APP-003245
SAND MINING OPERATIONS IN THE SWAKOP RIVER OTJOZONDJUPA REGION

UPDATED ENVIRONMENTAL MANAGEMENT PLAN

Assessed by:

GEO Pollution Technologies Namibia

Assessed for:

City Sand & Bricks (Pty) Ltd

November 2021

Project:	**SAND MINING ACTIVITIES IN THE SWAKOP RIVER, OTJOZONDJUPA REGION: UPDATED ENVIRONMENTAL MANAGEMENT PLAN**	
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Report Approval	 **André Faul** **Conservation Ecologist**	

I HENCO K. HENNING acting as the Proponent's representative (City Sand & Bricks (Pty) Ltd), hereby confirm that we approve the Environmental Management Plan as presented in this document. All material information in the possession of the proponent that reasonably has or may have the potential of influencing the Environmental Management Plan was provided to the consultant.

Signed at WINDHOEK on the 13th day of DECEMBER 2021.

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2001/110
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1 OBJECTIVES OF THE EMP

City Sand & Brick (Pty) Ltd requested Geo Pollution Technologies (Pty) Ltd to update the existing environmental management plan (EMP) for their sand mining operations in the Swakop River near Okahandja in the Otjozondjupa Region (Figure 1). The updated EMP will be submitted to the Ministry of Environment, Forestry and Tourism (MEFT) to renew the existing environmental clearance certificate (ECC) for the operations. Operations mainly involve removal of sand and stone deposits by means of earthmoving equipment, loading the material onto trucks and transporting it to a stockpile area next to the river. From there the resource is loaded onto trucks and transported to City Sand & Bricks' brickfield near Windhoek, where screening and crushing are conducted. All current and future sand mining operations are focussed within the active channel and no mining is proposed or being conducted on the floodplain and overbank areas. Such sand mining is also referred to as instream mining.

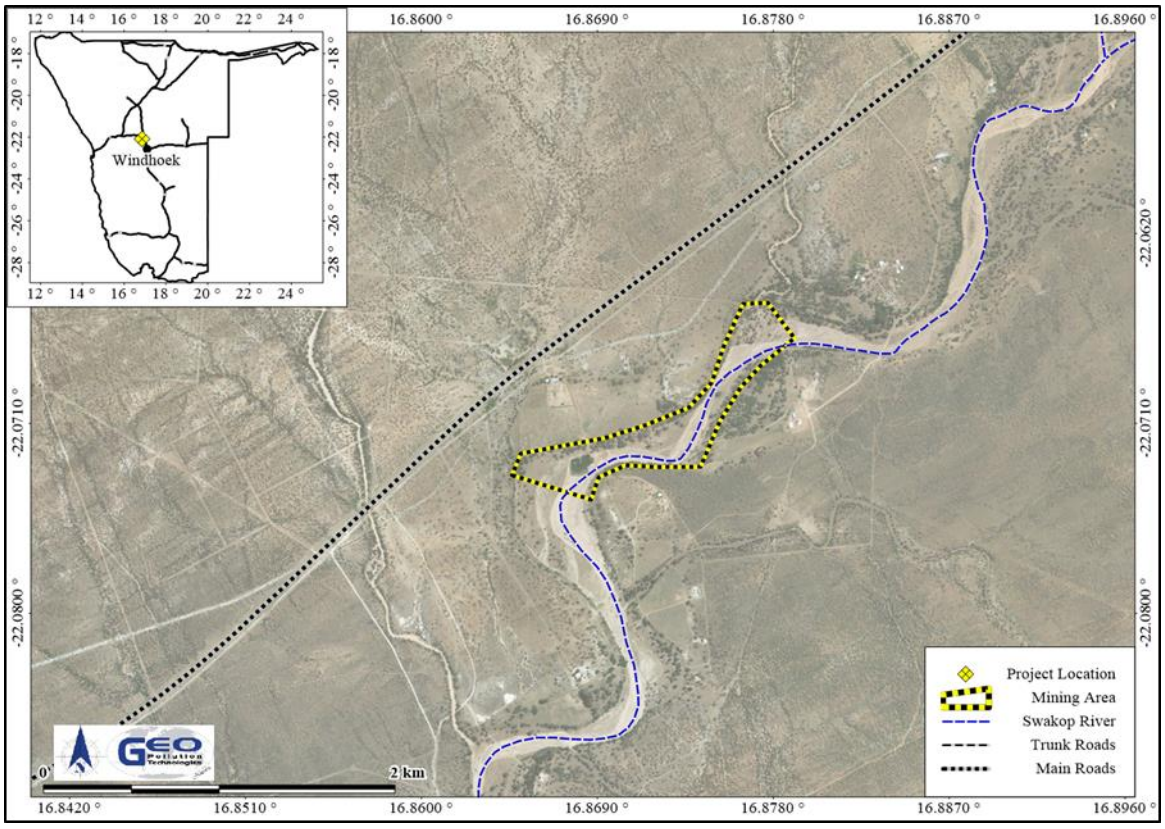

Figure 1. Project area

The updated EMP serves to continually provide management options to ensure impacts of the sand mining operations 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 sand 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 sand operations;
- to prescribe the best practicable control methods to lessen the environmental impacts associated with the operations of the sand mine;
- 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.

City Sand & Bricks (Pty) Ltd (hereafter referred to as CSB) 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;
- Periodic (internal and external) audits and reviews of environmental performance and the effectiveness of the EMS; and
- The EMP.

2 THE EMP

The following general guidance for the EMP is based on the findings of the initial Environmental Impact Assessment: Scoping Report & Risk Assessment carried out by Geo Pollution Technologies (Bosman et al., 2017). As no changes in infrastructure and operations were made or implemented, the updated EMP will continue to be based on these findings. The impacts identified during afore mentioned assessment has been listed in Table 1 below.

Table 1. Possible impacts associated with the current and proposed mining

ACTIVITY	DESCRIPTION	SENSITIVITY	POTENTIAL IMPACT
Excavating sand from riverbed with frontend loader and loading on tipper truck.	Change in river morphology. This include 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	♦ 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.
	Creating ponds and pools of flood water which may be used	Surrounding land users and	Increased risk of health and safety to community (drowning).

ACTIVITY	DESCRIPTION	SENSITIVITY	POTENTIAL IMPACT
	by animals and surrounding communities.	community	
	Discovery of heritage artefacts during excavation activities.	Heritage Resources	Loss of heritage resource.
	Spillage of fuel, lubrication oil or hydraulic oils.	Surface and groundwater	Surface and groundwater pollution.
	Noise	Noise	Nuisance and health impact on Neighbours and workers.
	Dust	Air Quality	Nuisance and health impact on Neighbours and workers.
Transporting sand with tipper truck to stockpile.	Construction of additional roads.	Fauna and Flora	♦ Ecological effects on bird nesting. ♦ Ecosystem functioning. ♦ Loss of habitat ♦ Protected plant species
	Spillage of fuel, lubrication oil or hydraulic oils.	Surface and groundwater	Surface and groundwater pollution.
	Noise	Noise	Nuisance and health impact on Neighbours and workers.
	Dust	Air Quality	Nuisance and health impact on Neighbours and workers.
Stockpiling and equipment storage and maintenance as well as loading of stockpiled sand onto 30 ton tipper trucks with frontend loader.	Change of land use from agriculture to industrial and previous cultivated lands are cleared for stockpile area. Stockpile areas will be compacted / hardened by operations.	Agricultural land and soil	♦ Reduction in agricultural land. ♦ Change in landscape character.
	Spillage of fuel, lubrication oil or hydraulic oils. Impacts from sewage treatment.	Surface and groundwater	Surface and groundwater pollution.
	Noise	Noise	Nuisance and health impact on Neighbours and workers.
	Dust	Air Quality	Nuisance and health impact on Neighbours and workers.
Transport of sand to markets.	Transportation to markets may increase road degradation and increase collision risk.	Traffic	Increased collision risk. Road degradation of the D 1972 road 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 Supply	Sand from operations are used in the brick making industry: Providing affordable material to the local community.	Okahandja and Windhoek community	♦ 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	♦ Positive contribution. ♦ Increase economic resilience
	Waste from employees	Waste	Domestic waste and toilet 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.

3 THE IMPLEMENTATION OF THE EMP

Table 2 and Table 3 outline the management of the environmental elements during the planning and operational phases. Section 4 provides a brief summary of the management of the mine closure phase.

The EMP is a living document that must be prepared in detail, and regularly updated, by the proponent as the project progress and evolve. Impacts addressed and mitigation measures proposed are seen as minimum requirements which have to be elaborated on. Delegation of mitigation measures and reporting activities should be determined by the proponent and included in the EMP.

All monitoring results must be reported on as indicated. Reporting is important for any future renewals of the ECC and must be submitted to the Ministry of Environment, Forestry and Tourism. Renewal of ECC will require bi-annual reports based on the monitoring prescribed in this EMP.

Table 2. 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 mine in Namibia.	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.	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.	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; Adequate protection and indemnity insurance cover for incidents; Comply with the provisions of all relevant safety standards; Procedures, equipment and materials required for emergencies.	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
Restoration Fund/Insurance	To establish a fund/insurance for future environmental restoration or pollution	To establish a fund for future ecological restoration of the project site should project activities cease and the site is decommissioned and environmental	During operations.	Financial statements of restoration fund/insurance.	Proponent; Independent Specialist Consultant

Activity	Objective	Action	Timing	Proof of Compliance	Responsible Body
	remediation if ever required.	restoration or pollution remediation is required. Any mined out areas must be rehabilitated immediately.			
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 business sector. Should the opportunity arise, employment opportunity and subcontracting to the local community should be considered by the mining company.	Ongoing throughout operations as well as possible future decommissioning of the mine.	Financial reporting.	Proponent
Reporting	To establish a reporting system to report on monitoring aspects of operations and decommissioning as outlined in the EMP.	Establish a reporting system to report on aspects of operations and decommissioning as outlined in the EMP. Keep monitoring reports on file for submission with ECC renewal applications where needed.	Ongoing throughout operations as well as possible future decommissioning of the mine.	Bi-annual monitoring Reports.	Proponent; Contractor
Biophysical Ecological)	To preserve large tree and protected plant species.	All staff should be trained in identifying any sensitive plant species which may occur on site. Mining to be planned and conducted as per buffer zones identified in the initial EIA.	Prior to future operational areas.	Attendance record for training held.	Proponent
Environmental Clearance Renewal	To renew the environmental clearance certificate every three years.	Appoint a specialist environmental consultant to update the EMP and apply for renewal of the ECC.	Prior to expiry of ECC.	Renewed ECC.	Proponent; Independent Specialist Consultant

Table 3. 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 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. Mapping to be included in a bi-annual report.	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 at the entrance onto the D1972 road. Prevent damage to other vehicles due to material falling from trucks. Damage 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). The current access point needs to be suitably upgraded by the proponent to prevent damage potentially inflicted on the bitumen surface, edge and shoulder of the main road by the haulage vehicles. 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 bi-annually 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. A holistic fire protection and prevention plan is needed. This plan must include an emergency response plan and firefighting plan.	A report should be compiled bi-annually of all incidents reported. The report should contain dates when fire equipment was tested and when Heavy Motor Vehicle (HMV) operators received training regarding possible fire risks.	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
Noise	Reduction of noise which may lead to hearing loss in operators of such machinery. Prevention of nuisance noise to adjacent receptors.	Follow World Health Organization (WHO) guidelines on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment and nuisances at nearby residences. The WHO limits noise levels to an average of 70 dB over a 24 hour period with maximum noise levels not exceeding 110 dB during the period in order to prevent hearing loss. Personnel working in noisy environments must be issued with hearing protectors. All vehicles and power screens to be maintained and serviced regularly to reduce noise impacts. No mining operations to be conducted after dark, on Sundays or on public holiday.	Any complaints received regarding excessive noise should be recorded with notes on action taken. If required a noise monitoring programme should be commenced. Noise complaints register to be kept and included in bi-annual reporting.	Proponent
Dust	Excessive dust generated from the movement of heavy vehicles to and from the site, as well as the excavation of sand. This will be aggravated during periods of strong winds.	Personnel must be issued with appropriately rated dust masks if required. No excavation to be conducted in excessively windy conditions. All sand conveyed onto the D1972 road at the access points should be removed to prevent excessive dust which may impair vision. Dust suppression on haul roads and maintenance of such system to be conducted.	Regular visual inspection. A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon. If required a dust monitoring programme should be commenced. All information and reporting to be included in a bi-annual report.	Proponent
Waste Production & Management	Any waste which can include hazardous waste, such as hydrocarbons or domestic waste.	All waste produced on site must be removed and disposed of at a recognised disposal facility. No dumping of waste should be allowed on site. Temporary ablution facilities should be erected on site (within the stockpile area).	Any complaints received regarding waste should be recorded with notes on action taken. All data to be compiled in a	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
		Staff to receive training on waste handling and the principles of reduce, reuse and recycle as well as hazardous waste.	bi-annual report.	
Groundwater, Surface Water and Soil Contamination	Contamination from earthmoving vehicles and HMV through accidental fuel, oil or hydraulic fluid spills and / or leakages. Salinization of soil and groundwater as a result of stagnant water where mining reaches the water table or pooling occurs.	Adhere to the following procedures: ♦ All vehicles must be serviced and maintained regularly. ♦ 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. ♦ Any polluted soil or water to be treated as a hazardous waste. Specialists must be employed to determine the best mitigation procedures relevant to the problem if a large amount of pollution is recorded. Excavation shall be terminated two meters above the groundwater table. 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.	A report should be compiled bi-annually of groundwater quality and all spills or leakages reported. Three monthly water level monitoring of mined areas. Bi-annual ground water testing of Total Dissolved Solids (TDS).	Proponent
Poaching, Hunting or Removal of Plant Material	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).	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 employees' contracts.	A report of any incidents reported should be complied bi-annually.	Proponent
Riverbed and Bank Erosion	Changing the flow of the river may lead to increased erosion. To prevent the removal of vegetation which anchors the soil to avoid possible soil erosion.	Mining must be limited to the riverbed and sandbanks outside of the tree line as per the buffer zone. The river bed must be kept as smooth as possible to reduce turbulent flow.	Mining plan kept on file. Mined out areas to be indicated on mine plan.	Proponent
Ecosystem and Biodiversity Impact	Removing of sediment from the river, may change the localised habitat in some areas along the river, should	Mining must be limited to the riverbed and sandbanks 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	Restoration plan on file and restoration plan to be executed within the first 3	Independent specialist consultant (Restoration Ecologists); Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
	mining be conducted hap-hazzardly. Pooling and sedimentation (and erosion) may result from mining operations.	to the base of the treeline (or any tree). 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. All mined out areas must immediately be rehabilitated and restored as close as possible to its original state. Mining operations should be delineated by clear beacons for all personal as not to infringe any further vegetation buffer zone. Excavation or mining may not expose the roots of the vegetation in any watercourse, especially native woody species; Mining must be limited to the riverbed and sandbanks outside the tree line as indicated to be the mineable resource.	years of operation. A report should be compiled bi-annually of all restoration performed. Mine plan kept on file indicating mined areas.	
River Morphology / Erosion	Removing sediment and established sand deposits may alter the flow regime of the river which may result in a change of the river morphology. This may be aggravated by the fact that less sand deposits may occur due to the possible upstream mining and damming.	Systematic strip mining of the sand deposits to be conducted. Limit in-stream mining methods to bar-skimming. All unused material to be uniformly levelled across the riverbed (not left in heaps around the site). Maintain river channel flood discharge capacity. Minimize activities that release fine sediment into the river. Should mining be conducted during low flow periods a buffer area should be maintained between the water and operations. 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	Mine plan to be kept indicating the mined out areas and future mining. Monthly inspections conducted on mining operations and any non-compliance documented. Incidents to be included in a bi-annual report.	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
		(even out). Stockpile areas to be monitored for degradation (no additional material from surface to be taken apart from stockpiled reserves). Maintain river channel flood discharge capacity. No damming of flow allowed.		
Visual Impact	This is an impact that affects the aesthetic appearance of the site being mined.	No dumping of waste should be allowed on site. Ensure rehabilitation of mined out areas in order to improve aesthetic appearance. The area where the removal of sand takes place shall be left clean and in a neat condition so that the view of the river is not blemished at any time.	A report should be compiled bi-annually 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. Bi-annual report on employee demographics	Proponent
Heritage	The discovery of archaeologically or culturally important sites.	If such a site or any other archaeologically important 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. Mining may only continue at that location once permission has been granted from the relevant authorities.	Record of any discoveries and proof of notifications to authorities on file. All information and reporting to be included in a bi-annual report.	Proponent
Skills, technology and development	Improved skills of employees in the region as employed by the Proponent's mining operations.	Where skills exist local Namibians must be employed for the sand mine as well as the brick making facility. Deviations from this must be justified. When training is provided, it should be certified or a managerial reference given.	Bi-annual summary report based on actual training and the enhancement of skills and transfer of technology should be compiled when	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
			such training has been completed.	
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. Any complaints / conflict received should be included in a bi-annual report along with actions taken.	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. Operational health and safety risks mainly pertain to the labourers.	All Health and Safety standards specified in the Labour Act should be complied with. Ensure that all staff members are briefed about the potential risks (such as and including flash floods) of injuries on site. Qualified operators to work with heavy machinery / trucks. Adhere to Health and Safety Regulations pertaining to personal protective clothing, first aid kits being available on site, warning signs, etc.; 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). Equipment that will be locked away on site must be placed in a way that does not encourage criminal activities (e.g. theft). Access to the locked away equipment should always be strictly controlled. No alcohol or recreational drugs are allowed on site. No labourers under the influence of either alcohol or recreational drugs should be allowed to conduct any work.	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. A report should be compiled bi-annually of all health and safety related incidents. .	Proponent
Restoration/ Rehabilitation	Mined out areas must be rehabilitated as soon as possible to reduce safety impacts and restore vegetation to the area.	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.	Restoration plan on file. A report should be compiled bi-annually of all restoration performed.	Independent Specialist Consultant (Restoration Ecologists); Proponent

4 DECOMMISSIONING PHASE

Decommissioning of the sand 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. At the time of mine closure CSB must ensure that the area has been successfully rehabilitated and that all waste, including polluted soil or water, has been remediated or removed and disposed of at an approved dumping site. No form of waste may be buried.

5 CONCLUSIONS

The above management measures, if properly implemented will help to continually 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 updated EMP should continue to 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. 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 submitted to the Ministry of Environment, Forestry and Tourism on a bi-annual basis to allow for future renewal of the ECC, this is a requirement of the Ministry. It is advised that an environmental consultant be involved in the monitoring and compilation of the monitoring reports and rehabilitation plans.

6 REFERENCES

Bosman Q, Botha P, v d Merwe. 2017 July. Environmental Assessment: Sand Mining Operations in the Swakop River, Otjozondjupa Region: Scoping Report.