



PROJECT DETAILS

APP-002589

Title	UPDATED ENVIRONMENTAL MANAGEMENT PLAN FOR THE ONGOING SAND MINING OPERATIONS ON MINING CLAIMS 69069-69071, TO SOURCE SAND AS A CONSTRUCTION RAW MATERIAL FROM THE USIB RIVER AT GROOT AUB, KHOMAS REGION, NAMIBIA.		
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ABBREVIATIONS

AIDS	Acquired Immuno-Deficiency Syndrome
PR	Proponent's Representative
EA	Environmental Assessment
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
GG	Government Gazette
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
HIV	Human Immuno-deficiency Virus
I&APs	Interested and Affected Parties
PR	Proponent's representatives
NHC	National Heritage Council
Reg.	Regulation
S	Section
TB	Tuberculosis

1 INTRODUCTION

This document constitutes the updated Environmental Management Plan (EMP) for the renewal of the Environmental Clearance for the sand mining operations run by Mr. Alan Gerome Stumpfe, located at the Groot Aub Settlement in the Khomas Region.

The mining claims 69069, 69070 & 69071 where the mining activities are taking place are currently disturbed and human interference is visible. Bulk infrastructure and services on and near the operations site includes access roads, borehole water, NamPower electricity and a French drain sewer system. The allocated portions are surrounded by predominately open areas with farming related activities with associated infrastructure.

Mr. Alan Gerome Stumpfe already holds a valid Environmental Clearance issued in December 2018 for sand mining operations under Mining Claim/Mining License MC 69069 – 69071, which is due to expire once 3 years lapse and is hereby applying for renewal to ensure compliance to the Environmental Management Act of 2007 and EIA regulations of 2012. To that effect, Mr. Alan Gerome Stumpfe enlisted the services of Healthy Earth Environmental Consultants CC (HEEC) to carry out an environmental audit for compliance and update the Environmental Management Plan (EMP) as part of the application for the renewal of the Environmental Clearance Certificate (ECC). The contents of this updated EMP will be binding on all parties with defined roles and obligations in the sand mining activities as stipulated in all sections.

Mr. Alan Gerome Stumpfe, hereinafter referred to as the proponent intends to carry out the following activities:

- **Updated Environmental Management Plan for the ongoing sand mining operations (mining claims 69069-69071) used to source sand as a construction & gardening raw material from the Usib River at Groot Aub, Khomas Region, Namibia.**

The aim of the updated EMP is to ensure that the sand mining by Mr. Alan Gerome Stumpfe is conducted in accordance with the provisions of the Namibian Environmental Management Act (No. 7 of 2007) and EIA regulations of 2012 (GN: 30). The updated EMP provides a guideline for sand mining and recommends rehabilitation measures on how the activity should be undertaken to ensure compliance against the recommended mitigation measures to avert any possible negative impacts. The updated EMP also provides a monitoring framework against the recommended mitigation and rehabilitation measures.

The above is a listed activity in terms of the Environmental Management Act (No. 7 of 2007) and Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012).

In terms of the Environmental Management Act (No. 7 of 2007) and Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012), the following listed activities in **Table 1** were triggered by the proposed project:

Table 1: List of triggered activities identified in the EIA Regulations that apply to the project

Activity description and No(s):	Description of relevant Activity	The portion of the development as per the project description that relates to the applicable listed activity
Activity 3.1 (Mining and Quarrying Activities)	The construction of facilities for any process or activities which requires a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation, in terms of the Minerals (Prospecting and Mining Act), 1992.	The project includes the harvesting of sand for construction & gardening purposes.
Activity 3.2 (Mining and Quarrying Activities)	Other forms of mining or extraction of any natural resources whether regulated by law or not.	The project entails the extraction of sand for construction & gardening purposes.
Activity 3.3 (Mining and Quarrying Activities)	Resource extraction, manipulation, conservation and related activities.	The project entails the extraction of sand for construction & gardening purposes.

An Environmental Management Plan (EMP) is one of the most important outputs of the EA/scoping process as it synthesises all of the proposed mitigation and monitoring actions, set to a timeline and with specific assigned responsibilities. The EMP is a living document and maybe considered inconclusive. This implies that, in-addition to the information contained herein, any other relevant information gained during the actual sand mining activities, internal monitoring or auditing by MEFT can be added to the EMP (evolution of activities), and such changes or inclusions will be binding to Mr. Alan Gerome Stumpf and all contractors / sub-contractors. This updated EMP details the mitigation and monitoring actions to be implemented during the following phases of these developments:

- Sand Mining Phase – the period during which the proponent, having dealt with the necessary legislative and administrative arrangements, appoints a contractor to engage in the harvesting of sand from the project site to be used for construction purposes;
- Borrow Pit rehabilitation – the continual period during which the topsoil from the active borrow pit will be transported to existing borrow pits that were dug prior in the Usib River portions and use to cover them so as to match the local topography.

The rehabilitation of the active sand mine once activities have ceased and the continual rehabilitation of the existing borrow pits site is highly recommended so as to ensure that the subject area is sustainably managed and during the decommissioning phase. In-addition, the updated EMP does not only focus and it is not limited to the boundaries of the borrow pit, but it includes the socio-economic impacts to the Groot Aub residents and serves as the guiding tool to protecting the natural, bio-physical and socio-economic environment in the surrounding area, beyond the boundaries of the borrow pit. Because, some impacts (e.g. dust, noise, fumes, smell, wastewater, solid waste etc.) are not confined to the borrow pit boundaries; when the event occurs then some recommendations have been outlined in **Table 5**.

OVERALL OBJECTIVES OF THE UPDATED EMP

The following overall environmental objectives have been set for the sand mining project in Groot Aub, Khomas Region area:

- To act in accordance with national legislation and standards for the protection of the environment.
- To limit potential impacts on biodiversity through the minimisation of the footprint (as far as practically possible) and the conservation of residual habitat within the mining area.
- To keep surrounding communities informed of sand mining activities through the implementation of community meetings and constructive dialogue.
- To ensure the legal and appropriate management and disposal of general and hazardous waste (fuel), through the implementation of a strategy for the minimisation, recycling, management, temporary storage and removal of waste.
- To develop, implement and manage monitoring systems to ensure good environmental performance in respect of the following: waste, air quality, noise, biodiversity and rehabilitation.

Consultations between the Proponent and MAW & LR

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. The previously issued Environmental Clearance Certificate allowed Mr. Alan Gerome Stumpfe to remove sand and gravel from the Usib River in the Groot Aub Area to be used for commercial purposes i.e. construction, gardening, industrial, selling, transporting etc. subject to certain conditions.

Both these sites are currently mined by Mr. Alan Gerome Stumpfe under agreement with the relevant contractors. The general conditions to which sand mining operators should adhere to are the following:

1. The area where removal of sand and gravel takes place shall be left clean and in a neat condition when the approval expires.
2. Excavation of sand shall be at least 200 meters from any developed areas/plots in the flood plains and on the river banks in this case including the District Road crossing.
3. Excavation of sand should be at least 10 meters away from the river banks and vertical slopes resulting from excavations shall not be higher than 1 meter.
4. Excavation shall under no circumstances expose the ground water table and shall have slopes not higher than 4 meters.
5. The normal underground flow of water in the river as well as the periodic visible run-off and floods shall under no circumstances be polluted, clogged or deflected.
6. The permission excludes the right of access to private properties and where applicable, permission shall separately be obtained from the particular landowner by holder.
7. A return in respect of the previous month shall be submitted, on or before the 7th day of the following month to the Control Officer: Abstraction Control, Private Bag 13193, Windhoek and shall reflect the volume of sand and gravel removed during the previous month.
8. The Factory, Machinery and Building Work, Ordinance, 1952 and any applicable regulations promulgated there under, shall be adhered to.
9. All possible precautions shall be taken to prevent damage to the river banks during excavation of sand and gravel.

10. The Permanent Secretary or his authorized representative in consultation with the Minister reserves the right to:

10.1 check the volume of sand and gravel removed at any time:

10.2 carry out periodic inspections to determine whether the conditions of this approval are adhered to: and

10.3 withdraw, amend or substitute any condition of the approval or withdraw it in its entirety, after reasonable notice to the holder.

11. Subject to the provision of condition 10.3 the validity period of his permission shall otherwise expire every five years from the date of this permission. Extension of the validity period shall be considered on your written request, which must be in the hands of the Permanent Secretary at least two months before each expiry date.

These conditions were previously confirmed with at a meeting with Mr. Galant who is the Senior Administrative Officer of the Department of Water Affairs who is responsible for issuing the permits for sand and gravel excavation from rivers.

STAKEHOLDER MANAGEMENT AND MITIGATION

It is important that channels of communication are maintained over the project life cycle for surrounding community, the general public members, as well as the Groot Aub local authority, Table 2 shows the stakeholders communication Management and Mitigation Plan.

Table 2: Actions relating to stakeholder communication

Issue	Management commitment	Phase
Understanding who the stakeholders are	Maintain and update, key stakeholders' needs and expectations. Ensure that all relevant stakeholder groups are incorporated.	All
	A representative database would include line ministries, employees, service providers, contractors, indigenous populations, local community authorities, NGOs, shareholders, community-based organizations, suppliers and the media.	All
	Ensure that vulnerable groups are also considered in the stakeholder communication process.	All
	Record partnerships as well as their roles, responsibilities, capacity and contribution toward the development.	All
Liaising with interested and affected parties at all phases in the mine life	Devise and implement a stakeholder communication and engagement strategy.	All
Responsibility	Mr. Alan Gerome Stumpf's Management and Environmental Control Officer (ECO)	

2 ROLES AND RESPONSIBILITIES

The proponent (Mr. Alan Gerome Stumpfe) is ultimately responsible for the implementation of the EMP, from the sand mining phase, surrounding existing borrow pits. The proponent will delegate this responsibility as the project progresses through its life cycle. The delegated responsibility for the effective implementation of this updated EMP will rest on the following key individuals:

- Proponent's Representative;
- Environmental Control Officer/Borrow Pit Manager; and
- Contractor (Sand Worx CC).

PROPONENT'S REPRESENTATIVE

Mr. Alan Gerome Stumpfe, the proponent, should assign the responsibility of managing all aspects of this project for all development phases (including all contracts for work outsourced) to a designated member of staff, referred to in this EMP as the Proponent's Representative (PR). Therefore, Mr. Alan Gerome Stumpfe should ensure that each and every team (its own staff, contractor / subcontractor) to be engaged in the sand mining activity should be given a copy of this updated EMP and an induction should be conducted with the each team before deployment and commencement of sand mining activities at the borrow pit.

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

The proponent may decide to assign this role to one person for the full duration of these developments, or may assign a different PR to each of the project phases – i.e. one for the sand mining, one for the borrow pit rehabilitation phase. The PR's responsibilities are as follows:

Responsibility	Project Phase
Making sure that the necessary approvals and permissions laid out in Table 3 are obtained/adhered to	Throughout the lifecycle of this project
Suspending/evicting individuals and/or equipment not complying with the updated EMP	<ul style="list-style-type: none"> • Sand Mining • Borrow pit rehabilitation
Issuing fines for contravening updated EMP provisions	<ul style="list-style-type: none"> • Sand Mining • Borrow pit rehabilitation

ENVIRONMENTAL CONTROL OFFICER/BORROW PIT MANAGER

The PR should assign the responsibility of overseeing the implementation of the updated EMP on the ground during the on-going sand mining; continuous borrow pit rehabilitation phases to a designated member of staff, referred to in this updated EMP as the Environmental Control Officer (ECO) or Borrow pit manager. The Mr. Alan Gerome Stumpfe /PR may decide to assign this role to one person for all the activities, or may assign a different ECO for each activity. The ECO will have the following responsibilities during the sand mining and associated operational and maintenance phases of these projects:

- Management and facilitation of communication between the Proponent, PR, the contractors, and Interested and Affected Parties (I&APs) with regard to this EMP;
- Conducting regular inspections (recommended minimum frequency is once every six months) with respect to the implementation of this updated EMP (monitor and audit the implementation of the updated EMP);
- Assisting the Contractor in finding solutions with respect to matters pertaining to the implementation of this EMP;
- Advising the PR on the removal of person(s) and/or equipment not complying with the provisions of this updated EMP;
- Making recommendations to the PR with respect to the issuing of fines for contraventions of the updated EMP; and
- Undertaking an annual review of the EMP and recommending additions and/or changes to this document.

The Contractor

The following are the specific responsibilities of Contractor to oversee the borrow pit operations:

- Appoint a Borrow pit Manager to oversee the daily onsite activities.
- Liaise closely with the Borrow pit Manager and ECO 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 updated EMP at all times. Special care shall be taken to prevent irreversible damage to the environment.
- Where reasonably applicable, Mr. Alan Gerome Stumpfe shall set up the borrow pit sites 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 (operated under Mining Claims 69069 – 69071 which has been issued to Mr. Alan Gerome Stumpfe); and in a manner that complies with the requirements of this updated EMP.

- Ensure that all staff remain within the boundaries of the borrow pit site, and that all works remain within the sand mining parameters as specified Site Map.
- Ensure that all site staff are adequately informed of the requirements of the updated 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 updated EMP or relevant sections of the updated EMP pertaining to their role on-site.
- Ensure that the site is rehabilitated in accordance within the requirements of this updated EMP.

SAND MINING AND BORROW PIT REHABILITATION

A contractor, in this case being the proponent, conducts the sand mining and processing operations take place on mining claims in and along the Usib River at the Groot Aub Settlement and is therefore automatically responsible for implementing all provisions contained within the relevant chapters of this updated EMP and also will be responsible for the implementation of this updated EMP applicable to any work outsourced to subcontractors. **Table 5** applies to contractors appointed during the sand mining phase. In order to ensure effective environmental management the aforementioned chapters should be included in the applicable contracts for outsourced work relating to the ongoing activities.

The tables in the following chapter (**Chapter 3**) detail the management measures associated with the roles and responsibilities that have been laid out in this chapter.

3 MANAGEMENT ACTIONS

The aim of the management actions in this chapter of the EMP is to avoid potential impacts where possible. Where impacts cannot be avoided, measures are provided to reduce the significance of these impacts.

The following tables provide the management actions recommended to manage the potential impacts rated in the scoping-level EA conducted for these activities. These management actions have been organised temporally according to project phase:

- Applicable legislation (**Error! Reference source not found.3**);
- Sand Mining & borrow pit rehabilitation Management Actions (**Table 5**);
- Decommissioning phase management actions (**Table 6**).

The responsible persons from the proponents' team have assessed these commitments in detail and have committed to the specific management actions where indicated in the tables below.

ASSUMPTIONS AND LIMITATIONS

This updated EMP has been drafted based on the scoping-level Environmental Assessment (EA) conducted for the operation and management of the sand mining activities; continual borrow pit rehabilitation at the end of the project lifecycle activities. HEEC will not be held responsible for the potential consequences that may result from any alterations to the agreed course of action in terms of the ongoing sand mining and processing operations taking place on mining claims 69069-69071 in and along the Usib River at the Groot Aub Settlement.

It is assumed that labourers will be sourced mostly from the Groot Aub village area and that migrant labourers (if applicable) will be housed within established accommodation facilities in Groot Aub.

APPLICABLE LEGISLATION

There are multiple legal instruments that regulate and have a bearing on good environmental management in Namibia. Error! Reference source not found.3 below provides a summary of the legal instruments considered to be relevant to the on-going sand mining activities and processing operations take place on mining claims 69069-69071 in and along the Usib River at the Groot Aub Settlement and the environmental assessment process.

Table 3: Legal provisions relevant to these activities

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
The Constitution of the Republic of Namibia as Amended	<p>Article 91 (c) provides for duty to guard against “the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia.”</p> <p>Article 95(l) deals with the “maintenance of ecosystems, essential ecological processes and biological diversity” and sustainable use of the country’s natural resources.</p>	Sustainable development should be at the forefront of management of the on-going activities.
Environmental Management Act No. 7 of 2007 (EMA)	<p>Section 2 outlines the objective of the Act and the means to achieve that.</p> <p>Section 3 details the principles of Environmental Management</p>	The management of this project must be informed by the EMA.
EIA Regulations GN 28, 29, and 30 of EMA (2012)	<p>GN 29 Identifies and lists certain activities that cannot be undertaken without an environmental clearance certificate.</p> <p>GN 30 provides the regulations governing the environmental assessment (EA) process.</p>	<p>Activity 3.1 (Mining and Quarrying Activities) The construction of facilities for any process or activities which requires a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation, in terms of the Minerals (Prospecting and Mining Act), 1992.</p> <p>Activity 3.2 (Mining and Quarrying Activities) Other forms of mining or extraction of any natural resources whether regulated by law or not.</p> <p>Activity 3.3 (Mining and Quarrying Activities) Resource</p>

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
		extraction, manipulation, conservation and related activities.
Convention on Biological Diversity (1992)	Article 1 lists the conservation of biological diversity amongst the objectives of the convention.	The on-going sand mining activities and processing operations take place on mining claims 69069-69071 in and along the Usib River at the Groot Aub Settlement should consider the impact it will have on the biodiversity of the area.
Draft Procedures and Guidelines for conducting EIAs and compiling EMPs (2008)	Part 1, Stage 8 of the guidelines states that if a proposal is likely to affect people, certain guidelines should be considered by the proponent in the scoping process.	The EA process should incorporate the aspects outlined in the guidelines.
Namibia Vision 2030	Vision 2030 states that the solitude, silence and natural beauty that many areas in Namibia provide are becoming sought after commodities and must be regarded as valuable natural assets.	Care should be taken that the sand mining activities do not lead to the degradation of the natural beauty of the Groot Aub village area.
Water Act No. 54 of 1956	Section 23(1) deals with the prohibition of pollution of underground and surface water bodies.	The pollution of water resources should be avoided during on-going sand mining activities and processing operations take place on mining claims 69069-69071 in and along the Usib River at the Groot Aub Settlement.
The Ministry of Environment and Tourism (MET) Policy on HIV & AIDS	MET has recently developed a policy on HIV and AIDS. In addition it has also initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments.	The proponent and its contractor have to adhere to the guidelines provided to manage the aspects of HIV/AIDS. Experience with similar projects has shown that a significant health risk is created when migrant construction workers/labourers interact with local communities.
Local Authorities Act No. 23 of 1992	The Local Authorities Act prescribes the manner in which a town or municipality should be managed by the Town or Municipal Council. Sections 34-47 make provision for the aspects of water and sewerage.	Sand mining and processing activities have to comply with provisions of the Local Authorities Act.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
Labour Act No. 11 of 2007	Chapter 2 details the fundamental rights and protections. Chapter 3 deals with the basic conditions of employment.	Given the employment opportunities presented by the on-going sand mining activities and processing operations take place on mining claims 69069-69071 in and along the Usib River at the Groot Aub Settlement, compliance with the law is essential.
Public and Environmental Health Act of 2015	This Act (GG 5740) provides a framework for a structured uniform public and environmental health system in Namibia. It covers notification, prevention and control of diseases and sexually-transmitted infections; maternal, ante-natal and neo-natal care; water and food supplies; infant nutrition; waste management; health nuisances; public and environmental health planning and reporting. It repeals the Public Health Act 36 of 1919 (SA GG 979).	Sand mining & processing activities are to comply with these legal requirements.
Nature Conservation Ordinance No. 4 of 1975	Chapter 6 provides for legislation regarding the protection of indigenous plants.	Indigenous and protected plants have to be managed within the legal confines.
Environmental Assessment Policy of Namibia (1995)	The Policy seeks to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process, and that the term ENVIRONMENT is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.	This EIA considers this term of Environment.
Minerals (Prospecting and Mining) Act, 1992 (Act 33 1 of 1992)	To provide for the reconnaissance, prospecting and mining for, and disposal of, and the exercise of control	The ongoing activity involves the mining of sand for construction & gardening purposes.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
	<p>over, minerals in Namibia; and to provide for matters incidental thereto.</p> <p>“mineral” means any substance, whether in solid, liquid or gaseous form, occurring naturally in, on or under any land and having been formed by, or subjected to, a geological process, excluding -(c) subject to the provisions of subsection (2), soil, sand, clay, gravel or stone (other than rock material specified in Part 2 of Schedule 1) if they are bona fide required for purposes of –</p> <p>(i) agriculture, building works, fencing or road making;</p> <p>(ii) the manufacture of bricks and tiles;</p>	
Soil Conservation Act 6 of 1969 Ministry of Agriculture, Water and Forestry	This Act covers the prevention and combating of soil erosion; the conservation, improvement and manner of use of the soil and vegetation; and the protection of water sources	Soils should not be polluted or left un-rehabilitated.

PROJECT LOCATION AND DESCRIPTION

The sand mining and processing operations take place on mining claims 69069-69071 in and along the Usib River at the Groot Aub settlement which is located between Windhoek and Rehoboth to the east of the Main Road on the D1320 road. Mr. Alan Gerome Stumpfe operates from an area just north of District Road 1320 leading to Groot Aub, to the west of the Usib River. On this site (Site A) the sand mined from the allocated portions in the Usib River and from the Mining Area is washed, graded, processed and stockpiled and collected for transportation to the Windhoek depot or directly to clients. This site also accommodate the admin offices, parking areas for construction and transport vehicles as well as housing for people working for Mr. Alan Gerome Stumpfe. The locality of the site is shown in Figure 1, 2 and 3 below, GPS Coordinates: -22, 9464120; 17, 1974940.

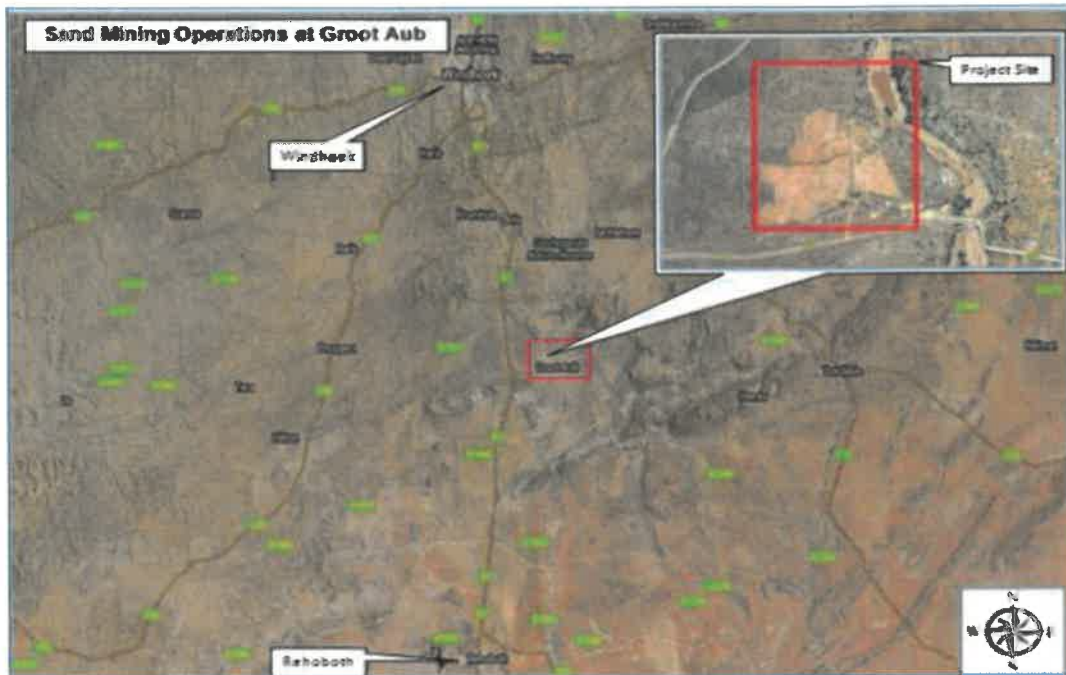


Figure 1: Location of the project site, Usib River, Groot Aub Settlement

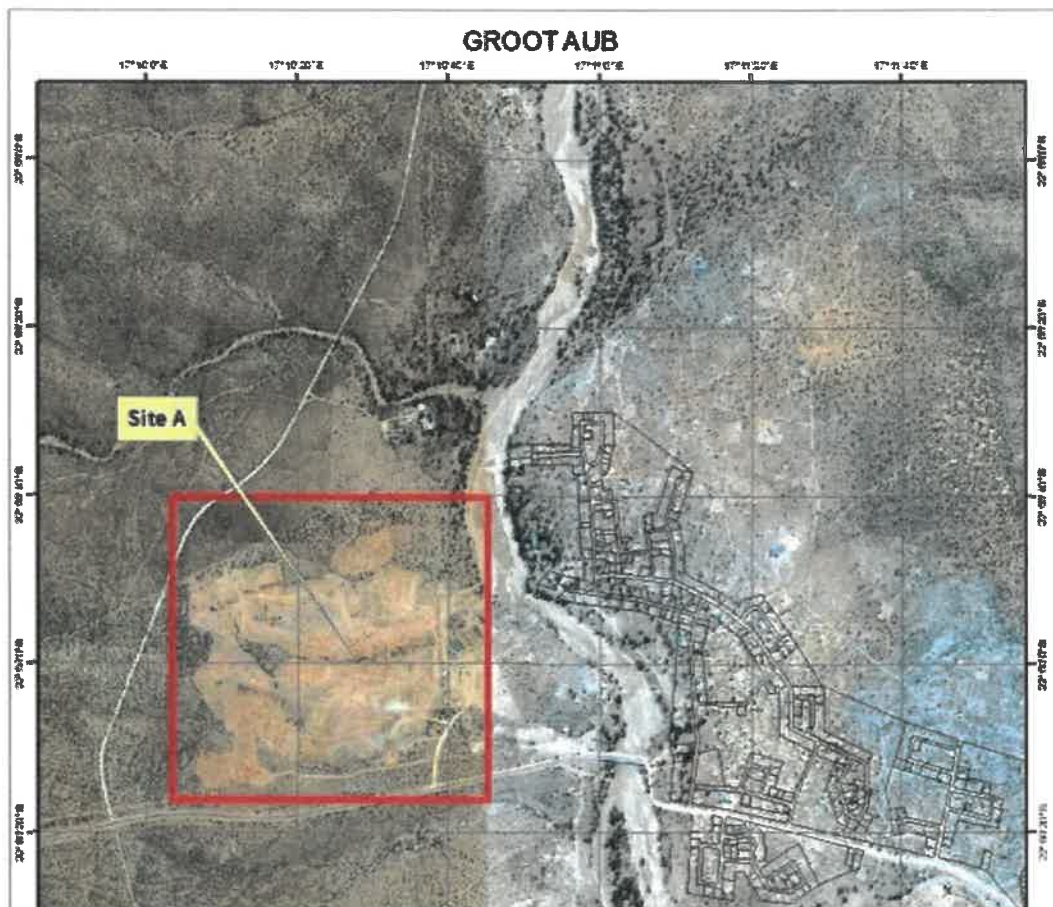


Figure 2: Site A is operated under Mining Claim/Mining License MC 69069 – 69071 which has been issued to Mr. Alan Gerome Stumpf to obtain construction raw materials.

Site A is used by Sandworx CC for the washing, grading, processing, crushing, stockpiling and collection of sand and gravel for transportation to the Windhoek depot or directly to clients. This site also accommodates the admin offices, parking areas for construction and transport vehicles, the screening, washing and crushing plant, as well as housing for people working for Sandworx. Gravel and coarse materials used for filling material in construction and landscaping activities are also mined on Site A. The site also accommodates the settling ponds through which the water used for the washing of the sand and gravel is recycled.

The sand, building stone and land filling materials are used for construction purposes and for the manufacturing of building materials. The volume of sand and stone produced varies but is on average $\pm 6300\text{m}^3/\text{month}$. This material is transported by customized trucks to the Windhoek depot and clients directly. The premises are further used for the parking and washing of the mining and transportation vehicles. A number of the staff, ± 40 people also resides on the premises in houses provided by Sandworx CC. These houses share an ablution facility. The premise is fenced in to prevent animals and unauthorized people for entering the site.

MINING CLAIM AREAS



Figure 3: Mining claim areas for the sand mining and processing activities along the Usib River, Groot Aub Settlement

*Topography, Geology and Hydrology***3.3.2.1 Topography and Geology**

The sand mining operations are located in the Khomas Trough on a geological area classified as Damara Supergroup and Gariep Complex. See Map below.

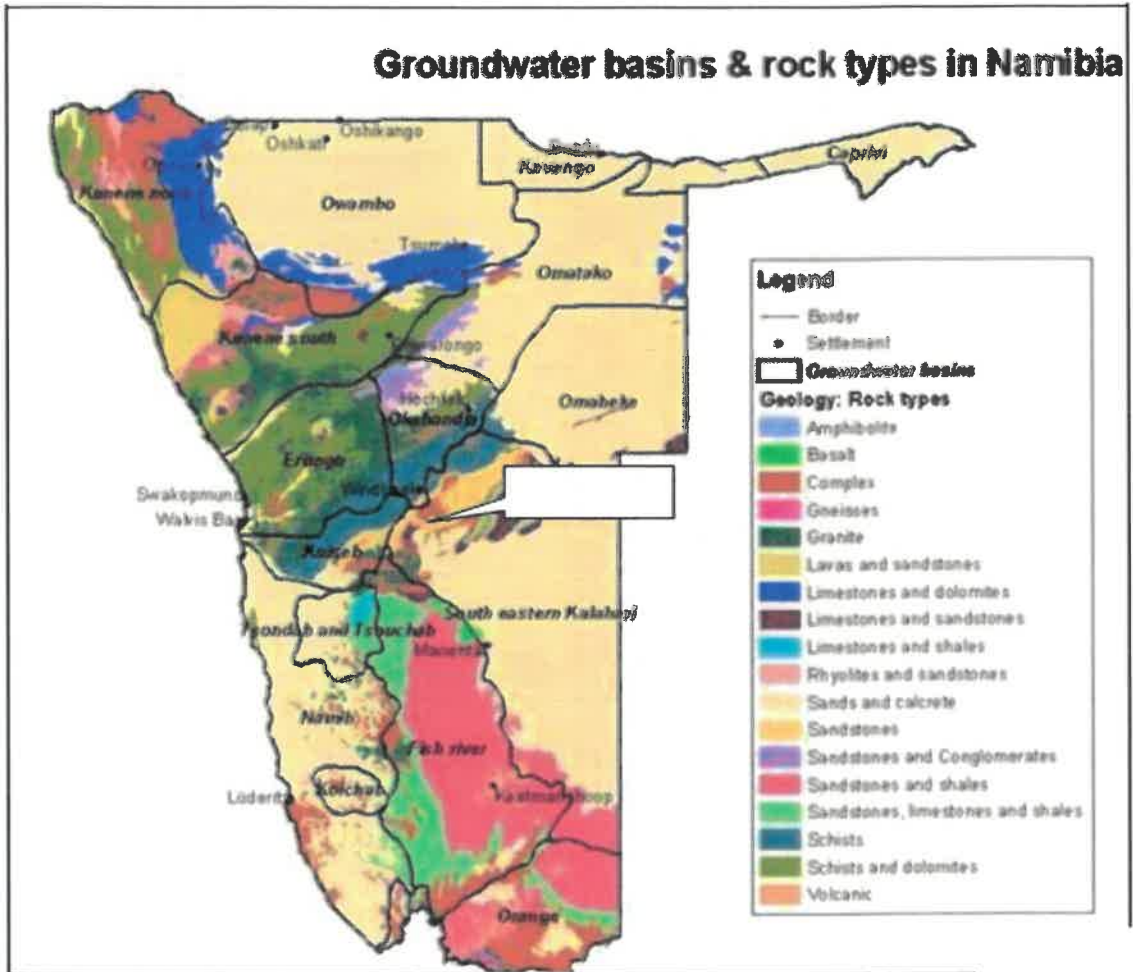
The Usib River from which the sand is extracted drain from the chain of the Auas Mountains which is located south east of Windhoek. Together with additional mountain chains the Auas Mountains form the southern and eastern border of the Windhoek Valley and the Usib River form part of the larger surface drainage systems which drains this area in a south-easterly direction. The Auas Mountains is also a part of the Damara Super Group of mountains. The Auas Mountains consist of a high percentage of weathering resistant quartzite with smaller quantities of the rather 'softer' mica-schist. Quartzite is a massive, very hard rock that developed by the metamorphism from sandstone during the Damara Mountain Building phase. The sand mined in the drainage systems to the south east of the Auas Mountains are created from the weathering and erosion of the Mountain ridges and foothills through wind and rain which then washes the sand into the river systems downstream of the mountains.

The sand created through these processes over time accumulated in the river systems and floodplains of these rivers. In a dry/arid environment as the Central Areas of Namibia this natural sediment yield is rather low and in practice the sand extracted through sand mining will only be replaced over 100's of years as can be seen from the over mining of the rivers (the Klein Windhoek River specifically) in the surroundings of Windhoek. From an environmental perspective care should be taken that the rates of sand extraction do not exceed the natural sediment yield of the river systems, resulting in a net loss of sand from the broader system.

When sand and gravel are extracted in quantities higher than is sustainable, changes take place in the river's ecosystem, such as in its channel form, physical habitats and food webs. The removal of sand from the riverbed increases the speed of flowing water, which in turn erodes the riverbanks. Sand also acts as a sponge, which helps in recharging the water table. Thus the progressive depletion of a river is accompanied by sinking water tables, which has an adverse impact on nearby communities. Sand eroded from upper catchments and transported by rivers is deposited along Riverbanks and floodplains where it sustains a riparian habitat and provides fertile ground for agriculture.

3.3.2.2 GEOHYDROLOGICAL CHARACTERISTICS OF THE SITE- PREVAILING HYDROGEOLOGY

The bedrock geology of the area consists primarily of highly deformed rocks of the Kuiseb Formation rocks of the Swakop Group. The dominant lithologies are metagreywacke and mica schist.



Structures present in the larger area are mainly north-south faults and joint systems. The north-south fault systems are less developed in the micaceous lithologies of the Kuiseb Formation rocks, as the mica schist undergoes plastic deformation rather than brittle fracturing. No faults are mapped within the operations area.

Some geological observations made during the field visit are:

- The schist is generally more massive and foliation is not very well developed.
- Some north-west – south-east striking joints are cross-cutting the massive schist.
- Quite a lot of quartz veins are present.
- The area is largely covered by a thin “quartz-pebble mulch” covering much of the soil horizon.

To understand the occurrence of groundwater and the potential pollution impact of the proposed project on groundwater, it is necessary to describe the prevailing geohydrological conditions, and to understand some of the fundamental geohydrological concepts. The predominant geology is the determining factor in the behaviour and characteristics of the geohydrological environment. The underlying geology is primarily schist, which is considered having a low groundwater potential and low risk of groundwater contamination.

Along drainage channels and rivers, alluvium may be found which have a moderate to high groundwater potential, with an associated higher risk of groundwater pollution. The main aquifer type found in the area is secondary fractured aquifers hosted in the mica schist of the Kuiseb Formation, with perceived limited (small) aquifers formed along the ephemeral river courses that are associated with river alluvials, or where groundwater recharge takes place during flood events.

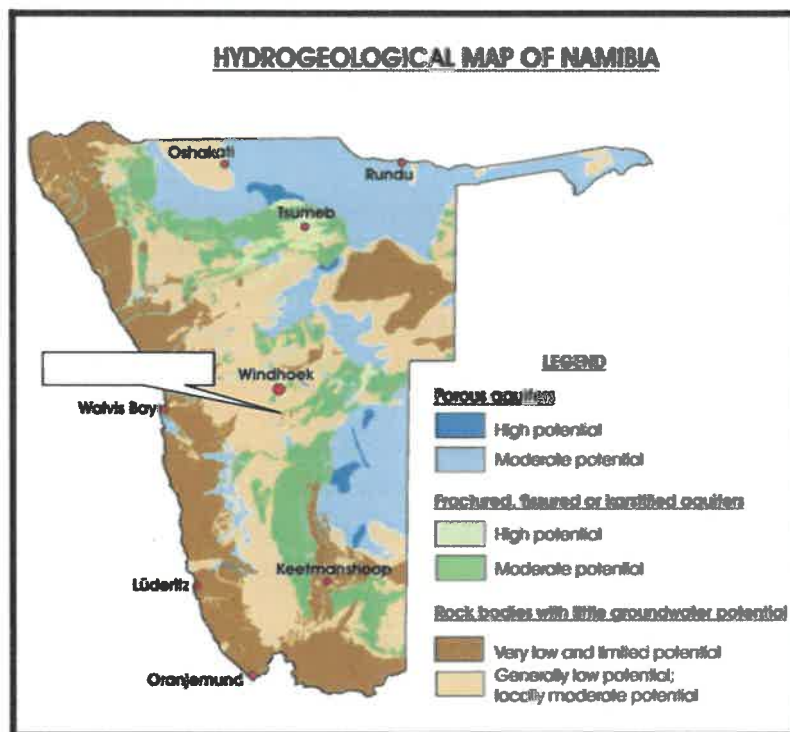
Schist, being a naturally poor host of groundwater, acts as an aquiclude, or when hosting groundwater, at best as an aquatard. The weathering product of schist is clayey material, which also is not favourable for transmitting groundwater. The field observations made regarding some of characteristics of the schist, namely its massive nature together with cross-cutting joints, is important in that:

1. The massive schist will be even more impervious than well-foliated schist, thereby further reducing the potential for groundwater flow.
2. The joints, if open at depth, will have higher transmissivity in relation to the matrix rock transmissivity, thus resulting in higher percolation rates and flow rates of groundwater in the joints.
3. If the quartz veins are a result of quartz intrusion from depth, these veins can act as preferential flow paths, and it can also store significant quantities of groundwater, thus it can potentially act as good secondary aquifers.

It must however be borne in mind that, even if flow rates can be higher in certain parts of the schist, the rock type in general is at best an aquatard. Furthermore, the “geohydrologically better” portion of the schist in relation to the “geohydrologically poor” portion of the schist is most likely negligibly small. The most significant negative aspect of this higher transmissivity characteristic in joint zones is that pollutants can enter and disperse through such joint zones much easier. At the same time however, it will be extremely difficult to remove or abstract any pollutant from the schist due to its over-all poor transmissivity.

All information suggests that the area in general has poor groundwater potential and the predominant geology in the area results in very little risk of groundwater contamination, *unless* pollutants end up in geological structures acting as preferential groundwater flow paths (faults or open joints) or along the river courses where groundwater flow in the alluvial sediments will be higher. Under such conditions the transmissivity is higher; therefore, the potential to easily transmit pollutants can also be moderate to high.

The Hydrogeological Map of Namibia shows that the study area fall in a zone of rock bodies with little groundwater potential (generally low; locally moderate potential) in an area of metamorphic rocks.



5: Hydrogeological Map of Namibia (Geological Survey of Namibia, 2015)

It can therefore be concluded that the geological and geohydrological settings: limit the flux of groundwater between different groundwater bodies or aquifers in the schist bedrock, thus limiting the movement of potential pollutants within this rock type; limit the probability that groundwater utilisation in one area will adversely affect groundwater availability in surrounding areas, and could result in higher flux within homogenous layers (*Geological Survey of Namibia, 2015*).

3.3.4 SURFACE WATER

Surface water flow in a catchment is largely determined by rainfall (quantity and intensity), potential evapotranspiration and catchment relief. A drainage system comprises all the elements of the landscape through which or over which water travels within that drainage basin. These elements include the soil, vegetation growing on it, geological materials underlying the soil, stream channels carrying surface water and the zones where water is held in the soil and moves below the surface. It also includes constructed elements such as pipes and culverts, cleared and compacted land surfaces, and pavement and other impervious surfaces unable to absorb water. The hydrology of a region is thus characterised by the collection, movement and storage of water through a drainage basin.

Alteration of a natural drainage basin through for instance urbanisation can impose dramatic changes in the movement and storage of water. These changes can have negative impacts on other parties that use water for industrial, domestic and livestock watering purposes in the immediate vicinity or downstream.

3.3.5 Climatic Conditions (rainfall and wind)

No specific climate data is available for the project site. Groot Aub and surroundings in general is characterized with a semi-arid highland savannah climate typified as very hot in summer and moderate dry in winter. The highest temperatures are measured in December with an average daily temperature of maximum 31°C and a minimum of 17°C. The coldest temperatures, conversely, are measured in July with an average daily maximum of 20°C and minimum 6°C (*Weather - the Climate in Namibia, 1998 – 2012*). The area therefore has fairly low frost potential.

Rainfall in the form of thunderstorms is experienced in the area during the summer months between October and April. The annual average rainfall for Groot Aub and surroundings is 350mm to 400mm however the average evaporation rate is 3 400mm a year (*Weather - the Climate in Namibia, 1998 – 2012*). Over 70% of the rainfall occurs in the in the summer months' period between November and March. Rainfall in the area is typically sporadic and unpredictable however the average highest rainfall months are January to March.

The prevailing wind direction is expected to prevent the spread of any nuisance namely noise and smell. The predominant wind in the region is easterly with westerly winds from September to December (*Weather - the Climate in Namibia, 1998 – 2012*).

4. Biodiversity (Flora and Fauna)

4.1 Flora and Fauna

The general Groot Aub area and surroundings (i.e. central Namibia) is regarded as “average to high” in overall (all terrestrial species) diversity while the overall terrestrial endemism is “high” (Mendelsohn *et al.* 2002). Central Namibia has between 161-200 endemic vertebrates (all vertebrates included). The overall diversity and abundance of large herbivorous mammals (big game) is viewed as “high” with 7-8 species while the overall diversity of large carnivorous mammals (large predators) is determined at 3 species with Leopard and Cheetah being the most important with “high” densities (Mendelsohn *et al.* 2002).

Mountainous and rocky features in the Highland Savannah are viewed as unique and often critical habitat to a variety of vertebrate fauna of concern – e.g. *Python anchietae* & Verreaux’s Eagle (“Near Threatened”). Such habitats should be protected, especially isolated patches thereof, as these often have an “island” effect with a variety of rock and crevasse dwelling species dependent on these areas.

Ephemeral drainage lines with associated riparian habitat, especially bigger trees, and temporary pools (and/or perennial springs and seeps) are also viewed as important habitat for a variety of vertebrate fauna – e.g. bark roosting bats; South African Gallago; cavity nesting birds (Monteiros & Damara Hornbills and Rüppells Parrot), etc. Important habitats for vertebrate fauna identified during the site visits are viewed as the rocky, mainly schist outcrops and few ephemeral drainage lines.

It is estimated that at least 78 reptiles, 9 amphibians, 81 mammal and 209 bird species (breeding residents) are known to or expected to occur in the general/immediate Groot Aub area of which a large proportion are endemics. Endemics include at least 36% of the reptiles, 33% of the amphibians, 9.9% of the mammals and 71% (10 of the 14 Namibian endemics) of all the breeding and/or resident birds known and/or expected to occur in the general area. Although these endemics are known to occur in the general area, it is currently not clear if any of these are associated with the proposed operations area(s) or how exactly they will be affected by these operations.

The Highland Savannah, although varied, is classified by *Combretum apiculatum* subsp. *apiculatum* and *Acacia hereroensis*, *Acacia reficiens* and *Acacia erubescens* amongst others and the climax grasses on undisturbed areas dominated by *Antheophora pubescens*, *Brachiaria nigropedata* and *Digitaria eriantha* (Giess 1971). The best palatable grasses have often been denuded in the general area over time due to over-and selective grazing practices (Giess 1971). The overall vegetation structure can be classified as “dense shrubland” and “shrubs and low trees” (Mendelsohn *et al.* 2002).

According to Curtis and Mannheimer (2005) and Mannheimer and Curtis (2009) between 66 and 83 species of larger trees and shrubs are known and/or expected to occur in the general Windhoek area, respectively. Twenty-seven (32.5%) species of larger trees and shrubs have some kind of protected status in the general area. Five species (6.1%) are endemic, 3 species (3.7%) near-endemic, and 16 species (19.3%) protected by Forestry laws, 3 species (3.7%) protected by Nature Conservation laws.

During the site visit, various species of trees/shrubs were identified in the proposed project area. Of these, 6 species (*Acacia erioloba*, *Albizia anthelmintica*, *Boscia albitrunca*, *Ozoroa crassinervia*, *Searsia lancea* & *Ziziphus mucronata*) are protected under Forestry legislation with 1 species also being “near-endemic” (*Ozoroa crassinervia*).

The most important tree/shrub species expected from the general area are the various protected species and species of conservation concern and include *Commiphora dinteri* (endemic), *Cyphostemma bainesii* (endemic, NC), *Cyphostemma currorii* (NC) and *Heteromorpha papillosa* (endemic). All aloe species are protected in Namibia and other species potentially occurring in the general area are *Aloe hereroensis* and *Aloe zebrina* (Rothmann 2004). None of the species are exclusively associated with the project area.

Up to 101 grasses are expected in the general Windhoek area of which 4 species are viewed as endemic (*Eragrostis omahekensis*, *Eragrostis scopelophila*, *Pennisetum foermeranum* and *Setaria finita*). *Pennisetum foermeranum* is associated with rocky mountainous terrain and consequently only expected in such suitable habitat. *Eragrostis omahekensis* is virtually only found on disturbed soils – e.g. close to watering points – while *Eragrostis scopelophila* is associated with mountainous areas under trees and shrubs. The endemic *Setaria finita* is associated with drainage lines in the general area; never very common and probably the grass species most likely to be affected most by operations in the area. None of the species are exclusively associated with the project area. The dominant grass throughout the proposed project area was *Brachiaria nigropedata*.

Site A has been stripped of its top soil layers during the mining activities and only a few of the protected tree species have been left. So the project site is showing some serious evidence of human inference as the bulk of the vegetation was cleared to be able to reach the sand and gravel for the mining activities.

Site B is located in the Usib River Bed which is only covered by annual and perennial grasses after the rainy season. No trees were observed in this section where the mining is taking place. The trees are found on the banks of the river away from the main river flow area where the sand and gravel is mined. In this area only the necessary plants/vegetation is removed for the mining of the sand and gravel and the operator is staying away at least 10m from the river banks.

The natural characteristics of the project site namely the vegetation clearance and the destruction of habitats is expected to further on have a low impact on the environment before the mitigation measures are taken and after the mitigation measures are taken, the impact will be very low. It is expected that once these areas are rehabilitated after mining that the natural vegetation will recover to its original state.

4.3 BIODIVERSITY MANAGEMENT AND MITIGATION

4.3.1 ISSUE: GENERAL PHYSICAL DISTURBANCE OF BIODIVERSITY

The updated EMP covers the following broad topics: physical destruction of biodiversity and related functions, impacts on environment as an ecological driver, and general disturbances to biodiversity.

Table 4: Physical disruption of biodiversity - link to phase and activities

Issue	Management commitment	Phase
Physical disruption to biodiversity by Staff	Undertake a relocation and plant storage before the start of any clearing if there is any endangered/protected plant species found on site. Prepare the base camp and ablution facilities at already disturbed areas. The Principle of zero tolerance to killing and collecting of biodiversity i.e. no poaching (including collection of firewood) will be allowed and poaching offenders will be prosecuted. Remove and store topsoil for later rehabilitation of vegetation Forbid off-road driving during hauling operations Restrict the movement of the vehicles on demarcated track only Prohibit illegal fishing Do not allow domestic animals such as cat and dogs in the area of sand mining. Enforce a speed limit of 60km/hr.	All
	All species with a conservation and or protection status should be identified, clearly marked and preserved (by at least 50%)	Sand mining
Physical disruption to biodiversity by infrastructures	Barricade the areas of operations to ensure that animals have no access to sand mining areas.	All
	Upon completing sand mining activities, initiate restoration program including areas that were only impacted during topsoil stock piling activities.	Operation, decommissioning and closure
Emergency	Certain instances of injury to animals may be considered emergency situations. These will be managed in accordance with the proponent's emergency response procedure. Conduct a safety induction program to all the employees before commencing duties.	All
Responsibility	Mr. Alan Gerome Stumpfe's Management and Environmental Control Officer (ECO)	

4.4 Environment and Economic Issues

Namibia's economy is highly dependent on a healthy environment. Sand mining is the removal of sand from their natural configuration. Mining of sand is essential to the construction sector of the country, due to the fact that it is one of the essential raw materials needed for cement brick making. However, the sand mining activities whether at a large or small scale is inherently disruptive to the environment. Environmental problems occur when the rate of extraction of sand exceeds the rate at which natural processes generate these materials. It is thus necessary to ensure that rehabilitation of the borrow pits occur soon after the sand mining activities cease so as to restore the environment to its natural state.

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.

4.4.1 SOCIAL-ECONOMIC COMPONENT

Sandworx CC subcontracted by Mr. Alan Gerome Stumpfe produces ± 6300 cubic of sand per month. Sandworx CC obtains normal claims or mining land from private owners. The claim holder/s is being paid for the amount of sand that is being extracted from his property. Sandworx CC makes use of ± 7 trucks and the trucks go directly to the site in Windhoek in Prosperita where sand is sold to companies. In a few cases sand has been delivered to clients themselves however this is limited. ± 40 workers are employed by Sandworx CC at their site in Groot Aub and some of these individuals live on the management and crushing site. Approximately 68 workers in total are employed by Sandworx CC on their Prosperita and Groot Aub Site. It is proposed that Sandworx CC will employ ± 100 workers if the project continues. All workers living on the site of Sandworx CC are provided with water and electricity. The crusher sites are fully fenced with a few gates leading out the site. At the moment a limited amount of dust and noise are being produced on the site.

The proposed sand mining activities have a positive impact on the socio-economic environment because of employment creation. Apart from the proponent's intension to make a profit out of the proposed activities, advantages to the area are numerous. The on-going operations have attracted more business activities such as medical care, building maintenance, vehicle maintenance, electrical and additional support for schools and other existing businesses etc.

The proposed project has created permanent employment for at least 40 people. Full time employment opportunities were created for domestic workers and other related work. The ongoing operations have given the area the much needed economic stimulation especially after the economic downturn brought about by the Covid19 pandemic which ultimately have a multiplier effect in the community regarding sales and services. Services that will benefit from the sand mining operations are amongst others shops, doctors, garages, etc. These operations

have brought investment into the Groot Aub Settlement and increased the buying power of the locals. Since the majority of land use in and around the area is characterised by open or farm land, residential and commercial/business related activities, the operations will not have a negative impact on the neighbours or the surrounding areas.

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 this updates EMP. The following tables prescribe the management actions to be taken at each phase of the sand mining activities.

SAND MINING PHASE

The PR should ensure that the management actions detailed in **Table 5** below should be adhered to during the operation of the sand mining activities and should be undertaken together with the mitigation measures in **Table 5**.

Table 5: Sand Mining Phase Management Actions

Aspect	Management Actions
Environmental Incidents	<ul style="list-style-type: none"> • The ECO on site shall maintain a register of all environmental incidents occurring as a result of the activities associated with the project. Environmental incidents that shall be recorded include (but are not limited to): <ul style="list-style-type: none"> ➤ Fires; ➤ Drowning; ➤ Accidents (e.g. traffic); ➤ Spills of hazardous materials, contaminating soil or water resources; ➤ Non-compliances with applicable legislation; and ➤ Non-compliances with this updated EMP. • Environmental incident reports shall include (as a minimum) a description of the incident, the actions taken to contain any damage to the environment, personnel, or the public, and the actions taken to repair / remediate any such damage. • Additional measures shall be prescribed that may be required to remediate damage resulting from the incident and / or to prevent similar incidents occurring in the future.
Traffic	<ul style="list-style-type: none"> • Ensure that road junctions have good sightlines. • Limit the type of vehicle (heavy trucks) allowed on site.

Aspect	Management Actions
	<ul style="list-style-type: none"> • Adhere to the speed limit. If permissible, caution signs and 40 km/hr signs shall be placed at regulation distance from heavy vehicle crossing signs at the intersections of the access tracks and the main B1 road to Rehoboth. • Designate no-drive zones. • Implement traffic control measures where necessary by keeping a number plate register of all vehicles harvesting sand at the site and restricting access to authorised contractors.
Borrow pits/Sand mining area	<ul style="list-style-type: none"> • Sand should be sourced from a borrow pit with a valid ECC. • The mining area must be clearly demarcated by means of a perimeter stock-proof fence with a lockable gated entrance. • Sand mining and resultant operations shall only take place within this demarcated area. • A detailed photographic record of the demarcated areas, prior to any mining activities, shall be taken. These records are to be kept by the Proponent and PR for reference purposes during the rehabilitation of the site. • There will be 'No unauthorised access' signs at the borrow pit gates until the earth dam is open for public use. • Excess material may also be spoiled in open borrow pits around the Groot Aub Settlement as part of the rehabilitation process.

Aspect	Management Actions
EMP training	<p>All workers at the site are to undergo EMP training that should include as a minimum the following:</p> <ul style="list-style-type: none"> • Explanation of the importance of complying with the EMP. • Discussion of the potential environmental impacts of the intended sand mining and earth dam construction activities. • Employees' roles and responsibilities, including emergency preparedness and response requirements. • Explanation of the mitigation measures that must be implemented when particular work groups carry out their respective activities. • The potential consequences of departure from specified operating procedures; and rewards for enhancing mitigation measures or avoiding negative environmental effects.
Fauna and Flora	<ul style="list-style-type: none"> • Prevent the destruction of protected tree species. • Encourage the regrowth and regeneration of trees with exposed roots at the site. • The excavation of the sand should incorporate existing trees¹. • The Contractor should compile a Tree Management Plan which should include the following as a minimum:

¹a "tree" is defined as an indigenous woody perennial plant with a trunk diameter ≥ 150 mm

Aspect	Management Actions
	<ul style="list-style-type: none"> ○ Trees if not already accounted for in an existing Geographic Information System (GIS), should be surveyed, co-ordinates/location incorporated into the Contractor's GIS, marked with paint (or other means so as to be readily visible) and protected; ○ Trees, which are impossible to conserve, need to be identified and their location recorded on a map; ○ The Contractor should apply to the traditional authority for a permit to remove these trees. ○ A list should be compiled of all trees to be removed detailing the location of the tree, the species as well as which trees will be planted to replace these. The nursery where these trees will be sourced from should also be included; ○ Each tree that is removed needs to be replaced with an indigenous tree species; ○ Some of these trees can be obtained at the nearest Windhoek forestry office or Namib Trees Nursery. Assistance can be sought from this forestry office regarding nearby nurseries where additional trees may be bought. ● Only a limited width +/- 5 m on the side of the access roads may be partially cleared of vegetation. ● Workers are prohibited from collecting wood or other plant products on or near the site. ● No alien species may be planted on or within the existing site. ● Prevent contractors from collecting wood and veld food such as amphibians, migrating birds, etc. during the sand mining phase.

Aspect	Management Actions
	<ul style="list-style-type: none"> Prevent contractors from fishing in the sea or catching aquatic species without valid fishing permits.
Lay-down areas and materials camp	<p>Suitable locations for the contractors lay-down areas and materials camp should be identified with the assistance of the PR and the following should be considered in selecting these sites:</p> <ul style="list-style-type: none"> The areas designated for the services infrastructure should be used as far as possible. Second option should be degraded land. Avoid sensitive areas (e.g. wetlands/rivers/drainage lines)
Hazardous waste	<ul style="list-style-type: none"> All heavy-duty vehicles and equipment on site should be provided with a drip tray. All heavy-duty delivery vehicles should be maintained regularly to prevent oil leakages. Maintenance and washing of vehicles should take place only at a designated workshop area. Spilled cement and/or concrete (wet or dry) should be treated as hazardous waste and disposed of by the end of each day in the appropriate hazardous waste containers. All hazardous substances (e.g. fuel etc.) or chemicals should be stored in a specific location on an impermeable surface that is bunded - with a volume of 120 % of the largest single storage container or 25 % of the total storage containers, whichever is greater.
Surface and Ground Water Impacts	<ul style="list-style-type: none"> It is recommended that sand harvesting takes place outside of the rainy season in order to limit erosion & flooding on site and surface water pollution. No dumping of waste products of any kind in or in close proximity to surface water bodies.

Aspect	Management Actions
	<ul style="list-style-type: none"> • Heavy duty vehicles should be kept out of any surface water bodies and the movement of vehicles should be limited where possible to the existing access roads and tracks. • Contaminated runoff from the sites should be prevented from entering the surface water bodies. • Workers should be given ablution facilities at the sites that are located at least 30 m away from any surface water and regularly serviced. • Washing of personnel or any equipment should not be allowed on site.
Topsoil	<ul style="list-style-type: none"> • When excavations are carried out, topsoil² should be stockpiled in a demarcated area and used in profiling and rehabilitating of the open borrow pits in the surrounding areas in Groot Aub Settlement. • Stockpiled topsoil should be used to rehabilitate post-harvesting degraded areas and/or other nearby degraded areas within the Groot Aub Settlement.
Soil Erosion	<ul style="list-style-type: none"> • Clear the vegetation of the project area in phases during the sand mining period in order to keep the soil more compacted as well as to limit overall disturbance to the area over time. • It is recommended that most sand harvesting takes place outside of the rainy season in order to limit potential flooding and the run off of loose soil causing further erosion. • Appropriate erosion control structures must be put in place where soil may be prone to erosion.

² Topsoil is defined here as the top 150mm of surface material, which accounts for the seedbank.

Aspect	Management Actions
	<ul style="list-style-type: none"> • Checks must be carried out at regular intervals to identify areas within the site where erosion is occurring. Appropriate remedial actions are to be undertaken wherever erosion is evident.
Rehabilitation	<ul style="list-style-type: none"> • Upon completion of the sand mining phase consultations should be held with the local community/property owner(s) regarding the post-sand mining use of remaining excavated areas (if applicable) and to identify priority areas. • Sand at the site should be levelled so it can be reclaimed for other purposes once the sand mining has ceased and rather than leaving the borrow pit open which will pose a threat to people and animals in the area. • In the event that no post-operation uses are requested, all excavated/degraded areas need to be rehabilitated as follows: <ul style="list-style-type: none"> ○ Excavated areas may only be backfilled with clean or inert fill. No material of hazardous nature (e.g. sand removed with an oil spill) may be dumped as backfill. ○ Rehabilitated excavated areas need to match the contours of the existing landscape. ○ The rehabilitated area should not be higher (or lower) than nearby drainage channels. This ensures the efficiency of revegetation and reduces the chances of potential erosion. ○ Topsoil is to be spread across excavated areas evenly.

Aspect	Management Actions
	<ul style="list-style-type: none"> ○ Deep ripping of areas to be rehabilitated is required, not just simple scarification, so as to enable rip lines to hold water after heavy rainfall. ○ Ripping should be done along slopes, not up and down a slope, which could lead to enhanced erosion.
HIV/AIDS and TB awareness	<ul style="list-style-type: none"> ● The Contractor should approach the Ministry of Health and Social Services to co-opt a health officer to facilitate HIV/AIDS and TB education programmes periodically on site during the project operation. ● A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases. ● Provide free condoms in the workplace and to local community throughout project operation. ● Facilitate access to Antiretroviral medication ● Personnel should not overnight at the sand mining site, but only the security personnel.
Road safety	<ul style="list-style-type: none"> ● Demarcate roads clearly. ● Off-road driving should not be allowed. ● All vehicles that transport materials to and from the site must be roadworthy. ● Drivers that transport materials should have a valid driver's license and should adhere to all traffic rules. ● Loads upon vehicles should be properly secured to avoid items falling off the vehicle. ● Limit and control the number of access points to the site.

Aspect	Management Actions
	<ul style="list-style-type: none"> • The road leading to the sand harvesting site should be properly maintained so as to reduce dust emissions when heavy vehicles travel on them. • Consideration should be given to possibly tar the road leading to the sand harvesting site which could reduce dust emissions onsite.
Safety around work sites	<ul style="list-style-type: none"> • Excavations should be left open for the shortest time possible. • Excavate short lengths of trenches and box areas for services or foundations in a manner that will not leave the trench unattended for more than 24 hours. • Demarcate excavated areas and topsoil stockpiles with danger tape. • Provide additional warning signage in areas of movement and in “no personnel” areas where workers are not active. • Borrow pits are to be fenced-off with stock-proof perimeter fencing. • Work areas must be set out and isolated with danger tape on a daily basis. • All materials and equipment are to be stored only within set out and demarcated work areas. • Only sand mining personnel will be allowed within these work areas. • 2 fire extinguishers should be available at fuel storage areas. • Comply with all waste related management actions stated above in this table.

Aspect	Management Actions
Ablutions	<ul style="list-style-type: none"> • Separate toilets should be available for men and women and should clearly be indicated as such. • Portable toilets (i.e. easily transportable) should be available at every construction site: <ul style="list-style-type: none"> ○ 1 toilet for every 15 females. ○ 1 toilet for every 30 males. ○ Sewage needs to be removed on a regular basis to an approved (municipal) sewage disposal site. Alternatively, sewage may be pumped into sealable containers and stored until it can be removed. ○ Workers responsible for cleaning the toilets should be provided with latex gloves and masks.
Open fires	No open fires may be made anywhere on site.
General health and safety	<ul style="list-style-type: none"> • A fully stocked first aid kit should permanently be available on-site as well as an adequately trained member of staff capable of administering first aid. • All workers should have access to the relevant personal protective equipment. • Sufficient potable water reserves should be available to workers at all times. • No person should be allowed to smoke close to fuel storage facilities or portable toilets (if toilets are chemical toilets – the chemicals are flammable). • No workers should be allowed to drink alcohol during work hours. • No workers should be allowed on site if under the influence of alcohol.

Aspect	Management Actions
Dust	<ul style="list-style-type: none"> • A watering truck should be used on gravel roads with the most heavy vehicle movement especially during dry and windy conditions. However, due consideration should be given to water restrictions during times of drought. • The use of waterless dust suppression means (e.g. lignosulphonate products such as Dustex) should be considered. • Cover any stockpiles with plastic to minimise windblown dust. • Dust protection masks should be provided to workers if they complain about dust. • During high wind conditions the contractor must make the decision to cease works until the wind has calmed down.
Noise	<p>Work hours should be restricted to between 08h00 and 17h00 where excavation involving the use of heavy equipment, power tools and the movement of heavy vehicles is less than 500 m from residential areas. If an exception to this provision is required, all residents and business owners within the 500 m radius should be given 1 week's written notice.</p>
Recruitment of labourers	<p>The Contractor should compile a formal recruitment process including the following provisions as a minimum:</p> <ul style="list-style-type: none"> • Adhere to the legal provisions in the Labour Act No. 11 of 2007 for the recruitment of labour (target percentages for gender balance, optimal use of local labour and SME's, etc.). • Recruitment should not take place at the sand mining site.

Aspect	Management Actions
	<ul style="list-style-type: none"> • Ensure that all sub-contractors are aware of recommended recruitment procedures and discourage any recruitment of labour outside these agreed upon procedures. • All contractors should give preference in terms of recruitment of sub-contractors and individual labourers to those who are qualified and from the project area and only then look to surrounding towns. • Clearly explain to all job-seekers the terms and conditions of their respective employment contracts (e.g. period of employment etc.) – make use of interpreters where necessary.
Communication plan	<p>The Contractor or PR should draft a Communication Plan, which should outline as a minimum the following:</p> <ul style="list-style-type: none"> • How Interested and Affected Parties (I&APs), who require on-going communication for the duration of the operation period, will be identified and recorded and who will manage and update these records; • How these I&APs will be consulted on an on-going basis; • Make provision for grievance mechanisms – i.e. how concerns can be lodged/ recorded and how feedback will be delivered as well as further steps of arbitration in the event that feedback is deemed unsatisfactory.
General communication	<ul style="list-style-type: none"> • The PR must appoint an ECO to liaise between the Contractor, I&APs and Sand Worx CC management. • The Contractor shall at every bi-monthly site meeting report on the status of the implementation of all provisions of the EMP.

Aspect	Management Actions
	<ul style="list-style-type: none"> • The Contractor should implement the EMP awareness training as stipulated above in this table. • The Contractor must list the I&APs of the project and their contact details with whom on-going communication would be required for the duration of the contract. This list, together with the Communication Plan must be agreed upon and given to the PR before operation commences/resumes. • The Communication Plan, once agreed upon by the Developer, shall be legally binding. • A copy of the updated EMP must be available at the site office and should be accessible to all I&APs. • Key representatives from the above mentioned list need to be invited to attend monthly site meetings to raise any concerns and issues regarding progress to rehabilitate the excavated areas and surrounding borrow pits. • The Contractor should liaise with the proponent regarding all issues related to community consultation and negotiation before operation commences/resumes. • A procedure should be put in place to ensure that concerns raised have been followed-up and addressed. • All people on the I&APs list should be informed about the availability of the complaints register and associated grievance mechanisms in writing by the PR prior to the commencement of site activities.

Aspect	Management Actions
Archaeology	<ul style="list-style-type: none"> • Should a heritage site or archaeological site be uncovered or discovered during the sand harvesting or earth dam construction phase of the project, a “chance find” procedure should be applied in the order they appear below: <ul style="list-style-type: none"> ○ If operating machinery or equipment stop work; ○ Demarcate the site with danger tape; ○ Determine GPS position if possible; ○ Report findings to the site foreman; ○ Report findings, site location and actions taken to superintendent; ○ Cease any works in immediate vicinity; ○ Visit find site and determine whether work can proceed without damage to findings; ○ Determine and demarcate exclusion boundary; ○ Site location and details to be added to a Geographic Information System (GIS) for field confirmation by archaeologist; ○ Inspect site and confirm addition to sand mining site GIS; ○ Advise the National Heritage Council (NHC) and request written permission to remove findings from work area; and ○ Recovery, packaging and labelling of findings for transfer to National Museum. • Should human remains be found, the following actions will be required: <ul style="list-style-type: none"> ○ Apply the chance find procedure as described above;

Aspect	Management Actions
	<ul style="list-style-type: none">○ Schedule a field inspection with an archaeologist to confirm that remains are human;○ Advise and liaise with the NHC and Police; and○ Remains will be recovered and removed either to the National Museum or the National Forensic Laboratory.

DECOMMISSIONING PHASE

The decommissioning of the sand mining site is envisaged in the near future so as to use this land parcel for alternative uses as deemed suitable when the event occurs and some recommendations have been outlined in **Table 6** below.

Table 6: Decommissioning phase management actions

Environmental Feature	Management Actions
Deconstruction activity	Many of the mitigation measures prescribed for the sand mining activities (Table 5 above) would be applicable to some of the decommissioning activities. These should be adhered to where applicable.
Rehabilitation	In the event that decommissioning is deemed necessary, excavations need to be rehabilitated according to the management actions laid out in Table 5 above.

4 SAND MINING IMPACT MONITORING

Once the Environmental Clearance has been renewed, the proponent should set up a sand mining monitoring points, as per the following guideline:

- a) Set up sand mining Monitoring Points (MP's)
- b) Preferably, a minimum of 4 MP's points (1 in each corner of the borrow pit),
- c) Mark / peg all each MP with visible marking (e.g. metal rod / pole),
- d) Take GPS coordinates for each MP
- e) Take pictures of the borrow pit, at ninety degrees (90°) from each MP towards the borrow pit, *before the commencement* of the sand mining activities
- f) Repeat point (e) at *mid-term (half-way)* through the sand mining project,
- g) Repeat point (e) at *the end* (when sand mining at the particular point has been completed
- h) Keep the photo records and Print all pictures taken from e – g for monitoring purposes.
- i) The photo records will enable all stakeholders (ECO, MEFT, Contractor etc) to the overall impacts of sand mining. This information will be crucial for the review and renewal of the EC license after three (3) years.

The following must be kept in mind when planning with rehabilitation in mind:

- The proponent (Mr. Alan Gerome Stumpf) management should restore the area to the photographic images of its undisturbed state once the sand mining project is completed.
- Take into account that the same material that end up as the final surface cover be the same as previously there.
- How will the landform fit into the natural landscape?
- The shape and contours and colours of the refilling material should be natural and blend in to the best resemblance of the original scenery making sure that the new land form will not have undesirable attributes such as steep slopes thereby making it prone to erosion.
- The soil and plant materials removed must be stored at an onsite nursery and used for rehabilitation as a first approach while the seeding method is a second option to ensure a fool proof approach in approaching the restoration efforts.

In order to undertake rehabilitation the following should be considered:

- Remove all temporary infrastructures and waste;
- Clean up all solid waste pollution including litter, rubble and separate all recyclables;
- Restore the habitat so that plants can re-colonise it;
- If topsoil and plant onsite nursery storage proves feasible this can also be spread on the topsoil on disturbed areas;
- Replant areas with the indigenous plant species in the area since it might take a long time to recover without assistance.

Common problems during rehabilitation that require certain interventions are:

- Compacted soil;
- Unsuitable physical and chemical condition of the soil (for instance salts that have been brought up from deep in the ground during excavation).

5 CONCLUSION

The updated EMP has identified and recommended measures to be adopted by Mr. Alan Gerome Stumpfe and his contractors to manage the sand mining activities as well as measures to ensure that the borrow pit is rehabilitated. In-addition, the updated EMP prescribes site closure measures that are considered both legally compliant and environmentally acceptable.

The 2 borrow pits within the Usib River have been used by Mr. Alan Gerome Stumpfe since 2018 (about 3 years) and have created employment in the operations, mining, transport and admin division, value addition to a natural resource and in providing sand to construction and gardening companies. Mr. Alan Gerome Stumpfe would like to continue conforming 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 this updated Environmental Management Plan (EMP).

Mr. Alan Gerome Stumpfe further acknowledges that the 2 borrow pit falls under the jurisdiction of the Groot Aub Local Authority. The current contractor, Sandworx CC is in possession of a lease agreement with the mining claims owner, Mr. Alan Gerome Stumpfe (the applicant) enabling them to continue harvesting the sand as a raw material for construction from the allocated portion on mining claims 69069, 69070 and 69071.

It is recommended that an Environmental Control Officer monitors the preparation, operational, rehabilitation and closure of the borrow pit in-order to ensure that the mitigation and rehabilitation measures prescribed in this updated EMP are adhered to.

6 PENALTIES

6.1 Penalties for the activities detailed below, will be imposed by the ECO on the Proponent and / or his Sub-Contractors.

a)	Any employees, vehicles, or things related to the Contractor's operations operating outside the designated boundaries or a "no-go" area.	N\$ 5,000
b)	Persistent and un-repaired oil leaks from machinery.	N\$ 2,000
c)	Persistent failure to monitor and empty drip trays timeously.	N\$ 2,000
d)	The use of inappropriate methods for refuelling, resulting in spillages.	N\$ 2,000
e)	Deliberate lighting of illegal fires on site.	N\$ 2,000
f)	Employees not making use of the site ablution facilities.	N\$ 2,000
g)	Unauthorised removal of vegetation.	N\$ 10,000
h)	Hunting, trapping and collection of animals (per unit taken).	N\$ 20,000
i)	Failure to implement specified noise controls.	N\$ 2,000
j)	A spillage, pollution, fire or any damage to the environment resulting from negligence on the part of the Proponent.	N\$ 25,000
k)	Damage to vegetation or ground arising from equipment leaving designated haul or access routes.	N\$ 25,000
Responsibility		Mr. Alan Gerome Stumpfe's Management and Environmental Control Officer (ECO)

For each subsequent similar offence the penalty shall be doubled in value to a maximum value of **N\$ 50,000.00**. The ECO shall be the judge as to what constitutes a transgression in terms of this clause.

HEEC CC

Mr. Alan Gerome Stumpfe

APPENDIX A- PHOTO PLATE OF THE CURRENT SITUATION AT THE SAND MINING CLAIMS

(69069-6071), GROOT AUB SETTLEMENT.







