in summer. Luderitz is located in the transitional zone between the summer and winter rainfall.

2.2.4 Affected area (Sand Mining)

The existing borrow pit measures 3,96 ha and proposed expansion measures 16.6 ha / 100 = 0.166 km^2 in comparison to the total area of the Namib Naukluft Park (50,000 km^2) and the Tsau //Khaeb (Spergebied) National Park (measures 26,000 km^2) = 76,000 km^2 in total. Therefore, proportionally, the affected area is 0.166 km^2 / 76,000 km^2 = 0.0002% for which biodiversity loses may occur. The affected area is very small and in comparison to the entire landscape with similar characteristics, it can be considered insignificant. Nonetheless, The Succulent Karoo Biome is a global biodiversity hotspot and necessary precautions should be taken at all times.

Overall, the areas surrounding Lüderitz town are rich in desert-adapted plants including endemic species. Although protected species of the Mesembryanthemaceae family (protected according to the Nature Conservation Ordinance No. 4 of 1975) exist in the area (Burke, 2012). However, the specific site where the borrow site is located is barren and only comprises of gravel *(see photo plan on page 10)*. A few Populations of wildlife (mainly gemsbok, ostrich, brown hyena and springbok) occur in the surrounding area.

2.3 SAND MINING – MATERIAL QUANTITIES

At present, the existing borrow pit covers an area of approximately 3.96 hectares with an average depth of 1.5 meters. It is estimated that the town council has been extracting about 9, 380 m^3 of material from the borrow pit per year. The table below presents the estimated projections of material to be exctrated by the LTC from the borrow pit.

Table 2-1: Future sand mining projections from the borrow pit

Year	Estimated volumes to be sourced	Estimated depth
2017	10,050 m_3	1.6 m
2018	11,725 m_3	1.7 m
2019	13,400 m_3	1.9 m

As presented by the map on page 11 (Figure 2.2, the existing borrow site measures 3.96 ha (indicated by the yellow polygon on the map) and it is projected to expand to approximately 16.6 ha (indicated by the blue polygon on the map).

As part of the mitigation, it is relatively easier to rehabilitate a shalower borrow pit, than a deeper one. In other words, rehabilitation of the borrow pit becomes more difficult with increasing depth. As presented in table 2.1, it is therefore recommended that the depth of the borrow pit should not exceed 2 meters, to aid natural rehabilitation through sand deposits by the wind, which is prominent in Lüderitz and surrounding areas.

2.4 CONSULTATIONS BETWEEN THE LTC AND MET

The EIA regulations stipulate that, for new projects, all interested and/or affected parties (I&AP's) should be informed of the proposed activity as part of the EIA Scoping and Public Participation Process (PPP). However, for existing activities, only an EMP is required and the PPP process is not mandatory.

However, Since the borrow site falls within the Namib Naukluft park, it is important that the land custodian (MET) is fully consulted during the development of the EMP and application the Environmental Clearance (EC).

Therefore, the Lüderitz Town Council consulted the Ministry of Environment and Tourism's Regional Office in Luderitz in order to establish a Memorandum of Understanding (MoU) regarding the proposed continuation of the LTC to extract materials from the existing borrow pit *(Appendix A)*.

The MoU certifies that:

- *MET was consulted during the development of the EMP,*
- *Assessed the existing borrow site together with the LTC*
- *Pegged the recommended borrow site expansion together with the LTC*
  Will ensure that LTC adheres to the rehabilitation measures recommended in the EMP

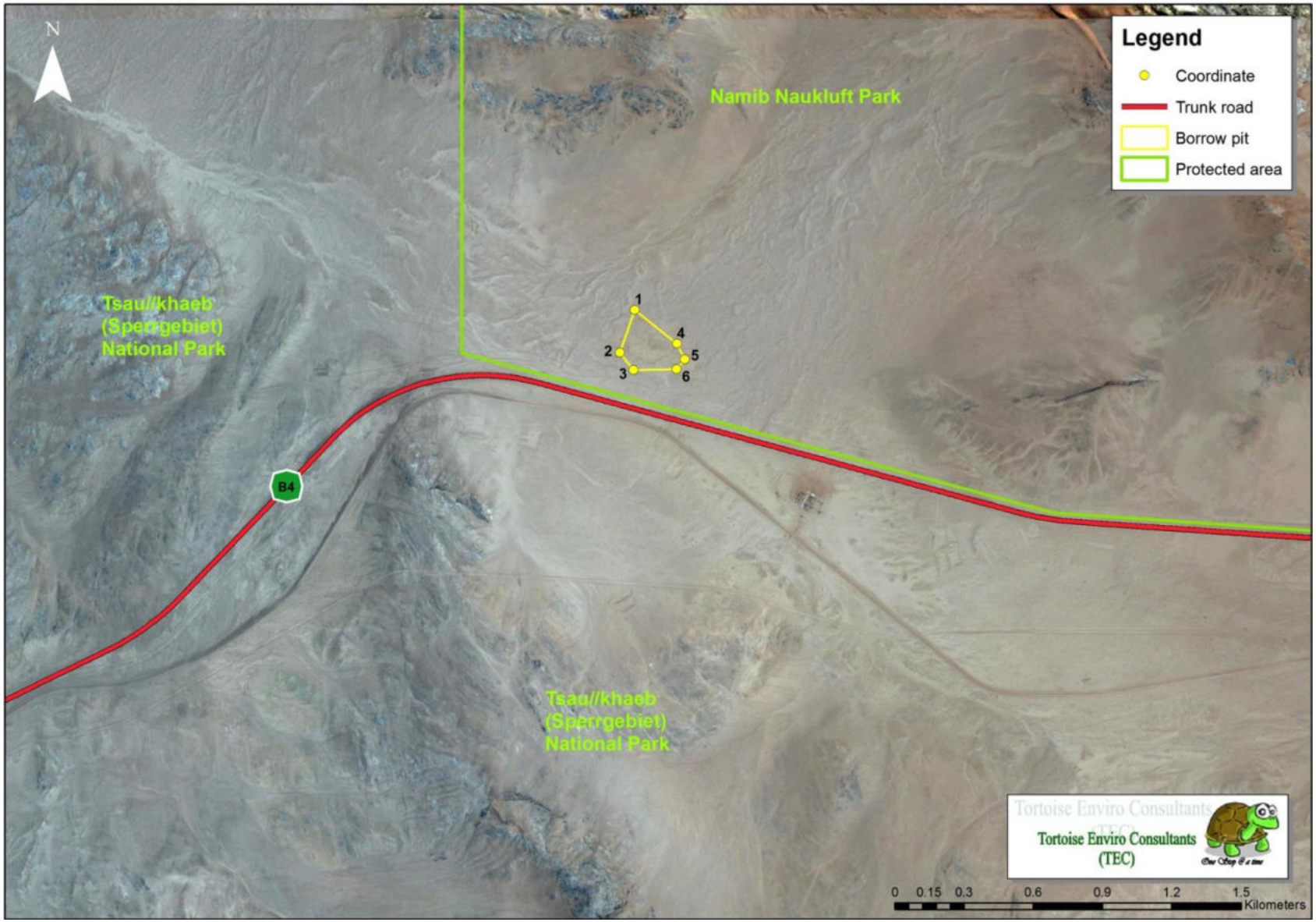
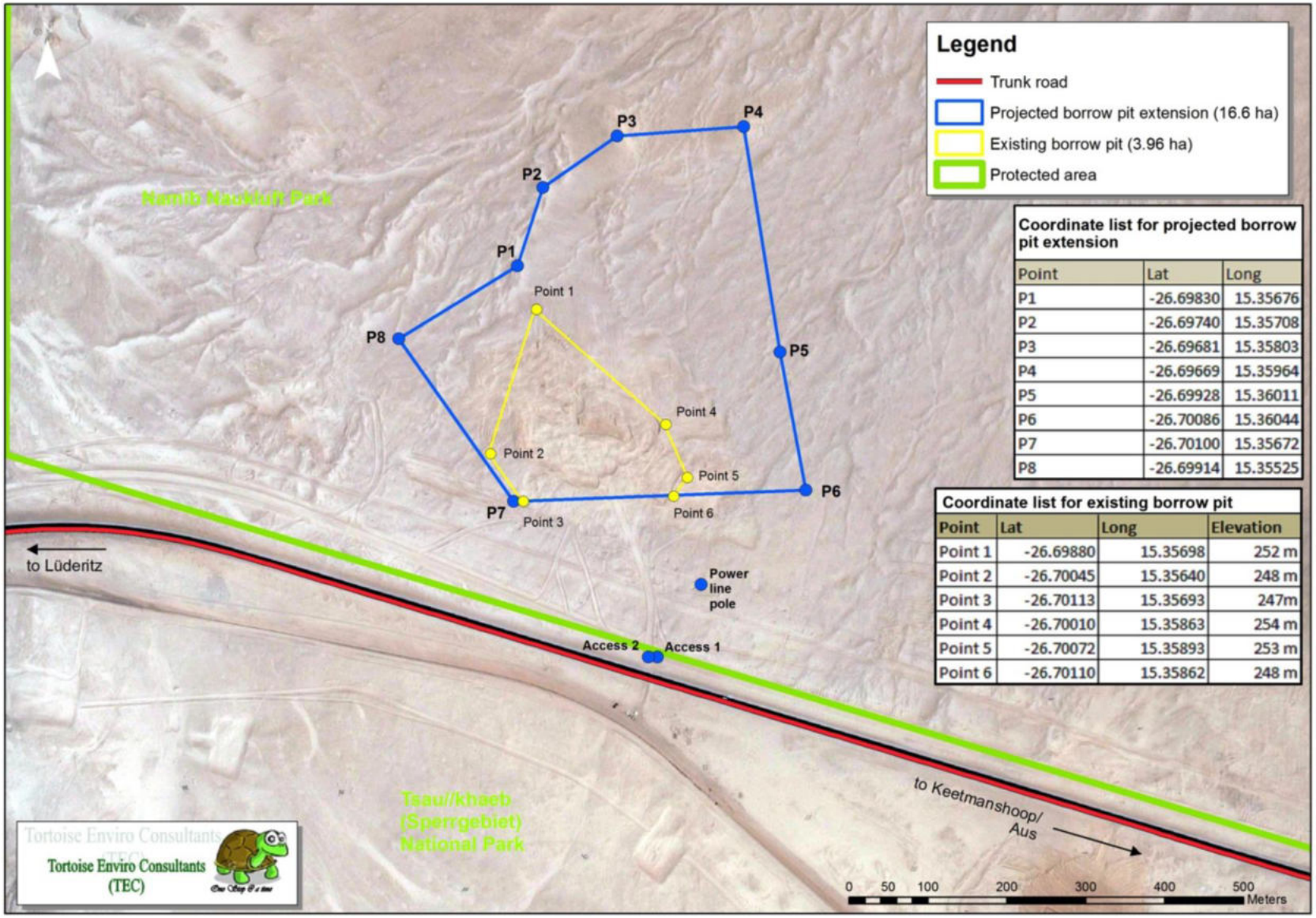


Figure 2-1: Location of the existing borrow pit as indicated by the yellow polygon

Table 2-2: Site pictures showing the current status of the existing borrow pit

 The general setting of the existing borrow pit site *(no vegetation)*	 Vehicle tracks as a sign of previous activities
 The existing borrow pit, note the shallowness of the excavations to facilitate rehabilitation	 Road track to the existing borrow pit
 Stockpiles from previous excavations (red circle).	 Entry to the borrow pit requiring signage to warn motorists on the B4 Road about the presence of earthmoving vehicles.

Figure 2-2: **Map showing the demarcation of the existing borrow pit (yellow) as well as the projected expansion (blue)**



Coordinate list for projected borrow pit extension

Point	Lat	Long
P1	-26.69830	15.35676
P2	-26.69740	15.35708
P3	-26.69681	15.35803
P4	-26.69669	15.35964
P5	-26.69928	15.36011
P6	-26.70086	15.36044
P7	-26.70100	15.35672
P8	-26.69914	15.35525

Coordinate list for existing borrow pit

Point	Lat	Long	Elevation
Point 1	-26.69880	15.35698	252 m
Point 2	-26.70045	15.35640	248 m
Point 3	-26.70113	15.35693	247m
Point 4	-26.70010	15.35863	254 m
Point 5	-26.70072	15.35893	253 m
Point 6	-26.70110	15.35862	248 m

Table 2-3: Shows the pegs (circled in red) demarcating the borrow pit boundaries




The pegs comprise of a Pin (steel rod) embended into the ground and a pile of rocks for visibility (because the pin can easily be buried by the sand.

3 ROLE PLAYERS & RESPONSIBILITIES

This section outlines the roles and responsibilities of the respective key personnel that would be responsible for effective implementation of the EMP.

3.1 Roles and Responsibilities

Assigning responsibilities is necessary to ensure that key procedures are followed. The purpose of this section is to define roles for personnel and to detail their respective responsibilities in the execution of the EMP. The key role-players for project implementation are;

a) An Environmental Compliance Officer (ECO) representing MET for environmental auditing and monitoring;

b) The Contractor (entity carrying out the sand mining operation). The contractor could be the Lüderitz Town Council itself or the entity contracted or sub-contracted by the LTC to source the gravel material on its behalf (the person responsible should be appointed as the Borrow pit Manager and will be responsible for the implementation and adherence to the EMP).

c) The Town Engineer (representative of Lüderitz Town Council management and responsible to ensure that each / entity team enlisted by the LTC to work at borrow pit (including LTC staff members, contractors / sub-contractors) adheres to the EMP. The TE is liable and should maintain communication with the ECO as well as the I&AP's as guided by the communication strategy.

It is further recommended that an organisational structure be developed to ensure that:

- There are clear channels of communication;
- There is an explicit organisational hierarchy to implement the project; and
- Potential conflicting or contradictory instructions are avoided from either side.

All instructions and official communications regarding environmental matters shall follow the organisational structure as determined by the Lüderitz Town Council. In terms of the recommended organisational structure, all instructions relating to the EMP should be communicated by Lüderitz Town Council. The only exception to this rule would be in an emergency (defined as a situation requiring immediate action and where failure to intervene timeously would, in the reasonable opinion of the Town Engineer (TE) (or equivalent), result in unacceptable environmental degradation), where instructions may be given directly to the Borrow pit Manager or any other person contracted to work at the borrow pit.

Whatever the structure adopted by LTC, it is essential that the responsibilities outlined are assigned to specific parties with the capacity and experience required to implement the EMP.

The Contractor (Borrow pit Manager):

Lüderitz Town Council will be responsible for the overall operation of the borrow pit even if the sourcing of the material from the site gets assigned to a contractor. LTC shall be responsible for ensuring the day-to-day implementation of the EMP during the lifecycle of the borrow pit activities, and all team members shall be well-versed with the contents of this document. The following are responsibilities of LTC for overseeing the borrow pit

- Appoint a Borrow pit Manager to oversee the daily onsite activities.
- Liaise closely with the Borrow pit Manager and TE on any environmental management issues, incidents or emergencies.
- Ensure that the works on-site are conducted in an environmentally sensitive manner and in accordance with the requirements of the EMP at all times. Special care shall be taken to prevent irreversible damage to the environment.
- Where reasonably applicable, LTC shall set up the borrow pit site in accordance with the layout of the Site Map, and must ensure all work areas and stockpiles are located within the area as demarcated by the pegs; and in a manner that complies with the requirements of this EMP.
- Ensure that all staff remain within the boundaries of the borrow pit site, and that all works remain within the mining parameters as specified Site Map.
- Ensure that all site staff are adequately informed of the requirements of the EMP pertaining to their site role, and that they have attended an environmental induction session (this session must be in the form of an on-site talk and/or a written code of conduct that is clearly explained to and understood by the team).
- Ensure that any subcontractors or visitors to the site are conversant with the EMP or relevant sections of the EMP pertaining to their role on-site.
- Ensure that the site is rehabilitated in accordance within the requirements of this EMP.

The Town Engineer:

The Town Engineer in the context of this document refers to the party responsible for overseeing the overall activities associated with the excavation of the borrow pit, including the site operational phase, the rehabilitation and closure phase of the site. The Town Engineer should be a representative of the Lüderitz Town Council.

The Environmental Compliance Officer (ECO):

The ECO in the context of this document refers to the party responsible for the environmental compliance and auditing activities required by the EMP for the lifecycle of the borrow pit activities. The ECO shall be a representative of MET or an equivalent independent environmental manager.
The ECO shall have adequate environmental knowledge to understand the detailed environmental issues associated with the project, and is to be well versed in the contents of the EMP and its associated reports:

- The ECO shall undertake all monitoring and auditing activities to ensure compliance with the EMP.
- The ECO shall inspect the borrow pit site prior to any preparation activities commencing; at least once (1) a month during operation; on completion of any progressive rehabilitation and re-vegetation activities per phase; and on final closure of the site.
- The ECO shall compile Progress Reports following any site inspections (including progressive rehabilitation inspections), Compliance Reports following any non-compliances, and a Closure Report following the conclusion of mining and eventual closure of the site.
- The ECO shall liaise closely with the Borrow pit Manager and Town Engineer, and shall provide guidance on any environmental management issues, incidents or emergencies that are brought to their attention.
- The ECO shall assist in providing recommendations for remedial action in the event of any non-compliances.

3.2 Compliance with Requirements

Environmental management is not only concerned with the final results of the Contractor's operations to carry out the Works, but also with how such operations are carried out. Tolerance with respect to environmental matters applies not only to the finished product but also to the standard of the day-to-day operations required to complete the Works.

The development of an EMP for a project is an important and necessary task that is aimed at assigning responsibilities and mitigation options to a variety of activities. However, it can be an ineffective tool in the absence of auditing or monitoring activities. Auditing or monitoring activities involve the structured observation, measurement, and evaluation of environmental data over a period of time.

The overall responsibility to ensure that the EMP is implemented rests with the Lüderitz Town Council, who shall appoint a competent engineer and contracting teams (internal = council staff or external = sub-contractors) to undertake the work. The ECO shall inspect the site at regular intervals during the various phases of the mining process and shall report on the level of compliance with this EMP to MET Authorities.

3.2.1 Disciplinary Action

The EMP is a legally binding document. Non-compliance with the EMP shall result in disciplinary action being taken against the perpetrator/s. Such action may take the form of (but is not limited to) financial penalties, legal action, fines and/or suspension of work.

The Lüderitz Town Council shall be deemed to have **not** complied with the EMP if:

- Within the boundaries of the borrow pit site, site extensions and haul/access roads, there is evidence of contravention of the EMP and its associated reports;
- LTC fails to comply with corrective or other instructions issued by the ECO or MET within a specified time.
- LTC fails to respond adequately to complaints from the public.

The disciplinary action shall be determined according to the nature of the non-compliance or crime, and exact penalties are to the discretion of MET according to the severity of the incident.

Measures to be implemented and overseen and monitored by the ECO during the construction phase are included in the Table 3-1 overleaf:

Table 3-1: Planning Phase

Table 3-2: Management activities to be implemented during Operation Phase

Aspect	Management Objective	Management Action	Action Frequency	Indicator / Data Source	Party responsible for implementation
Communication with Contractor, Contractor's staff and other stakeholders	To ensure effective and formal communication throughout the project lifespan.	All correspondence relating to construction issues between the Contractor and the Project management Team to be signed by the Contractor's Project Manager.	Project term (from site establishment to project completion)	Records of correspondence No avoidable environmental impacts occurring due to miscommunication The ECO is aware of *ad-hoc* decisions taken by the TE and Contractor.	All
		The contact details of the key construction team must be available to all relevant parties.			
		All sub-contractors and employees etc. must be fully aware of the environmental management requirements detailed in this EMP.			
		The TE, Contractor and ECO must be informed immediately should environmental issues arise.			
		A copy of the EMP and ECC must be readily available for ease of reference to all requirements.			

Aspect	Management Objective	Management Action	Action Frequency	Indicator / Data Source	Party responsible for implementation
Staff induction training and code of conduct	To ensure that staff are familiar with the management requirements for the borrow pit and conform to the prescribed EIA Regulations	All construction workers must undergo induction training. The induction training must cover environmental awareness, protection of flora and fauna, noise minimisation on site, SHE measures and training in safe construction.	Project term	Signed induction attendance register	LTC_TE
		Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks.			LTC_TE
	Punitive measures and incentives for site staff	LTC to adopt a disciplinary system to address common, minor health and safety misdemeanours of individual staff, such as littering, not using ablution facilities and illegal collection of specimen.	*Ad hoc*	A reduction in the number of fines issued daily, PM reports	LTC_TE
Road safety and traffic control	To reduce the impacts associated with increase of traffic on public roads	Speed limit for heavy construction vehicles shall be restricted to 30km/h.	Project term	Public complaints and non-compliance register	LTC_TE
		Keep roads off and away from sensitive areas such as rocky outcrops and sand dunes. No off-road driving shall be permitted.			
		Provision shall be made for the turning movements of the vehicles to minimise disturbed areas.			

Aspect	Management Objective	Management Action	Action Frequency	Indicator / Data Source	Party responsible for implementation
		The road leading to the borrow site must be marked with a “NO ENTRY for public vehicles" sign.			
Vehicle Emissions	Reduce unnecessary greenhouse gas (GHG) emissions from poorly maintained or malfunctioning equipment	All vehicles and equipment shall be kept in good working order and serviced as required. Ensure that vehicles do not leak oil etc	Project term	Physical verification and routine monitoring, record of non-compliance	LTC_TE
Visual quality	Namib Naukluft National Park is frequented for its scenery.	Demarcate the borrow site working area and contain all activities within the demarcated working area.	Project term	Physical verification and routine monitoring	LTC_TE
		Appropriate signage and information posters to be prominently displayed and maintained to warn motorists about the presence of earthmoving vehicles.			
		Consider visual impacts when determining the location and size of stockpiles. Maintain all travelling speed in the area to below 30 km/hour			
Site demarcation	Ensuring adequate planning is given to the layout of the site	The borrow site area must be kept as demarcated by the pegs. No fencing off the site as this may endanger wildlife. Unless otherwise agreed to by the Borrow pit Manager, LTC shall	Project commencement	Physical verification and routine monitoring	LTC_TE

Aspect	Management Objective	Management Action	Action Frequency	Indicator / Data Source	Party responsible for implementation
		ensure that all activities are restricted to within the defined Working Area. The areas outside of the defined Working Area shall be regarded as exclusion/ No-Go areas.			
	To limit the spatial extent over which LTC will have influence	LTC shall ensure that no unauthorised entry, stockpiling, dumping or storage materials shall be allowed within the exclusion areas.	Project commencement	Physical verification and routine monitoring	LTC / ECO
	Reducing health and safety and security risks associated with unauthorised access to the construction site	LTC shall ensure that access to the site and associated infrastructure and equipment is controlled throughout the project term.			
		The movement of site staff shall be restricted to the demarcated borrow pit area.			
		No onsite burying, dumping or burning of waste material shall be permitted. Ensure appropriate waste collection and removal from the site and dispose at the municipal dumpsite.			
Ablution facilities	Reduce health risks and environmental pollution arising from a concentration of human excreta in the environment	Ensure adequate ablution facilities for site staff. Acts of excretion and urination, other than at the facilities provided, shall be strictly prohibited.	Project term / daily / *ad hoc*	Physical verification and routine monitoring	LTC

Aspect	Management Objective	Management Action	Action Frequency	Indicator / Data Source	Party responsible for implementation
	Verification of adherence to specified requirements	All ablution facilities are to be inspected on a regular basis to ensure the above requirements are being met.			
Heritage Resources	Reduce the impacts of construction and associated earthworks on heritage resources.	Recovery of heritage remains or artefacts discovered and their removal must be directed by the National Museum (+264 61 276800) or National Forensic Laboratory (+264 61 240461).	Project term	Physical verification	LTC
		No artefacts must be removed or be interfered with prior to authorisation from the Namibian National Heritage Council (NHC).			
		Mitigation must involve the scientific recording or collection of such artefacts.			
Protection of ecological resources	The site is located within a national park and all precautions to safeguard the environment must be applied The borrow pit excavation activities may have impacts on vegetation and animals in the area.	Prevent and discourage the setting of snares (poaching), indiscriminate killing of perceived dangerous species (e.g. snakes, etc.) in and surrounding the project area.	Project term	Physical verification	LTC / ECO
		Avoid the removal of any plant (especially protected species i.e. *Lithop* species [Forestry Act No. 12 of 2001)			
		Natural features (e.g. rocky outcrops) situated in or around the borrow site shall not be defaced, painted, damaged or marked for survey.			

Aspect	Management Objective	Management Action	Action Frequency	Indicator / Data Source	Party responsible for implementation
		Vegetation shall not be unnecessarily disturbed.			

4 REHABILITATION

Socio-economic development is very important for our livelihood and provides services, income and employement opportunities, and hence activities such as sand mining are vital and necessary for development. However, such developmental activities should be conducted in a thoghtful 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.

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-vegtating, removal of unwanted infrastructure, cleaning up pollution etc).

4.1 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.

4.2 Recommended Measures

The borrow pit is situated in an area that is characteristic of strong wind occurrences, that often carries along and blows sand around. In other words, the strong winds moves sand from one area to another.

The approach and recommendation of sand mining is to maintain a maximum depth of less than 2 meters across the borrow pit, as opposed to deeper excavations (beyond 2 meters). Keeping the borrow pit shallower is a measure to ensure that the site is able to reshape itself as a result of sand movement by the wind over time. In other words, to shallowness can aid natural rehabilitation, relatively.

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.

Fencing off the site is not advisable as the borrow pit is located within a national park. 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). Fencing off the site would therefore be detrimental to wildlife in the area as they may get traped or injured by the fence. Furthermore, the fence would be an eyesore to tourists frequenting the national park. Mining and all associated activities should therefore be restricted to the borrow pit boundary which has been pegged and demarcated with visible markings *(see Map on page 11 and demarcation photo plan on page 12)*.

Table 4-1: 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	LTC
	Borrow site closure and rehabilitation objectives shall be communicated to all staff.	Ensure proactive rehabilitation by site staff through appropriate communication and training.			
	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.			

5 CONCLUSION

The EMP has identified and recommended measures to be adopted by the by the Lüderitz Town Council to manage the sand mining activities as well as measures to ensure that the borrow pit is rehabilitated. In-addition, the EMP prescribes site closure measures that are considered both legally compliant and environmentally acceptable.

The borrow pit has been used by the town council long before the enactment of the Environmental Management Act of 2007 and EIA regulations of 2012 and it remains an important source of construction material. The Lüderitz Town Council would like to conform 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 this Environmental Management Plan (EMP).

The Lüderitz Town Council acknowledges that the borrow pit falls within the boundaries of the Namib Naukluft and therefore consulted the Ministry of Environment and Tourism's Regional Office in Luderitz in order to establish a Memorandum of Understanding (MoU) regarding the proposed continuation of the Lüderitz Town Council to extract materials from the existing borrow pit *(Appendix A)*.

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