

APP-002909
CITY SAND & BRICKS
SAND MINING OPERATIONS IN BRAKWATER,
KHOMAS REGION

ENVIRONMENTAL MANAGEMENT PLAN



Assessed by:



Assessed for:

**City Sand &
Bricks (Pty) Ltd**

August 2021


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1 OBJECTIVES OF THE EMP

The Environmental Management Plan (EMP) provides 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 mining 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; and
- ◆ Periodic (internal and external) audits and reviews of environmental performance and the effectiveness of the EMS.

2 THE EMP

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. The impacts identified during afore mentioned assessment have 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.

ACTIVITY	DESCRIPTION	SENSITIVITY	POTENTIAL IMPACT
	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.
	Creating ponds and pools of flood 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 resources.
	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	<ul style="list-style-type: none"> ◆ 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 previous natural area to being cleared for stockpile areas. Stockpile areas will be compacted / hardened by operations.	Agricultural land and soil	<ul style="list-style-type: none"> ◆ 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.

ACTIVITY	DESCRIPTION	SENSITIVITY	POTENTIAL IMPACT
Transport of sand to markets.	Transportation to markets may increase road degradation and increase collision risk.	Traffic	Increased collision risk. Road degradation of public 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.	Windhoek and surrounding community	<ul style="list-style-type: none"> ◆ Positive contribution to the town economy and development ◆ Increased economic resilience ◆ Aspiration towards the future
Employment	Providing job opportunities	Socio-economic	<ul style="list-style-type: none"> ◆ Positive contribution. ◆ Increase economic resilience
	Waste generated by 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.

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 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 opportunities and subcontracting to the local community should be considered by the mining company.	Continuous	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 and submit bi-annually to allow for future ECC renewal applications where needed.	During operations as well as possible future decommissioning of the mine.	Monitoring Reports.	Proponent; Contractor
Biophysical Ecological	To preserve large trees 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 which considers the tree roots. Therefore no mining within a distance from trees equal to 2.5 times the size of the canopy.	Prior to future operational areas.	Attendance record for training held. Record of training material.	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.	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 laws 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 to the processing site. Prevent damage to other vehicles due to material falling from trucks when transporting from the processing site to clients. Damage to road surface at the access point.	Road traffic signs, warning oncoming traffic of heavy motor vehicle (HMY) turning, to be erected (permission to be acquired from the Roads Authority/ City of Windhoek and Farm owners). Such signs should be erected for any other entrance which may be used in the future along any public road (access point) and at the entrance of the processing facility. 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 erected signage.	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 annually of all incidents reported. The report should contain dates when fire equipment was tested and when HMY operators received training regarding possible fire risks.	Proponent
Noise	Production of noise which may lead to hearing loss in operators of such machinery. Prevention of nuisance noise	Follow World Health Organization (WHO) guidelines on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment and nuisances at	Any complaints received regarding excessive noise should be recorded with	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
	to adjacent receptors.	<p>nearby residences.</p> <p>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.</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 holidays.</p>	<p>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>	
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.	<p>Personnel must be issued with appropriately rated dust masks if required.</p> <p>No excavation to be conducted in excessively windy conditions.</p> <p>Dust suppression on haul roads and maintenance of such systems to be conducted.</p>	<p>Regular visual inspection.</p> <p>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.</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>	Proponent
Waste Production & Management	Any waste which can include hazardous waste, such as hydrocarbons or domestic waste.	<p>All waste produced on site must be removed and disposed of at a recognised disposal facility.</p> <p>No dumping of waste should be allowed on site.</p> <p>Temporary abatement facilities should be erected on site (at the stockpile area).</p> <p>Staff to receive training on waste handling and the principles of reduce, reuse and recycle as well as hazardous</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

Criteria	Objective	Mitigation	Monitoring	Responsible Body
Groundwater, Surface Water and Soil Contamination	Contamination from earthmoving vehicles and HVM through accidental fuel, oil or hydraulic fluid spills and / or leakages. Salinization of soil and ground water as a result of evaporation of stagnant water where mining reaches the water table (groundwater exposed) or pooling occurs.	Adhere to the following procedures: <ul style="list-style-type: none"> 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. Any polluted soil or water to be treated as a hazardous waste. 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 every 6 months of 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 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 employee's contracts.	A report of any incidents reported should be compiled every 6 months.	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 to be planned and conducted as per buffer zones which considers the tree roots. Therefore no mining within a distance from trees equal to 2.5 times the	Mining plan kept on file. Mined out areas to be indicated on mine plan.	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
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 hap-hazardly. Pooling and sedimentation (and erosion) may result from mining operations.</p>	<p>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.</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.</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 sandbanks 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 / Erosion	<p>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 deposition may occur due to the possible upstream mining and damming.</p>	<p>Systematic strip mining of the sand deposits to be conducted. Limit in-stream mining methods 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 areas should be maintained between the water and</p>	<p>Mine plan to be kept indicating the mined out areas and future mining.</p> <p>Monthly inspections conducted on mining operations and any non-compliance documented.</p> <p>Incidents to be included in bi-annual report.</p>	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
		<p>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 (even 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>		
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 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.</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 culturally important sites.	<p>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.</p> <p>Mining may only continue at that location once permission has been granted from the relevant authorities.</p>	<p>Record of any discoveries and proof of notifications to authorities on file.</p> <p>All information and reporting to be included in a final report.</p>	Proponent
Skills, technology and development	Improved skills of employees in the region as employed by CSB: 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	Annual summary report based on actual training and the enhancement of skills	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
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. 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 of injuries (including flash floods) 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. theft).</p> <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>All employees to be issued with employee cards indicating the authorised area of movement.</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.	Proponent

Criteria	Objective	Mitigation	Monitoring	Responsible Body
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 and restoration plan to be executed within the first 3 years of operation. A report should be compiled every 6 months of all restoration performed.	Independent Specialist Consultant (Restoration Ecologists); Proponent

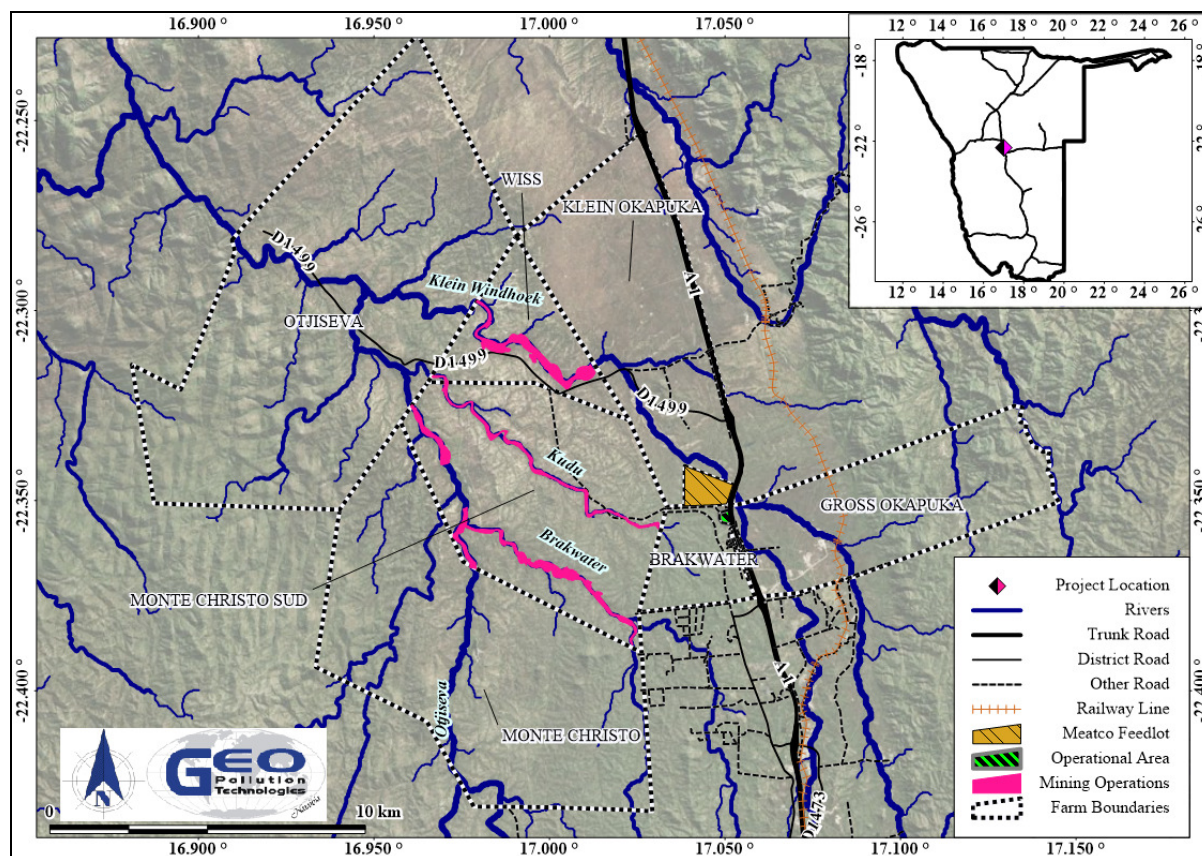


Figure 1. Delineated current and future mining areas

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 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 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 bi-annual submission to the Ministry of Environment, Forestry and Tourism to allow for 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.