

**BON OKAPUKA CRUSHERS' SAND, STONE AND
AGGREGATE MINING IN THE DÖBRA RIVER,
KHOMAS REGION**

UPDATED ENVIRONMENTAL MANAGEMENT PLAN



Prepared by:



Prepared for:

**Bon Okapuka
Crushers CC**

April 2023

Project:	BON OKAPUKA CRUSHERS' SAND, STONE AND AGGREGATE MINING, DÖBRA RIVER, KHOMAS REGION: UPDATED ENVIRONMENTAL MANAGEMENT PLAN	
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1 INTRODUCTION

Bon Okapuka Crushers CC operates an existing sand, stone and aggregate mine along a section of the Döbra River, north of Windhoek. Figure 1-1 depicts the area within which mining operations are conducted. Bon Okapuka Crushers obtained an environmental clearance certificate (ECC) for their operations in 2020 (Appendix A). An application to renew the ECC will now be made and for this purpose their existing environmental management plan (EMP) was updated and is presented in this document. The EMP is still based on the environmental impact assessment for their mining operations as conducted in 2019 (Coetzer et al. 2019).

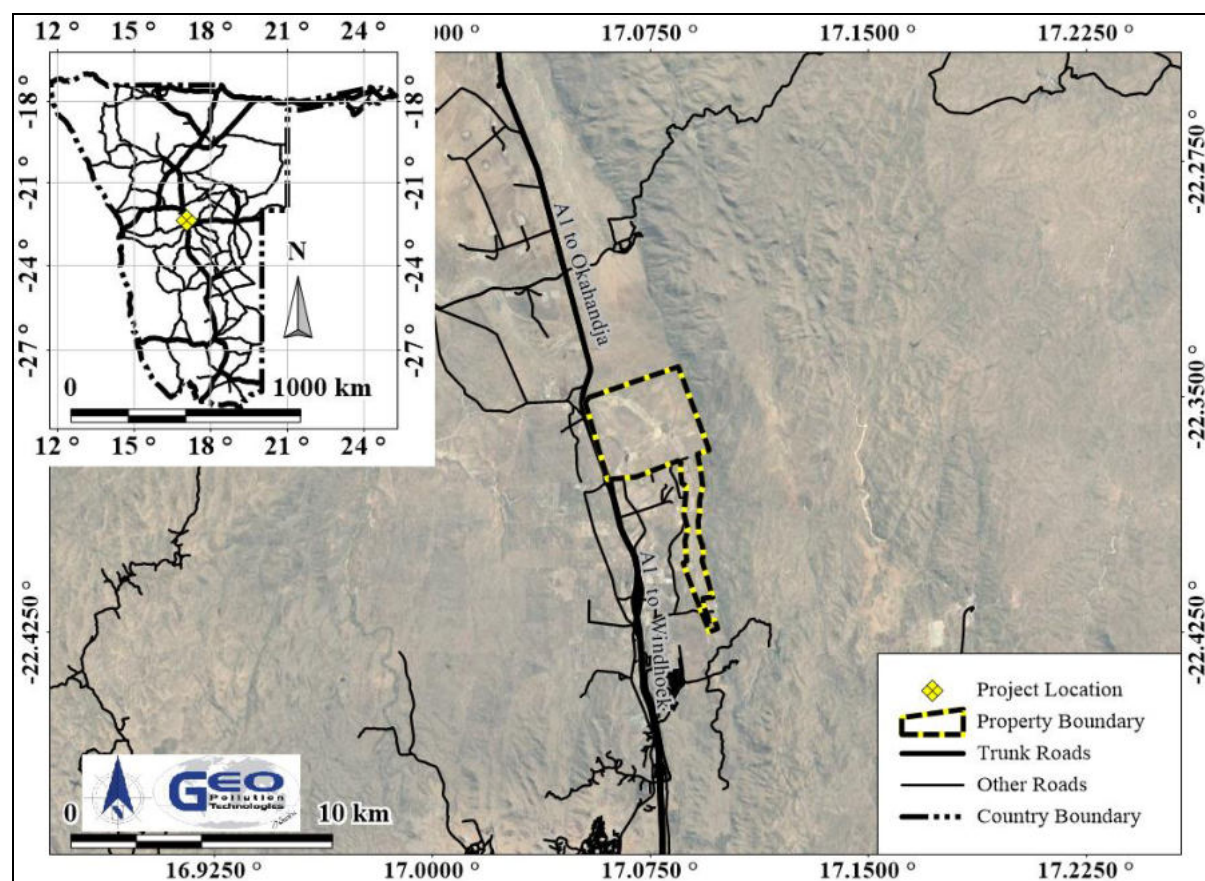


Figure 1-1 Location map indicating the mining area

2 PROJECT DEVELOPMENT AND RELATED ACTIVITIES

Mining activities entail the clearing of vegetation, loading of sand, stone and aggregate with earth moving equipment onto tipper trucks, transporting the sand, stone and aggregate to the crusher operations and operations of a consumer fuel installation.

In summary operations are as follows:

- ◆ Removal of vegetation,
- ◆ Active excavation of sand, stone and aggregate with earth moving equipment at deposits,
- ◆ Transportation of sand to stockpile area / crusher plant via tipper trucks,
- ◆ Levelling and shaping of remaining material,
- ◆ Re-placing overburden.

The gravel road which is used to transport material to the crusher site is wetted with a water tanker for dust suppression purposes. This road is shared with other road users such as the farm owner.

Table 2-1 below provides a list of the activities, labour and equipment requirements associated with the mining operations. Current operations ensure tipper trucks haul sand, stone and aggregate from the mining area to the crusher plant at a constant rate. From the crusher plant, some material is moved to

the brickfield. Employees are required for the following activities: Driving and operating of earth moving equipment, tipper trucks and dust suppression truck, clearing of vegetation from stockpiles and mining areas, operating crusher plant, operating brickfield and general labour. Three fuel storage tanks (2 x 25 m³ above surface diesel tanks and 1 x 4 m³ below surface petrol tank) are also present and have been operating on the site since 2002. These need to be operated according to legislation included in this EMP, with special focus on section 6. Ablution facilities are located at the brickfield as well as at the crusher plant.

Table 2-1 Mining activities

Activity	Operational Phase	Decommissioning Phase
Equipment requirements: removal of sand and levelling / shaping of remaining material	<ul style="list-style-type: none"> ◆ 4x4 vehicle(s) ◆ Earth moving equipment ◆ Tipper truck(s) 	<ul style="list-style-type: none"> ◆ 4x4 vehicle(s) ◆ Earth moving equipment
Approximate in-house labour requirements on site	<ul style="list-style-type: none"> ◆ Site manager ◆ Health and Safety Supervisor ◆ Earth moving equipment operators ◆ Tipper truck driver(s) ◆ General labourers 	<ul style="list-style-type: none"> ◆ Site manager ◆ Health and Safety Supervisor ◆ Earth moving equipment operators ◆ General labourers
Site access	<ul style="list-style-type: none"> ◆ Via existing roads. Development of new roads should be kept to a minimum if required for future operations 	<ul style="list-style-type: none"> ◆ Rehabilitation of any and all roads created for the transportation of material
Storage requirements	<ul style="list-style-type: none"> ◆ All fuel, lubricants and hydraulic fluids (hydrocarbons) to be stored in a bunded area 	<ul style="list-style-type: none"> ◆ Fuel, lubricants and hydraulic fluids (hydrocarbons) to be stored in a bunded area
Transporting of material	<ul style="list-style-type: none"> ◆ Carrier truck 	<ul style="list-style-type: none"> ◆ None
Dust abatement	<ul style="list-style-type: none"> ◆ Wetting of haul roads and sites of excessive dust generation 	<ul style="list-style-type: none"> ◆ Wetting of haul roads and sites of excessive dust generation
Onsite ablution	<ul style="list-style-type: none"> ◆ Ablution facilities at brickfield and crusher plant 	<ul style="list-style-type: none"> ◆ Ablution facilities at brickfield and crusher plant

The above activities and requirements are considered in the assessment and management of impacts section (section 6), in relation to the receiving environment.

3 ADMINISTRATIVE, LEGAL AND POLICY REQUIREMENTS

To protect the environment and achieve sustainable development, all projects, plans, programmes and policies deemed to have adverse impacts on the environment require an EIA, as per the Namibian legislation. The legislation and standards provided in Table 3-2 to Table 3-5 governs the EIA process in Namibia and/or are relevant to the project.

Table 3-1 EMA listed activities applicable to the project

Activity No.	Activity	Applicability
3.2	<i>Other forms of mining or extraction of any natural resource whether regulated by law or not.</i>	Sand, stone and aggregate is considered as natural resources.
3.3	<i>Resource extraction, manipulation, conservation or related activities.</i>	Sand, stone and aggregate is being extracted / mined.
4.	<i>The clearance of forest areas, deforestation, afforestation timber harvesting or any other related activity that requires authorisation in terms of the Forest Act (Act No. 12 of 2001) or any other law.</i>	The clearing of land for mining activities.

Activity No.	Activity	Applicability
9.4	<i>The storage and handling of dangerous goods, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic meters at any one location.</i>	Operation of consumer fuel installations with a combined capacity of 54 m ² on site.

The complex nature of safeguarding all elements of the Namibian environment and its resources requires that not only the EMA be considered during the compilation of environmental management plans, but that consideration should also be awarded to additional legislation pertaining to the bio-physical and social environment. As such the following Acts have been considered to have specific bearing on the project.

- ◆ The Water Act – has been compiled to specifically include sand mining activities in rivers. Although the regulations as related to the Water Act have not yet been promulgated, consensus has been reached in recent years that all sand mining activities in rivers need to apply for a sand mining permit from the Ministry of Agriculture, Water and Forestry. At the same time and application for an Environmental Clearance Certificate should be made to the Ministry of Environment and Tourism.
- ◆ The Water Resources Management Act - The Water Resources Management Act makes provision for the establishment of Basin Management Committees (BMC) to make sure that integrated management takes place at the basin level. The role of a BMC is to provide a scope for addressing various issues affecting water resources in the basin, ranging from efficient water use to monitoring the health of the basin. Initially the upper reaches of the Swakop River was included in the Omaruru-Swakop Basin, however were later split off to be known as the Upper Swakop Basin which still falls within the ambit of the Omaruru-Swakop BMC. Although the greater Omaruru-Swakop Basin has an established basin management plan, no such plan has yet been developed for the Upper-Swakop Basin. Therefore no management considerations could be incorporated into this report. Should any guidelines or requirements be developed from these initiatives, Bon Okapuka Crushers has to adhere to and incorporate it into their EMP.

Additional planning documentation to be considered by the proponent include the

- ◆ 5th National Development Plan (NDP5),
- ◆ Harambee Prosperity Plan (HPP).

The HPP is a targeted action plan to accelerate development in clearly defined priority areas. The plan aims to lay the basis for attaining prosperity in Namibia. It does not replace, but complements the long-term goal of the National Development Plans (NDPs) and Vision 2030. The rationale behind the HPP is to introduce an element of flexibility in the Namibian planning system by fast tracking development in areas where progress is insufficient. It also incorporates new development opportunities and aims to address challenges that have emerged after the formulation of NDPs. As such the proposed operations create opportunities to contribute to the HPP's economic advancement and it's forth target as per economic transformation which aims at creating new jobs for the construction and the manufacturing sectors. The HPP further acknowledges that promoting foreign investment though mining has been successful as the mining investment climate was rated number one in Africa by the Fraser Mining Index in 2014. The HPP therefore aims to improve public procurement and private sector supply chains of the mining sector.

The project is in line with Vision 2030 which sees the development of Namibia towards an industrialised country. Regulated mining, being conducted as per a certified Environmental Management Plan (EMP), will contribute to the mining industry which is responsible for not only further infrastructure development within Namibia, but sustains various jobs. Such possible advantages should however be underpinned by integrated and sustainable management of natural resources and the environment in context of the cost to the country.

Table 3-2 Namibian law of specific interest

Law	Key Aspects
The Namibian Constitution	<ul style="list-style-type: none"> ◆ Promote the welfare of people ◆ Incorporates a high level of environmental protection ◆ Incorporates international agreements as part of Namibian law
Environmental Management Act Act No. 7 of 2007, Government Notice No. 232 of 2007	<ul style="list-style-type: none"> ◆ Defines the environment ◆ Promotes sustainable management of the environment and the use of natural resources ◆ Provides a process of assessment and control of activities with possible significant effects on the environment
Environmental Management Act Regulations Government Notice No. 28-30 of 2012	<ul style="list-style-type: none"> ◆ Commencement of the Environmental Management Act ◆ List activities that requires an Environmental Clearance Certificate ◆ Provides Environmental Impact Assessment Regulations
Petroleum Products and Energy Act Act No. 13 of 1990, Government Notice No. 45 of 1990 and No. 48	<ul style="list-style-type: none"> ◆ Regulates petroleum industry ◆ Makes provision for impact assessment ◆ Petroleum Products Regulations (Government Notice No. 155 of 2000) ◆ Prescribes South African National Standards (SANS) or equivalents for construction, operation and decommissioning of petroleum facilities (refer to Government Notice No. 21 of 2002) ◆ Regulates the purchase, sale, supply, acquisition, possession, disposal, storage, transportation, recovery and re-refinement of used mineral oil.
Soil Conservation Act (Act No. 76 of 1969)	<ul style="list-style-type: none"> ◆ Law relating to the combating and prevention of soil erosion, the conservation, improvement and manner of use of the soil and vegetation and the protection of the water sources Namibia
The Water Act Act No. 54 of 1956	<ul style="list-style-type: none"> ◆ Remains in force until the new Water Resources Management Act comes into force ◆ Defines the interests of the state in protecting water resources ◆ Controls the disposal of effluent ◆ Numerous amendments
Forest Act Act No. 12 of 2001, Government Notice No. 248 of 2001	<ul style="list-style-type: none"> ◆ Makes provision for the protection of the environment and the control and management of forest fires ◆ Provides the licencing and permit conditions for the removal of woody and other vegetation as well as the disturbance and removal of soil from forested areas
Forest Regulation: Forest Act, 2001 Government Notice No. 170 of 2015	<ul style="list-style-type: none"> ◆ Declares protected trees or plants ◆ Issuing of permits to remove protected tree and plant species
Water Resources Management Act Act No. 11 of 2013	<ul style="list-style-type: none"> ◆ Provides for management, protection, development, use and conservation of water resources ◆ Prevention of water pollution and assignment of liability ◆ Not in force yet
Local Authorities Act Act No. 23 of 1992, Government Notice No. 116 of 1992	<ul style="list-style-type: none"> ◆ Defines the powers, duties and functions of local authority councils ◆ Regulates discharges into sewers
National Heritage Act Act No. 27 of 2004, Government Notice No.	<ul style="list-style-type: none"> ◆ Provides for protection and conservation of places and objects of heritage significance and the registration of such places and objects.

Law	Key Aspects
287 of 2004	
Public and Environmental Health Act Act No. 1 of 2015, Government Notice No. 86 of 2015	<ul style="list-style-type: none"> ◆ Provides a framework for a structured more uniform public and environmental health system, and for incidental matters ◆ The objects of this Act are to - <ul style="list-style-type: none"> ○ promote public health and wellbeing; ○ prevent injuries, diseases and disabilities; ○ protect individuals and communities from public health risks; ○ encourage community participation in order to create a healthy environment; and ○ provide for early detection of diseases and public health risks.
Labour Act Act No 11 of 2007, Government Notice No. 236 of 2007	<ul style="list-style-type: none"> ◆ Provides for Labour Law and the protection and safety of employees. ◆ Labour Act, 1992: Regulations relating to the health and safety of employees at work (Government Notice No. 156 of 1997)
Atmospheric Pollution Prevention Ordinance Ordinance No. 11 of 1976	<ul style="list-style-type: none"> ◆ Governs the control of noxious or offensive gases ◆ Prohibits scheduled process without a registration certificate in a controlled area ◆ Requires best practical means for preventing or reducing the escape into the atmosphere of noxious or offensive gases produced by the scheduled process
Hazardous Substances Ordinance Ordinance No. 14 of 1974	<ul style="list-style-type: none"> ◆ Applies to the manufacture, sale, use, disposal and dumping of hazardous substances as well as their import and export ◆ Aims to prevent hazardous substances from causing injury, ill-health or the death of human beings
Pollution Control and Waste Management Bill (draft document)	<ul style="list-style-type: none"> ◆ Provides for prevention and control of pollution and waste ◆ Provides for procedures to be followed for licence applications ◆ Not in force yet
Road Traffic and Transport Act Act No. 52 of 1999 Government Notice No 282 of 1999	<ul style="list-style-type: none"> ◆ Provides for the control of traffic on public roads and the regulations pertaining to road transport
Road Traffic and Transport Regulations Government Notice No 53 of 2001	<ul style="list-style-type: none"> ◆ Prohibits the transport of goods which are not safely contained within the body of the vehicle; or securely fastened to that vehicle, and which are not properly protected from being dislodged or spilled from that vehicle.

Table 3-3 Municipal by-laws, guidelines and regulations

Municipal By-laws, Guidelines or Regulations	Key Aspects
Groundwater Protection Regulations	<ul style="list-style-type: none"> ◆ Provides for the protection of groundwater, landscape and vegetation sensitivity ◆ Requires an EIA and EMP for projects that may potentially impact on groundwater ◆ Identifies three groundwater control zones: medium, high and very high.
Windhoek Environmental Structure Plan and Environmental Policy	<ul style="list-style-type: none"> ◆ Integrates spatial planning decision-making, environmental planning and environmental impact management

Town Planning Scheme	<ul style="list-style-type: none"> ◆ Enables the comprehensive management of all property and related public sector functions across the city. ◆ Provides for the protection of groundwater and the environment.
City of Windhoek's Policy Towards Sustainable Sand Mining	<ul style="list-style-type: none"> ◆ Regulates sand mining activities and procedures and promote sustainable practices. ◆ Provides guidelines for the application and renewal of ECC's. ◆ Allows for monitoring plans to be set in place, to evaluate long term effects of sand mining.

Table 3-4 Relevant multilateral environmental agreements for Namibia and the development

Agreement	Key Aspects
Convention on Biological Diversity	<ul style="list-style-type: none"> ◆ Primary goal is the conservation of biodiversity ◆ Prescribes the precautionary principle ◆ Parties to the convention are obliged to: <ul style="list-style-type: none"> ○ Establish a network of protected areas; ○ Create buffer areas adjacent to these protected areas using environmentally sound and sustainable development practices; and ○ Rehabilitate degraded habitats and populations of species.
Stockholm Declaration on the Human Environment, Stockholm 1972	◆ Recognizes the need for a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment
Convention Concerning the Protection of the World's Cultural and Natural Heritage	◆ The objective is that effective and active measures are taken for the protection, conservation and presentation of the cultural and natural heritage.
United Nations Convention To Combat Desertification (UNCCD)	◆ Aims at land management and combating desertification/land degradation to contribute to the conservation and sustainable use of biodiversity and the mitigation of climate change

Table 3-5 Standards and codes of practice

Standard or Code	Key Aspects
South African National Standards (SANS)	<ul style="list-style-type: none"> ◆ The Petroleum Products and Energy Act prescribes SANS standards for the construction, operations and demolition of petroleum facilities. ◆ SANS 10089-3:2010 is specifically aimed at the installation, modification and decommissioning of underground storage tanks for petroleum products. ◆ SANS 10131:2004 is specifically aimed at standards for above-ground storage tanks for petroleum products. ◆ Provides requirements for standards of construction and spill control infrastructure

4 OBJECTIVES OF THE EMP

The EMP provides management options to ensure impacts of the mining operations and fuel storage tanks are minimised. An EMP is a tool used to take pro-active action by addressing potential problems before they occur. This should limit the corrective measures needed, although additional mitigation measures might be included if necessary. The EMP acts as a stand-alone document, which can be used during the various phases (operational and decommissioning) of the mine. All employees, contractors and sub-contractors taking part in the operational phases should be made aware of the contents of the EMP, so as to plan the relevant activities accordingly in an environmentally sound manner.

The objectives of the EMP are:

- ◆ to include all components of the operations;
- ◆ to prescribe the best practicable control methods to lessen the environmental impacts associated with the operations;
- ◆ to monitor and audit the performance of operational personnel in applying such controls; and
- ◆ to ensure that appropriate environmental training is provided to all operational personnel.

Bon Okapuka Crushers could implement an Environmental Management System (EMS) similar to for example ISO 14001. An EMS is an internationally recognized and certified management system that will ensure ongoing incorporation of environmental constraints. At the heart of an ISO 14001 EMS is the concept of continual improvement of environmental performance with resulting increases in operational efficiency, financial savings and reduction in environmental, health and safety risks. An effective EMS would need to include the following elements:

- ◆ A stated environmental policy which sets the desired level of environmental performance;
- ◆ An environmental legal register;
- ◆ An institutional structure which sets out the responsibility, authority, lines of communication and resources needed to implement the EMS;
- ◆ Identification of environmental, safety and health training needs;
- ◆ An environmental program(s) stipulating environmental objectives and targets to be met, and work instructions and controls to be applied in order to achieve compliance with the environmental policy; and
- ◆ Periodic (internal and external) audits and reviews of environmental performance and the effectiveness of the EMS.
- ◆ The EMP.

5 ENVIRONMENTAL MANAGEMENT PLAN

The following general guidance for the EMP is based on the findings of the Environmental Impact Assessment: Scoping Report & Risk Assessment carried out by Geo Pollution Technologies (Coetzer 2019). The impacts identified have been updated as per this updated EMP listed below.

Table 5-1 Possible impacts associated with the mining project

ACTIVITY	DESCRIPTION	SENSITIVITY	POTENTIAL IMPACT
Excavating sand, stone and aggregate from riverbed with front-end loader and loading on tipper truck.	Change in river morphology. This includes the width of the active channel as well as the gradient of the riverbed.	Erosion	Changes in channel morphology can increase erosion of the river with an increase in sediment load during floods.
		Groundwater	Lower flow velocities due to wider channel and reduced river bed gradient will increase the infiltration time. Removal of clay layers in the soil profile may further enhance groundwater recharge.
	Removal of vegetation (protected and invasive species).	Fauna and flora	<ul style="list-style-type: none"> ◆ Ecological effects on bird nesting. ◆ Ecosystem functioning. ◆ Loss of habitat. ◆ Protected plant species.
		Erosion	Removal of vegetation will increase the risk of erosion as the anchoring effect offered by plants are lost.
Exposure of groundwater.		Groundwater	Increased evaporation of water may cause salinization of groundwater and soil.

ACTIVITY	DESCRIPTION	SENSITIVITY	POTENTIAL IMPACT
	Creating ponds and pools of water which may be used by animals and surrounding communities.	Surrounding land users and community	Increased risk of health and safety to community (drowning).
	Discovery of heritage artefacts during excavation activities.	Heritage resources	Loss of heritage resource.
	Spillage of fuel, lubrication oil or hydraulic oils.	Surface and groundwater as well as soil	Surface and groundwater pollution. Soil pollution.
	Noise	Noise	Nuisance and health impact on neighbours and workers.
	Dust	Air quality	Nuisance and health impact on neighbours and workers.
Transporting sand, stone and aggregate with tipper truck to stockpile.	Construction of additional roads.	Fauna and flora	<ul style="list-style-type: none"> ◆ Ecological effects on bird nesting. ◆ Ecosystem functioning. ◆ Loss of habitat. ◆ Protected plant species. ◆ Influx in invasive plant species.
	Spillage of fuel, lubrication oil or hydraulic oils.	Surface and groundwater as well as soil.	Surface and groundwater pollution. Soil pollution.
	Noise	Noise	Nuisance and health impact on neighbours and workers.
	Dust	Air quality	Nuisance and health impact on neighbours and workers.
Stockpiling, equipment storage and maintenance as well as loading of stockpiled sand stone and aggregate onto tipper trucks with frontend loader.	Soil at the stockpile areas will be compacted / hardened by operations.	Soils and grazing land	<ul style="list-style-type: none"> ◆ Reduction in grazing capability of the land. ◆ Change in landscape character.
	Spillage of fuel, lubrication oil or hydraulic oils. Impacts from sewage treatment.	Surface and groundwater as well as soil.	Surface and groundwater pollution. Soil pollution.
	Noise	Noise	Nuisance and health impact on neighbours and workers.
	Dust	Air quality	Nuisance and health impact on neighbours and workers.
Transport of material to markets.	Transportation to markets may increase road degradation and increase collision risk.	Traffic	Increased collision risk. Road degradation as more frequent heavy loads stress the road surface and base especially at the access point to the road. Particulate fly-off from uncovered loads may increase collision and incident risks.
Sand / stone and aggregate supply	Sand, stone and aggregate from operations are used in the construction industry: Providing affordable material to the local community.	Okahandja and Windhoek community	<ul style="list-style-type: none"> ◆ Positive contribution to the town economy and development. ◆ Increased economic resilience. ◆ Aspiration towards the future.

ACTIVITY	DESCRIPTION	SENSITIVITY	POTENTIAL IMPACT
Employment	Providing job opportunities	Socio-economic	<ul style="list-style-type: none"> ◆ Positive contribution. ◆ Increase economic resilience.
	Waste from employees	Waste	Domestic waste and sewage effluent must be properly managed.
	Poaching and gathering of firewood.	Fauna and flora	No poaching and wood gathering is allowed. Employees only allowed at work areas.
Handling and storage of fuel and oils	Storage of fuel in consumer tanks & operation of consumer fuel storage tanks	Soil & water pollution. Fire or explosion.	Spillages has the potential to pollute soil, as well as surface and groundwater. Consumer fuel storage tanks and operations thereof must be properly managed. Increase risk of fire or explosion die to the storage of flammable substances.
	Storage of used mineral oil	Soil & water pollution. Fire or explosion.	Spillages has the potential to pollute soil, as well as surface and groundwater. Used mineral oil must be stored and disposed of properly. Increase risk of fire or explosion die to the storage of flammable substances.

6 THE IMPLEMENTATION OF THE ENVIRONMENTAL MANAGEMENT PLAN

Table 6-1 and Table 6-2 outline the management of the environmental elements during the planning and operational phases. section 7 provides a brief summary of the management of the mine closure phase.

Contents of these tables could be incorporated into a health safety environment and quality management system. The Proponent would be responsible to assign the responsibilities and to ensure that the tasks are executed.

Table 6-1 Planning for operations and future decommissioning of the project

Activity	Objective	Action	Timing	Proof of Compliance	Responsible Body
Compliance	To comply with all legal requirements for the operations of a sand stone and aggregate mine in Namibia and related fuel storage.	A permit as prescribed by the Water Act of 1956 is required in all instances where the flow of a river is altered or interfered with. Mining operations should comply with City of Windhoek's Policy towards sustainable sand mining. Apply for the necessary permits from the various ministries, local authorities and any other bodies that governs the construction and operations of the proposed activity. Importantly this includes permits from the Ministry of Mines and Energy for bulk fuel storage.	Concurrently with application for ECC.	All contracts, permits, certificates and other legal documents on file.	Proponent
Appointments	To appoint reputable contractors (if so required) and operational personnel and establish the EMP, a legal requirement that forms part of the contract with the contractor and employees.	Appoint a contractor and employees and enter into an agreement which includes the EMP. Ensure that the contents of the EMP are understood by the contractor, sub-contractors, employees and all personnel who will be present on site.	As required / need arises to employ a contractor. Permanent employees should be informed about the EMP prior to being on site.	Contracts on file.	Proponent; Contractor
Management	Establish a management system to implement and monitor health, safety and environmental performance.	Make provisions to have a health, safety and environmental coordinator to implement the EMP and oversee occupational health and safety as well as general environmental related compliance at the site. Have the following emergency plans, equipment and personnel in place to deal with all emergencies: Risk management / mitigation / EMP/emergency response plan and health, safety and environmental manuals;	Upon receipt of the ECC and to be kept during the operational and decommissioning phases.	Documentation on file. Personal Protection Equipment (PPE) on site. Signage related to restricted areas, dangerous areas, and PPE requirements on site. Emergency response material on site. All plans on file.	Proponent; Contractor

Activity	Objective	Action	Timing	Proof of Compliance	Responsible Body
		<p>Adequate protection and indemnity insurance cover for incidents;</p> <p>Comply with the provisions of all relevant safety standards;</p> <p>Procedures, equipment and materials required for emergencies.</p>			
Restoration Fund/Insurance	To establish a fund/insurance for future environmental restoration or pollution remediation if ever required.	To establish a fund for future ecological restoration of the project site should project activities cease and the site is decommissioned and environmental restoration or pollution remediation is required. Any mined out areas must be rehabilitated immediately.	During operations.	Financial statements of restoration fund/insurance.	Proponent; Independent Specialist Consultant
Economy	Maintain a positive input into the local and regional economy and industrial sector.	<p>All capital investment as required for machinery and maintenance to be invested into local or regional business sector.</p> <p>Should the opportunity arise, employment opportunity and subcontracting to the local community should be considered by the mining company.</p>	Continuous.	Financial reporting.	Proponent
Monitoring & Reporting	To establish a reporting system to report on monitoring aspects of operations and decommissioning as outlined in the EMP and in line with the conditions of the ECC.	<p>Establish a reporting system to report on aspects of operations and decommissioning as outlined in the EMP.</p> <p>Establish a monitoring system to provide data on profile changes as well as sediment transport capacity.</p> <p>Keep monitoring reports on file for submission as per the conditions of the ECC..</p>	During operations as well as possible future decommissioning of the mine.	Monitoring reports.	Proponent; Contractor
Biophysical (Ecological)	To preserve large tree and protected plant species and combat invasive plant species.	All staff should be trained in identifying any sensitive plant species which may occur on site. Miming to be conducted with buffer	Prior to future operational areas and refresher annually.	Attendance record for training held.	Proponent

Activity	Objective	Action	Timing	Proof of Compliance	Responsible Body
Environmental Clearance Renewal	To renew the environmental clearance certificate every three years.	<p>zones around protected trees and structures where required. Alien / Invasive plant species should be eradicated.</p> <p>Appoint a specialist environmental consultant to update the EMP and apply for renewal of the ECC.</p>	Prior to expiry of ECC.	Renewed ECC.	Proponent; Independent Specialist Consultant

Table 6-2 The operational phase

Criteria	Objective	Mitigation	Monitoring	Responsible Body
Infrastructure	To protect all existing infrastructure components against possible erosion cut-back.	The excavation of sand, stone and aggregate may not take place within 200 metres upstream or downstream from any developed river bank areas, bridge or plots.	Continued mapping of mining area by taking GPS coordinates of mining area. Monthly inspections.	Proponent Independent Audit
Economy	Maintain a positive input into the local and regional economy and industrial sector.	All capital investment as required for machinery and maintenance to be invested into local or regional Namibian business sector. Should the opportunity arise, employment opportunity and subcontracting to the local community should be considered by the mining company. Adherence to all Namibian law relating to revenue generation and employment generation.	Financial and human resource reporting.	Proponent
Traffic	To reduce the possibility of accidents or collision risk on site as well as on public roads. Prevent damage to other vehicles due to material falling from trucks. Damage to road surface at the access point.	Road traffic signs, warning oncoming traffic of heavy motor vehicle turning, to be erected (permission to be acquired from the Roads Authority). Such signs should be erected for any other entrance which may be used in the future along any public road (access point). All trucks should have their loads covered with a suitable covering to prevent fly-off rocks, sand and debris.	Installation and maintenance records of load covering kept. A report should be compiled every 6 months of all incidents reported, complaints received. Record of access point upgrade kept.	Proponent
Fire	Reduce the probability of an outbreak of a fire.	Open fires should not be allowed at the site. Fire precautions and fire control must be present at the site. In addition to this, all personnel have to be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials including rubbish, dry vegetation, and hydrocarbon-soaked soil from the vicinity of the construction. Regular inspections should be carried out to check for these materials at the site. A holistic fire protection and prevention plan is needed. This plan must include an emergency response plan and	A report should be compiled annually of all incidents reported. The report should contain dates when fire equipment was tested and when Heavy Motor Vehicle (HMV) and consumer fuel storage tank operators (refuelling) received training regarding possible fire risks and correct	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
		<p>Mitigation</p> <p>firefighting plan.</p> <p>All equipment and tools must comply with standards which allow certain tools and equipment near flammable sources. Safety distances must be adhered to as well as safe work procedures. Safety talks and job hazard analysis to be done before work starts.</p> <p>Firefighting measures as per the Material Safety Data Sheets of the product should be adhered to.</p> <p>All fuel storage and handling facilities in Namibia must comply with strict safety distances as prescribed by SANS. SANS is adopted by the Ministry of Mines and Energy as the national standard. Experience has shown that the best chance to rapidly put out a major fire is in the first 5 minutes. It is important to recognise that a responsive fire prevention plan does not solely include the availability of fire fighting equipment, but more importantly, it involves premeditated measures and activities to timeously prevent, curb and avoid conditions that may result in fires. An integrated fire prevention plan should be drafted before construction commences.</p>	<p>operating procedures</p>	
Noise	<p>To reduce noise which may lead to hearing loss or allocate correct safety measures to prevent hearing loss. Prevention of nuisance noise to adjacent receptors.</p>	<p>Follow the City of Windhoek guidelines for limits to noise pollution (Council Resolution 215/09/2006) to prevent hearing impairment and a nuisance at nearby receptors to prevent hearing impairment and nuisances at nearby residences.</p> <p>Personnel working in noisy environments must be issued with hearing protectors.</p> <p>All vehicles and power screens to be maintained and serviced regularly to reduce noise impacts.</p> <p>No mining operations to be conducted after dark, on Sundays or on public holiday.</p>	<p>Any complaints received regarding excessive noise should be recorded with notes on action taken.</p> <p>If required a noise monitoring programme should be commenced.</p> <p>Noise complaints register to be kept and included in annual reporting.</p>	<p>Proponent</p>
Dust	<p>Excessive dust generated from the movement of heavy vehicles to and from the site, as well as the excavation of</p>	<p>Personnel must be issued with appropriately rated dust masks if required.</p>	<p>Regular visual inspection. A complaints register must</p>	<p>Proponent</p>

Criteria	Objective	Mitigation	Monitoring	Responsible Body
	sand, stone and aggregate. This will be aggravated during periods of strong winds.	<p>No excavation to be conducted in excessively windy conditions.</p> <p>Dust suppression on haul roads and maintenance of such system to be conducted.</p>	<p>be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.</p> <p>If required a dust monitoring programme should be commenced.</p> <p>All information and reporting to be included in an annual report.</p>	
Waste Production & Management	<p>Any waste which can include hazardous waste, such as hydrocarbons or domestic waste.</p> <p>Used mineral oil should be managed in accordance with the Petroleum Products and Energy Act, 1990 (Act 13 of 1990): Government notice No. 48 of 1991.</p>	<p>Due to the nature of some hazardous materials, they should be disposed of in an appropriate way at an appropriately classified waste disposal facility. See the Material Safety Data Sheets available from suppliers if the user is not sure how to dispose of the substance. Liaise with the municipality regarding waste and appropriate handling of hazardous waste.</p> <p>No dumping of waste should be allowed on site.</p> <p>Temporary waste disposal facilities should be present on site. This should include separate containers for products that can be re-used or recycled.</p> <p>Staff to receive training on waste handling and the principles of reduce, reuse and recycle as well as hazardous waste.</p> <p>Bulk oil consumers (more than 20 litres/month) may not store more than 2,000 litres of used mineral oil for a period longer than 30 days.</p> <p>Used mineral oil should be stored in a suitable container that prevents destruction, loss or waste thereof.</p>	<p>Any complaints received regarding waste should be recorded with notes on action taken.</p> <p>All data to be compiled in an annual report.</p>	Proponent
Groundwater, Surface Water	Contamination from earthmoving vehicles and HMV through accidental	<p>Adhere to the following procedures:</p> <ul style="list-style-type: none"> All vehicles must be serviced and maintained regularly. 	A report should be compiled every 6 months of all spills	Proponent

Criteria and Contamination	Objective	Mitigation	Monitoring	Responsible Body
<p>Soil Contamination</p>	<p>fuel, oil or hydraulic fluid spills and / or leakages.</p> <p>Contamination from consumer fuel storage tank leaks / incorrect refuelling operations.</p> <p>Salinization of soil and ground water as a result of stagnant water where mining reaches the water table or pooling occurs</p>	<p>Mitigation</p> <ul style="list-style-type: none"> ● Vehicles may only be serviced and refuelled at the stockpile area on a suitable spill control structure. ● Spill control by making use of drip trays if there is a need to repair machinery on site. All hydrocarbon based waste must be removed from site and disposed of at a recognised hazardous waste disposal facility. ● Consumer fuel storage tanks and bund walls should be inspected biannually where possible. ● Operators of consumer fuel storage tanks should be trained in the correct refuelling operations. ● Vehicles may only be serviced and refuelled on a suitable spill control structure. ● Any polluted soil or water to be treated as a hazardous waste. ● Used mineral oils to be handled according to Government Notice No. 48 of 1991 <p>Specialists must be employed to determine the best mitigation procedures relevant to the problem if a large amount of pollution is recorded.</p> <p>Any polluted soil or water to be treated as a hazardous waste.</p> <p>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, blocked or deflected.</p> <p>Mining may not take place within 2 m of the groundwater level. It is important that water level monitoring be implemented to ensure that the level of mining takes seasonal water level fluctuation into consideration.</p>	<p>or leakages reported.</p> <p>Three monthly water level monitoring of mined areas.</p> <p>Bi-annual ground water testing of Total Dissolved Solids (TDS).</p>	
<p>Poaching, Hunting or Removal of Plant Material</p>	<p>Personnel working on site may use the opportunity to illegally hunt or trap animals. Plant material may not be collected such as wood for fire making purposes.</p>	<p>All employees must be informed of the value of biodiversity. Rules and regulations regarding the illegal harvesting of natural resources from the surroundings must be made clear and the disciplinary steps that will be followed against perpetrators must be issued in writing and form part of the employee's contracts.</p>	<p>A report of any incidents reported should be compiled every 6 months.</p>	<p>Proponent</p>
<p>Riverbed and</p>	<p>Changing the flow of the river may lead</p>	<p>Mining must be limited to the riverbed and sand, stone and</p>	<p>Mining plan kept on file.</p>	<p>Proponent</p>

Criteria	Objective	Mitigation	Monitoring	Responsible Body
Bank Erosion	to increased erosion. To prevent the removal of vegetation which anchors the soil to avoid possible soil erosion.	<p>aggregate banks outside of the tree line as per the buffer zone.</p> <p>The river bed must be kept as smooth as possible to reduce turbulent flow.</p> <p>Estimated annual replenishment to be determined – only a volume equivalent to this may be extracted annually.</p> <p>Determining a “Red Line” – the ultimate site specific elevation up to which mining may occur.</p>	Mined out areas to be indicated on mine plan.	
Ecosystem and Biodiversity Impact	<p>Removing of sediment from the river, may change the localised habitat in some areas along the river, should mining be conducted haphazardly.</p> <p>Pooling and sedimentation (and erosion) may result from mining operations.</p>	<p>Mining must be limited to the riverbed and sand, stone and aggregate banks outside of the tree line as per the buffer zone. Soil should be sloped at an angle of less than 35° from the mined area to the base of the treeline (or any tree).</p> <p>Overburden (where applicable) must be stored in such a way as to prevent the unnecessary destruction of the environment surrounding the river (i.e. either in mined out areas or in areas still to be mined). The return of overburden to the mined out areas is essential in restoration of the areas. Topsoil may not be stored below the 50 year flood level.</p> <p>All mined out areas must immediately be rehabilitated and restored as close as possible to its original state.</p> <p>Mining operations should be delineated by clear beacons for all personnel as not to infringe any further vegetation buffer zone.</p> <p>Excavation or mining may not expose the roots of the vegetation in any watercourse, especially native woody species.</p> <p>Mining must be limited to the riverbed and sand, stone and aggregate banks outside the tree line as indicated to be the mineable resource.</p>	<p>Restoration plan on file and restoration plan to be executed within the first 3 years of operation.</p> <p>A report should be compiled every 6 months of all restoration performed.</p> <p>Mine plan kept on file indicating mined areas.</p>	Independent specialist consultant (Restoration Ecologists); Proponent
River Morphology	Removing sediment and established deposits may alter the flow regime of	Systematic strip mining of the sand, stone and aggregate deposits to be conducted. Limit in-stream mining methods	Mine plan to be kept indicating the mined out	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
Erosion	the river which may result in a change of the river morphology. This may be aggravated by the fact that less deposits may occur due to the possible upstream mining and damming.	<p>to bar-skimming.</p> <p>All unused material to be uniformly levelled across the riverbed (not left in heaps around the site).</p> <p>Maintain river channel flood discharge capacity.</p> <p>Minimize activities that release fine sediment into the river.</p> <p>Should mining be conducted during low flow periods a buffer area should be maintained between the water and operations.</p> <p>Piles of unused material (soil, boulders plant material) (moveable material) which have previously been left in mined out areas should be flattened along the riverbed (evened out).</p> <p>Stockpile areas to be monitored for degradation (no additional material from surface to be taken apart from stockpiled reserves).</p> <p>Maintain river channel flood discharge capacity. No damming of flow allowed.</p>	<p>areas and future mining.</p> <p>Monthly inspections conducted on mining operations and any non-compliance documented.</p> <p>Incidents to be included in annual report.</p>	
Visual Impact	This is an impact that affects the aesthetic appearance of the site being mined.	<p>No dumping of waste should be allowed on site.</p> <p>Ensure rehabilitation of mined out areas in order to improve aesthetic appearance.</p> <p>The area where the removal of material takes place must be left clean and in a neat condition so that the view of the river is not blemished at any time.</p>	A report should be compiled every 6 months of all complaints reported.	Proponent
Employment	Permanent employment will be provided while operations will contribute to sustainable employment in the brickmaking and construction industry.	Local Namibian's must be employed. Deviations from this must be justified.	Profiling of employees on their job responsibilities and achievements and reporting on these will portray the company as a people centred organisation.	Proponent
Heritage	The discovery of archaeologically or	If such a site or any other archaeologically important	Record of any discoveries	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
	culturally important sites.	<p>artefact is found during the development phase any work in that area must be halted and the relevant authorities must be informed. These include; the Namibian Police and the National Monuments Council.</p> <p>Mining may only continue at that location once permission has been granted from the relevant authorities.</p>	<p>and proof of notifications to authorities on file.</p> <p>All information and reporting to be included in a final report.</p>	
Skills, technology and development	Improved skills of employees in the region as employed by Bon Okapuka Crushers: Mining operations.	Where skills exist local Namibians must be employed for the mine as well as the brickfield. Deviations from this must be justified. When training is provided, it should be certified or a managerial reference given.	Annual summary report based on actual training and the enhancement of skills and transfer of technology should be compiled when such training has been completed.	Proponent
Community Communication	Ambiguity and a lack of communication about the planned operations and related timing may result in community mistrust and grievances.	Information sharing regarding planned mining and related activities. A community liaison officer to be identified as person to accept grievances and provide key information to community leaders as enquired. Communication with various Governmental Ministries (those who have vested interests).	Proof of communication kept on file.	Proponent
Health & Safety	Various health and safety risks present themselves as per the current and planned operations. Public health and safety mainly relate to traffic associated incidents (trucks from the Bon Okapuka Crushers operations travelling on public roads). Operational health and safety risks mainly pertain to the labourers.	<p>All health and safety standards specified in the Labour Act should be complied with.</p> <p>Ensure that all staff members are briefed about the potential risks (such as and including flash floods) of injuries on site.</p> <p>Qualified operators to work with heavy machinery / trucks.</p> <p>Adhere to Health and Safety Regulations pertaining to personal protective clothing, first aid kits being available on site, warning signs, etc.;</p> <p>Selected personnel should be trained in first aid. The contact details of all emergency services must be readily available (two way radio provided for no-signal areas).</p> <p>Equipment that will be locked away on site must be placed in a way that does not encourage criminal activities (e.g.</p>	<p>Proof of health and safety training to be kept on file as per attendance register of training day to be kept with the material provided.</p>	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
		<p>Access to the locked away equipment should always be strictly controlled.</p> <p>No alcohol or recreational drugs are allowed on site.</p> <p>No labourers under the influence of either alcohol or recreational drugs should be allowed to conduct any work.</p>		
<p>Restoration/ Rehabilitation</p>	<p>Mined out areas must be rehabilitated as soon as possible to reduce safety impacts and restore vegetation to the area.</p> <p>It will be the right of the land owners to halt mining on the property, if practice, as agreed between the mining company and the land owner, is not being followed.</p>	<p>Restore the sites as close as possible to its original state after mining. Specific reference should be given to levelling and restoration of the areas where HMV have accessed the riverbed.</p> <p>Concurrent rehabilitation should take place in section B (as in EIA)</p>	<p>Restoration plan on file and restoration plan to be executed within the first 3 years of operation.</p> <p>A report should be compiled every 6 months of all restoration performed.</p>	<p>Independent Specialist Consultant (Restoration Ecologists); Proponent</p>

7 DECOMMISSIONING PHASE

Decommissioning of the mine is an ongoing process during the operations of the mine and not only an activity that should start at the time of mine closure. Rehabilitation/restoration of the mined out areas must be completed immediately and not be left for mine closure. This would decrease safety risks and allow the environment to recover more rapidly. All management actions as provided for the operational phase are valid up to decommissioning.

Prior to the decommissioning phase, a full decommissioning plan needs to be compiled, it is important that this plan included required guidelines for decommissioning of the on-site consumer fuel storage tanks. At the time of mine closure Bon Okapuka Crushers must ensure that the area has been successfully rehabilitated and that all waste, including polluted soil or water, has been removed and disposed of at an approved dumping site and that all above and below surface consumer fuel storage tanks has been removed. No form of waste may be buried.

8 CONCLUSIONS

The above management measures, if properly implemented will help minimise adverse impacts on the environment. Where impacts occur, immediate action must be taken to reduce the escalation of effects associated with these impacts. To ensure the relevance of this document it must be reviewed on a regular basis.

This EMP should be used as an on-site reference document during all phases of the proposed project, and auditing should take place in order to determine compliance with the EMP for the proposed site, and parties responsible for transgression of the EMP should be held responsible for any rehabilitation that may need to be undertaken.

Monitoring reports and rehabilitation plans and results must be kept available for submission with future renewal applications for environmental clearance certificates. It is advised that an environmental consultant be involved in the monitoring and compilation of the monitoring reports and rehabilitation plans.

9 REFERENCES

Coetzer W, Bosman Q, Botha P, Faul A. 2019 January; Environmental Assessment: Bon Okapuka Crushers CC: Sand, Stone and Aggregate Mining, Döbra River, Khomas Region: Scoping Report

Appendix A: Environmental Clearance Certificate

ECC – 00492

Serial No: TapDRC492



REPUBLIC OF NAMIBIA

MINISTRY OF ENVIRONMENT AND TOURISM

OFFICE OF THE ENVIRONMENTAL COMMISSIONER

ENVIRONMENTAL CLEARANCE CERTIFICATE

ISSUED

In accordance with Section 37(2) of the Environmental Management Act (Act No. 7 of 2007)

TO

Bon Okapuka Crushers cc
P.O Box 40451, Ausspannplatz, Windhoek.

TO UNDERTAKE THE FOLLOWING LISTED ACTIVITY

Proposed Stone and Gravel Mining in and along the Döbra River, Khomas Region.



[Signature]

DEPUTY ENVIRONMENTAL COMMISSIONER

Issued on the date: 2020-01-20

Expires on this date: 2023-01-20

(See conditions printed over leaf)

This certificate is printed without erasures or alterations

