

**ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE
PROPOSED SAND MINING IN THE TRIBUTARIES OF
OMARURU RIVER IN THE OMARURU AREA, ERONGO REGION**

ENVIRONMENTAL MANAGEMENT PLAN

PREPARED FOR:

**Municipality of Omaruru
P. O Box 14
Omaruru**

Applicable to all Sand Miners/Permit holders

PREPARED BY:



 +264 81142 2927
 info@greegain.com.na
 <https://www.greengain.com.na>

October 2020

DOCUMENT DESCRIPTION

Project Name	Environmental Impact Assessment (EIA) for the proposed Sand Mining in the Tributaries of Omaruru River in the Omaruru area, Erongo Region.
Proponent	Municipality of Omaruru P. O Box 14, Omaruru Tel: 064 - 463430 Contact person: Mr. Jesaya Andreas Email: jesayaandreas@gmail.com
Application Reference No.	APP: 001853
Project Team	Joseph K. Amushila Cell: 0811422927 or 0813380114 Email: info@greengain.com.na
Report Type	Environmental Management Plan
Assessment Period	October 2020

Table of Contents

LIST OF ACRONYMS.....	4
1. OBJECTIVES OF THE EMP.....	5
2. EMP METHODOLOGY.....	7
3. EMP RESPONSIBILITIES.....	8
3.1 The Proponent - Municipality of Omaruru	8
3.2 Sand miners/operators.....	9
3.3 The Environmental Assessment Practitioner (EAP).....	10
4. EMP IMPLEMENTATION & MONITORING	11
4.1 Sand Mining Procedures.....	11
4.2 Material Handling and Storage.....	12
4.3 Solid Waste Management.....	12
4.4 Lighting Management.....	13
4.5 Wastewater Treatment.....	13
4.6 Site Clean Up and Rehabilitation	13
4.7 Emergency Procedures.....	14
4.8 Compliance Monitoring.....	15
4.9 Environmental Monitoring Programme	16
5. ENVIRONMENTAL MANAGEMENT ASPECTS DURING THE OPERATIONAL AND DECOMMISSIONING PHASES.....	18
5.1 Operational Phase	18
5.2 Decommissioning and Rehabilitation.....	27
6. CONCLUSIONS	29

LIST OF ACRONYMS

EAP:	Environmental Assessment Policy
EAPAN:	Environmental Assessment Professionals Association of Namibia
ECC:	Environmental Clearance Certificate
EHRO:	Environmental Health and Risk Officer
EIA:	Environmental Impact Assessment
EMA:	Environmental Management Act
EMP:	Environmental Management Plan
ESR:	Environmental Scoping Report
ESO:	Environmental Site Officer
FEL	Front End Loader
I&APs:	Interested and Affected Parties
GN:	Government Notice
MEFT:	Ministry of Environment, Forestry and Tourism
NSA:	Namibia Statistic Agency
PPE:	Personal Protection Equipment
ToR:	Terms of Reference

1. OBJECTIVES OF THE EMP

The environmental Management Plan (EMP) is an environmental tool that is used to ensure that undue or reasonably avoidable adverse caused by the proposed project are minimized or prevented and the positive benefits of the project are enhanced. An EMP is therefore important in ensuring that the management actions arising from Environmental Impact Assessment (EIA) processes are clearly defined and implemented through all phases of the project life cycle. All employees, contractors and sub-contractors taking part in the operational phases should be made aware of the contents of the EMP, to plan the relevant activities accordingly in an environmentally sound manner.

The objectives of an EMP are:

- Ensuring compliance with regulatory stipulations and guidelines which may be local, provincial, national/international;
- To include all components of the sand mining operations;
- Define details of who, what, where and when environmental management and mitigation measures are to be implemented;
- to prescribe the best practicable control methods to lessen the environmental impacts associated with the operations of sand mining;
- Formulate measures which will mitigate adverse impacts on various environmental components, protect environmental resources where possible, and enhance the value of environmental components where possible; and
- Providing feedback for continual improvement in environmental performance.

An Environmental Management System (EMS) is an internationally recognized and certified management system the organization's environmental programs in a comprehensive, systematic, planned and documented manner. Municipality of Omaruru should implement an EMS for the operations of the sand mining activity. An EMS ensures ongoing incorporation of environmental constraints. With the aim to improve the environmental performance with resulting increases in operational efficiency, financial savings and reduction in environmental, health and safety risks.

The key elements of an effective EMS are:

- The development of an Environmental Policy, which is a statement of an organization's commitment to the environment and can be used as a framework for planning and action;
- An assessment of corporate activities, products, processes and services that might affect the environment;
- Details of environmental regulations and legislation that apply to the business and how to comply with these;
- Written procedures to control and document activities that could have a significant environmental impact;

- An environmental improvement programme, including policies and procedures to manage waste and resources;
- Defined environmental roles and responsibilities for staff;
- A formal and recorded staff training and environmental awareness programme;
- Systems for internal and external communications on environmental management issues;
- A recorded environmental performance against set targets;
- Systems to identify and correct problems and prevent their recurrence;
- Emergency procedures to follow in the event of an environmental incident;
- Periodic (internal and external) audit to verify that the EMS is operating as intended; and
- Formal review by senior management with a view to adapting and improving the EMS, as necessary.

2. EMP METHODOLOGY

The stipulated environmental impact assessment procedures in terms of the Environmental Impact Assessment Regulations: Environmental Management Act, 2007 was followed. The following key activities and tasks have been undertaken as part of the EIA and EMP development process, namely to:

- Solicited initial input from main stakeholders. This is essential toward the development of a sound plan. Since no resource sits in isolation, an environmental management plan can affect a few other parties. For the best adherence and acceptance of a plan, input is needed to address concerns early in the planning process.
- Identify the problems and or questions associated with sand mining operations. Clearly defined objectives were identified in order to remain centered on a management plan. Only in this way can the success of this environmental management plan be gauged.
- Made a list of applicable criteria, standards and principles as required by legislation, regulation, policies etc. As standards include criteria to fit various types of projects, much of the information is often irrelevant to anyone. Went through any standards or reference guides to be complied with and marked all requirements applicable to each situation.
- Established the extent of the management plan and what the client must do on its own. It is easy for a management plan to end up in someone's hands and never be executed. Inform the client that creating the plan is an iterative process requiring routine correspondence to tailor it to Project Contractor's specific needs.
- Seek public input through advertisement of the EIA process in the two widely circulated newspapers and continuous engagements with the registered I&APs. An attempt to gather public input is always required.

This environmental management plan was written to guide short-term goals and decision making and will provide environmental related guidelines. By having this plan in place, the Municipality of Omaruru will have means to make good decisions.

3. EMP RESPONSIBILITIES

It is the core responsibility of the proponent to ensure the successful implementation of this EMP and any condition to be imposed by the competent authority and the Ministry of Environment, Forestry and Tourism. The implementation of the EMP also requires the involvement of various role players, each with specific responsibilities to ensure that the development is operated in an environmentally sensitive manner.

3.1 The Proponent - Municipality of Omaruru

- a) Implement the final EMP after approval by DEA and ensure the project comply with the conditions therein.
- b) Provide for Environmental Training and awareness of the EMP to all contractors & sub-contractors (approved sand mining permit holder) and employees.
- c) Notify MET and EAP of any proposed changes to the sand mining activities.
- d) Appoint the responsible person to take the responsibility of the following:
 - Conduct monitoring and review of the on-site environmental management and implementation of the EMP by the Contractor and sub-contractors.
 - To audit the implementation of the EMP on a regular basis
 - Compile and submit an Environmental Reports (annually) to the MEFT.
 - Appoint the responsible person to act as the employer's on-site implementing agent and has the responsibility to ensure that the Client's responsibilities are executed in compliance with the relevant legislations.
 - In the case of Omaruru, the Environmental Health and Risk Officer (EHRO) of the Municipality of Omaruru
 - Any on-site decisions regarding environmental management are ultimately the responsibility of the EHRO

The EHRO's responsibilities includes

- Inspect operational areas on a quarterly basis (or otherwise needed) and at groundbreaking of new mining sites by new permit holders, to ensure that all specifications are met and implement the EMP throughout the duration of mining activities.
- Be fully knowledgeable with the contents of the mining EMP; and advise the EHRO in respect of implementation of the environmental requirements;
- Conduct inspection visits to ensure sand mining operations are conform to the EMP;
- Assess and inspect rehabilitation areas and give guidance regarding rehabilitation measures, if any.
- After each inspection, the EHRO will prepare a monitoring report that will be submitted to the Departmental Manager (EM) and the Ministry of Environment, Forestry and Tourism (Department of Environmental Affairs), when required.
- Ensure communication of EMP requirements to relevant project, contractor and sub-contractor personnel as required for EMP implementation;

- Relevant sections of the minutes of site meetings should be attached to the monitoring report.
- Monitor compliance of EMP implementation and compliance of all contractors and sub-contractors;
- Facilitate environmental induction of all project staff and either deliver or coordinate delivery of all such training that would be required for the effective implementation of the EMP;
- Advise operations team or contractors in respect of implementation of the EMP requirements;
- Undertake environmental system reviews, site inspections, audits and other verification activities to assure that the EMP implementation is at an optimal level;
- Participate in environmental performance verification activities to verify the level of compliance with the EMP in delivering the legal and environmental obligations;
- Maintain environmental incidents and stakeholder complaints register;
- Monitor and enforce environmental management specifications daily. Any violation of the environmental specifications shall be recorded and the agreed on disciplinary measures taken;
- Report significant incidents internally and externally as required by law and the conditions of authorization;
- Investigate incidents and recommend corrective and preventative actions;
- Provide support and advice to the contractor and all sub-contractors in the implementation of environmental management procedures and corrective actions;
- Ensure that monitoring programs, which assess the performance of the EMP, are implemented;
- Ensure maintenance of site document control requirements; and
- Assess and inspect rehabilitation area and give guidance regarding rehabilitation measures if any.
-

3.2 Sand miners/operators (permit holders)

Sand miners refers to personnel, workforce and suppliers responsible for the sand mining activities and/or operations at the project location. The Sand miners shall ensure that all sand mining personnel, sub-contractors, suppliers, etc. are familiar with, understand and adhere to the EMP.

By virtue of the environmental obligations delegated to the Sand miners through the Permitting Document, all sand mining personnel (including sub-contractors, suppliers, and service providers) appointed for the project would be responsible for:

- Ensuring adherence by providing adequate staff and provisions to meet the requirements of the EMP;
- Ensuring that any instructions issued by the EHRO and/or designated Municipal official are adhered to;
- Undertaking daily, weekly and monthly inspections of the work area(s);

- Reporting and recording any environmental incidents caused by the contractor or due to the contractor's activities;
- Obtaining required corrective action within specified time frame;
- Ensuring that a register of all the transgressions issued by the EHRO is kept on site and should be availed when requested;
- Ensuring that a register of all public complaints is maintained;
- Ensuring that all employees, including those of sub-contractors receive training in the language understood by the employees before the commencement of sand mining so that they can constructively contribute towards the success full implementation of the environmental requirements of the permit and
- Providing weekly checklists to the Environmental Health Risk Officer

Each Mining operator may nominate an Environmental Site Officer (ESO) who will be responsible for ensuring that the requirements of the EMP and the associated documents are complied with during all sand mining operations on behalf of the Contractor. The ESO shall:

- Identify areas of non-compliance and recommend measures to rectify them in consultation with the EHRO as required;
- Ensure that environmental problems are remedied timeously and to the satisfaction of the EHRO as required;
- Perform ongoing environmental awareness training of the Contractor's site personnel.
- All Sand miners who are currently operating Bricks making factories should be requested to compile EMPs and apply for ECCs with the MEFT.

3.3 The Environmental Assessment Practitioner (EAP)

The EAP on appointment by the proponent shall be responsible for the submission of Environmental Reports to the competent Authority (MEFT) and provide additional information on this study whenever required by any party (I&APs, Stakeholders, Authority or Proponent). The EAP should be available to provide training on this EMP on appointment by the proponent. Lastly, the EAP should be available to make amendments or additions to this EMP in accordance with the recommendations of the EIA study.

4. EMP IMPLEMENTATION & MONITORING

4.1 Sand Mining Procedures

a) Environmental Awareness Training

The Municipality of Omaruru have the responsibility to ensure that all persons involved in the sand mining project are aware of, and are familiar with, the environmental requirements for sand mining operations. All project personnel, including contractors and sub-contractors are required to receive training that is appropriate for the environmental aspects of their work. All attendees shall sign a completion and attendance register that clearly indicates participants' names. A copy of the register shall be handed to the EHRO.

b) Movement of Sand Mining Personnel and Equipment

The contractor shall ensure always that all personnel and equipment remain within the demarcated sand mining sites. When mining personnel and/or equipment wish to move outside the boundaries of the mine site other than normal access to the road for loading and access purposes, the contractor shall obtain written permission from the EHRO.

c) Location of Sand Mining Camps

Sand mining site camps/office include temporary stockpile sites, temporary fuel installations, other storage and work areas, required by the contractor, sub-contractors and suppliers. All construction camps (if any) will be positioned in demarcated areas approved by the EHRO.

d) Ablution Facilities

The contractor shall provide the adequate mobile ablution facilities for all site personnel. The placing of toilets shall be agreed with the EHRO. The contractor shall supply an adequate number of chemical or other suitable and approved toilets throughout the site where mining personnel will be operating. The toilets shall be secured to prevent them from tilting over, and the doors shall be provided with an external closing mechanism to prevent toilet paper from being blown out. Toilets shall be cleaned and serviced regularly.

The contractor shall ensure that any chemicals and/or waste from the toilets is not spilled on the ground at any time. Should there be spillage of chemicals and/or waste, the EHRO shall require the contractor to place the toilets on solid base or containment structures with sumps. The contractor will be required to remove accumulations of chemicals and waste from the site and dispose of it at an approved waste disposal site or sewage plant base at his own expense.

Abluting anywhere other than in the toilets shall not be permitted. The contractor shall be responsible for cleaning up any waste deposited by personnel.

4.2 Material Handling and Storage

a) Refueling of Equipment

Where reasonably practical, sand mining trucks plant and equipment's shall be refueled at designated re-fueling areas or workshops outside the project area. If refueling must be done, then the surface under the temporary refueling area shall be protected against pollution with proper spill containment materials. This should however be discussed and approved by the EHRO. The contractor shall ensure that there is always a supply of containment materials and absorbent material readily available to contain, absorb and breakdown hydrocarbon spillage. The quantity of such material shall be able to handle a minimum of 200 litre of hydrocarbon liquid spill.

b) Chemical, Harmful and Hazardous Materials

All project personnel and contractors shall comply with all relevant national and local legislation with regards to storage, transport, use and disposal of chemical, harmful and hazardous substances and materials. The contractor shall obtain the advice of the manufacturer with regards to the safe handling of such substances and materials.

The contractor shall provide the EHRO and EM with a list of all chemical, harmful and hazardous substances and materials on site, together with storage, handling and disposal procedures for these materials.

The contractor shall ensure that information on all chemical, harmful and hazardous substances are available to all personnel on site. The contractor shall furthermore be responsible for the training and education of all personnel on site who will be handling the material about its proper use, handling and disposal. A dangerous material datasheet should be available on site. The contractor shall submit method statements detailing the substances / materials to be used, together with the storage, handling and disposal procedures of the materials.

4.3 Solid Waste Management

The Contractor shall supply adequate waste disposal bins at the sand mining site. The bins shall be secured in such a manner as to prevent their contents blowing out. The Contractor shall ensure that all personnel immediately deposit all waste in the waste bins for removal by the Contractor. Waste shall be properly contained in a scavenger, water and wind-proof containers until disposed of at an approved disposal site. Bins shall be emptied, and waste removed at least once a week from the site. The bins shall not be used for any purposes other than waste collection.

Petroleum, chemical, harmful and hazardous waste generated at the mine site shall be stored in enclosed and properly contained areas. Such waste shall be disposed offsite at an appropriate hazardous waste disposal site.

4.4 Lighting Management

The Contractor shall ensure that any lighting installed at the mine site does not interfere with road traffic or cause an avoidable nuisance to the nearby land or other users of the area. Lighting installed shall, as far as practically possible, be energy efficient. Lighting utilized on site shall be turned off when not in use.

4.5 Wastewater Treatment

a) Discharge of Wastewater

No washing of plant, equipment or other equipment shall be permitted in the tributary, unless approved by the EHRO.

b) Prevention of Soil, Surface-and Groundwater Pollution

The Contractor shall take all reasonable precautions to prevent the pollution of the soil, surface and groundwater resources at the project location as a result of his activities. Such pollution could result from the release, accidental or otherwise, of chemicals, oils, fuels, sewage and other waste products.

The Contractor shall obtain oil absorbent pads, booms and spill kits, or similar designed products or materials to soak up oil, petrol and diesel. These materials shall be readily available for use wherever mining equipment is working. This should also be available at work areas where fuel and lubricants are being offloaded, stored and dispensed.

4.6 Site Clean Up and Rehabilitation

a) Site Clean Up

The sand mining contractor shall ensure that all waste, temporary structures, equipment, materials and facilities used for sand mining activities are removed upon completion of the project. The Contractor shall clear and clean the mining site to the satisfaction of the EHRO and EM upon completion of the project.

b) Rehabilitation

The Contractor shall undertake all rehabilitation of areas disturbed as a result of sand mining activities, especially areas outside the designated project area. Expenses incurred in rehabilitating these areas shall be for the Contractor's account. If deemed necessary, revegetation of disturbed areas shall be conducted as soon as possible after mining activities area completed.

4.7 Emergency Procedures

a) Accidents on Site

The Contractor shall comply with the Occupational Health and Safety Act and any other national, regional, or local regulations with regards to safety on site. The Contractor shall ensure that contact details of the local medical services are available to the relevant mining personnel prior to commencing work.

b) Petroleum, Chemical, Harmful and Hazardous Materials

The Contractor shall ensure that he is familiar with the requirements for the safe storage, handling and disposal of petroleum, chemical, harmful and hazardous materials.

The Contractor shall be responsible for establishing an emergency procedure for dealing with spills or release of these substances. He shall also ensure that the relevant mining personnel are familiar with these emergency procedures.

The Contractor shall submit his emergency procedure to the EHRO prior to bringing on site any such substances. All spills or accidents involving such materials are to be recorded. The clean-up of spills and any damage caused by the spill shall be for the Contractor's account.

c) Adverse Weather Conditions

In case of adverse weather conditions, the EHRO will determine if the sand mining operations can continue without posing a threat to environmental protection; and endangering the health and safety of the field workers. The EHRO will assess and monitor the weather conditions regularly and will document it in the field logbook. Some of the items to be considered prior to determining the continuance of work are:

- Potential for heat/cold stress and heat/cold-related injuries;
- Dangerous weather-related working conditions (i.e. high winds, dust storms, flash floods, river run-offs etc.); and
- Limited visibility.

d) Emergency Advisory Procedures

The Contractor shall ensure that there is an emergency advisory procedure on site before commencing any operations that may cause damage to the environment. The Contractor shall also ensure that site staffs are familiar with all emergency procedures to be followed.

The Contractor shall ensure that lists of all emergency telephone numbers/contact people are kept up to date, and that all numbers and names are always available at relevant locations.

4.8 Compliance Monitoring

a) Procedures

The Contractor shall comply with the environmental specifications and requirements on an ongoing basis and any failure on his part to do so will entitle the EHRO and EM to impose a penalty. In the event of non-compliance, the following recommended process shall be followed:

- The EHRO shall issue a notice of non-compliance to the Contractor, stating the nature and magnitude of the contravention. A copy shall be provided to the EM.
- The Contractor shall act to correct the non-conformance within 24 hours of receipt of the notice, or within a period that may be specified within the notice.
- The Contractor shall provide the EHRO with a written statement describing the actions to be taken to discontinue the non-conformance, the actions taken to mitigate its effects and the expected results of the actions. A copy shall be provided to the EM.
- In the case of the Contractor failing to remedy the situation within the predetermined time frame, the EHRO shall impose a monetary penalty based on the conditions of contract.
- In the case of non-compliance giving rise to physical environmental damage or destruction, the EHRO shall be entitled to undertake such remedial works as may be required to remedy such damage and to recover from the Contractor the full costs incurred in doing so.
- In the event of a dispute, difference of opinion, etc. between any parties in regard to or arising out of interpretation of the conditions of the EMP, disagreement regarding the implementation or method of implementation of conditions of the EMP, etc. any party shall be entitled to require that the issue be referred to specialists for determination.
- The EHRO shall at all times have the right to stop work and/or certain activities on site in the case of non-compliance or failure to implement remediation measures.

b) Offences and Penalties

Any avoidable non-compliance with the conditions of the EMP shall be considered sufficient grounds for terminating the sand mining permit and/or imposing a penalty. Possible offences, which should result in the termination of mining permit and/or issuing of a contractual penalty, include, but are not limited to:

- Unauthorized entrance into no-go areas e.g. wetlands outside designated mining site;
- Unauthorized damage to natural vegetation;
- Unauthorized camp establishment (including stockpiling, storage, etc.);
- Negligent spills or leaks of hydrocarbons and other hazardous material;
- Non-use, insufficient facilities, insufficient maintenance of ablution facilities;
- Insufficient solid waste management (including clean-up of litter, unauthorized dumping etc.);
- Erosion due to negligence, non-performance;
- Insufficient fire control and unauthorized fires; and
- Preventable damage or pollution to the Omaruru river course.

c) Environmental Monitoring

Periodic inspections will be performed by the EHRO. These will consist of formal reviews of conformance against municipal policies and procedures stated in EMP document. Inspections will occur on a regular basis (or as required). Supervisors in all work areas will conduct performance and compliance reviews, using the EMP as guideline to ensure compliance.

d) Environmental Register

An environmental register should be kept at the Municipality of Omaruru and at the sand mining site (or contractor's vehicle) in which incidents related to actual impacts are recorded. This will include information related to incidents as spillages, dust generation and complaints from neighbouring land and public. It shall also contain information relating to actions taken. It is envisaged that the EM, EHRO and the contractor(s) will be the main contributors, and who will also be the main parties involved in suggesting mitigation measures.

e) Site Management, Access Routes and Work Sites

Areas outside the designated sand mining sites shall be considered "no go" areas. Vehicular movement, sand mining trucks and equipment will access the sand mining sites from designated routes, as agreed by the EHRO. No new tracks or roads shall be established unless otherwise agreed by the EHRO and EM. Work sites shall be clearly demarcated and road signs erected where needed. The public should not have unauthorized or uncontrolled access to the sand mining sites during operations or after hours.

Furthermore, on-going controls, such as barricading and fencing (where necessary) and policing, must be implemented.

f) Staff Management

The Contractor must ensure that their employees have suitable personal protective equipment and properly trained in first aid and firefighting. Training records must be kept for future references.

4.9 Environmental Monitoring Programme

A monitoring programme should be developed to monitor the effectiveness of the control measures implemented within the sand mining area. The following specific areas should be considered:

- Collection of air and water samples at strategic locations. The sampling frequency should be decided by the EHRO and approved by the EM. If the parameters exceed the permissible tolerance limits, corrective regulation measure will be taken.

- Collection of soil samples at strategic locations once in a year and analysis thereof with regards to deleterious constituents, if any.
- Regular visual examination must be carried out to look for erosion of riverbanks. If any abnormal condition is observed or discovered, corrective measures should be instituted.
- Measurement of noise levels at mine site, stationary and mobile sources, and adjacent land must be done at least quarterly.
- Regular re-vegetation of must be conducted along the roadsides, riverbanks and near relevant public infrastructure.

5. ENVIRONMENTAL MANAGEMENT ASPECTS DURING THE OPERATIONAL AND DECOMMISSIONING PHASES

This section will look at the potential environmental impacts, which may arise during the sand mining operations in the tributaries of Omaruru River.

5.1 Operational Phase

Table 1: Proposed mitigation measures for the operational phase

Environmental Issue/Impacts	Mitigation Measures	Monitoring	Responsibilities
Groundwater impacts	<ul style="list-style-type: none"> • All vehicles must be serviced and maintained regularly. • Vehicles may not be serviced at the mining site, unless otherwise agreed upon with the EHRO and EM. If for some reasons, maintenance is to be undertaken on site, measures need to be put in place to avoid soil and groundwater. • 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 recognized hazardous waste disposal facility. • Any polluted soil or water should be treated as a hazardous waste. • Mined out sites with stagnant water must be rehabilitated and overburden returned immediately after mining to prevent exposed, stagnant water. • Portable ablution facilities with suitable containment systems should be erected at the site for use during the sand mining operations. Waste should be properly contained to avoid any leakages or spillages and should regularly be disposed off at a suitable disposal site. Run-off from ablution facilities due to overflows should be avoided at all cost. 	Regular visual inspection.	EHRO / Sand Mining Contractors.

	<ul style="list-style-type: none"> • Groundwater pollution is very difficult to remediate and remediation will depend on the pollutant released. Specialists must be employed to determine the best remediation procedures relevant to the problem if a large amount of pollution is recorded. • Equipment and materials to deal with spill cleanup must be readily available on site and staff must be trained as to how to use the equipment and briefed about reporting procedures. • Proper environmental awareness and remedial response training of operators must be conducted on a regular basis. 		
Surface water impacts	<ul style="list-style-type: none"> • Any spillage of hazardous substances including oils, hydrocarbon fuel, lubricants and grease must be cleaned up and disposed off at the designated disposal facility. • Drip trays and/or plastic sheeting should be used to contain any leaks emanating from the sand mining activity. • Avoid washing of sand mining vehicles, trucks and equipment or discharge of contaminated wastewater at the sand mining site or into the riverbed. • Ensure the availability of adequate portable ablution facilities with suitable containment systems for use at all sand mining sites throughout the mining operations. • Stabilise cleared areas as soon as possible to prevent and control surface erosion. • The contractor will adhere all guidelines and rules for proper and scientific method of mining during sand mining. • Proper environmental awareness and remedial response training of operators must be conducted on a regular basis. 	<p>Regular visual inspection.</p> <p>Surface water quality monitoring in cases of evident pollution.</p>	EHRO / Sand Mining Contractors.

	<ul style="list-style-type: none"> An emergency plan should be in place on how to deal with spillages and leakages during sand mining operations. 		
ecosystem and Biodiversity Impact	<ul style="list-style-type: none"> Mining in the sand quarry must be limited to the riverbed and sandbanks outside of the tree line. A buffer outside of the tree line must be maintained where no mining may be allowed. This will protect tree root systems and prevent collapse of the riverbank and trees. The buffer should be calculated as the distance away from the tree trunk equal to 1.5 times the radius of each individual tree's canopy. Where protected tree species must be removed, this action should be justified and the necessary permits from the Ministry of Agriculture, Water and Land Reform must be obtained. 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. Erosion damage to existing roads and adjacent land as a result of sand mining activities should be prevented. Overburden 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 and should be stored in such a way as to prevent washing or blowing away or being covered with other sand. All mined out areas must immediately be rehabilitated and restored as close as possible to its original state. 	<p>Permits and restoration plan on file and restoration plan to be executed within the first 3 years of operation.</p> <p>Monthly inspection for any signs of erosion during the rainy season.</p> <p>A report should be compiled every 6 months of all restoration performed.</p>	Independent Specialist Consultant (Restoration ecologists) / Proponent
Air Quality	<ul style="list-style-type: none"> Ensure that sand mining trucks are covered by canvas sheet to prevent dust emission. It must be ensured that all vehicles entering the site and machinery used in construction activities are in good working order to prevent unnecessary emissions. 	<p>Regular visual inspection.</p> <p>A complaints register must be maintained, in which any</p>	EHRO / Sand Mining Contractors.

	<ul style="list-style-type: none"> • Vehicles should not be allowed to idle for unnecessarily long periods of time. • Excavation, handling and transport of sand must be avoided under high wind conditions. • Dust suppression measures (e.g. dampening with water) may be required from time to time, should dust become a nuisance. 	<p>complaints from the community must be logged.</p> <p>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 a final report.</p>	
Waste generation	<ul style="list-style-type: none"> • The sand mining contractor and his personnel must adhere to all the relevant laws and regulations applicable to the disposal of waste. • No burying or dumping of any waste material, litter or refuse into Omaruru River channel should be allowed. • Ensure that sufficient weather- and vermin- proof bins/containers are present on site for the disposal of solid waste. • Waste must be appropriately collected and disposed off at an approved waste disposal site. • Ensure that no excavated soil, refuse or building rubble generated on site are placed, dumped or deposited on adjacent land. • Proper temporary toilet facilities with adequate containment structures should be erected at the sand mining site for use during operations. Waste should properly be contained to avoid any leakages or spillages and should be regularly disposed off at a suitable sewage disposal site. • No burying or dumping of any waste materials, litter or refuse shall be permitted. 	<p>Regular inspection and housekeeping procedure monitoring.</p> <p>Observation of mining sites appearances by the manager.</p> <p>A register of hazardous waste disposal should be kept. This should include type of waste, volume as well as disposal method/facility.</p> <p>Any complaints received regarding waste should be recorded with notes on action taken.</p> <p>All information and reporting to be included in a bi-annual report.</p>	EHRO / Sand Mining Contractors.

	<ul style="list-style-type: none"> • The site is to be kept clean, neat and tidy at all times and litter is to be avoided. • Contaminated soil must be removed and disposed off at a suitable waste disposal site. • Separate hazardous wastes from general waste, clearly marked, and stored in appropriate containers. • Ensure that all contaminated soils, waste oils, lubricants, grease, and hazardous chemicals well contained and disposed of at an approved hazardous waste disposal facility. • Awareness of the hazardous nature of various types of waste should be enforced. • Prevent scavenging (human and non-human) of waste storage. 		
Noise	<ul style="list-style-type: none"> • Sensitize sand mining vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used. • Ensure engines of sand mining machinery are fitted with mufflers. • Equipment and machinery operators should be equipped with ear protection equipment. • Loud music from operational vehicles should be restricted. • Operations should be strictly between 08H00 to 17H00. • Any complaints received by the Contractor regarding noise will be recorded and communicated to the EHRO. • Capture public perceptions and complaints with regards to noise impacts and introduce corrective measures for continuous improvement. • • Follow World Health Organization (WHO) guidelines on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment. 	<p>Strict operational times. Regular inspection.</p> <p>Maintain a complaints register. Bi-annual report on complaints and actions taken to address complaints and prevent future occurrences.</p>	EHRO / Sand Mining Contractors.

	<ul style="list-style-type: none"> • Keep volume of public address systems on a level where neighbours are not impacted on. • Manage noise caused by clients/customers – loud music etc. • Hearing protectors as standard PPE for workers in situations with elevated noise levels. 		
Fire	<ul style="list-style-type: none"> • Open fires should not be allowed at the mining area except at designated sites. • Fire precautions and fire control must be present at the site. • In addition to this, all personnel must 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. • Experience has shown that the best chance to rapidly put out a major fire is in the first 5 minutes. It is important to recognize that a responsive fire prevention plan does not solely include the availability of firefighting equipment, but more importantly, it involves premeditated measures and activities to timeously prevent, curb and avoid conditions that may result in fires. 	<p>A report should be compiled every 6 months of all incidents reported. This should include measures taken to ensure that such incidents do not repeat themselves. The report should also contain date when fire drills were conducted and when fire equipment was tested.</p>	EHRO / Sand Mining Contractors
Traffic Impact	<ul style="list-style-type: none"> • The main access to the sand mining area as identified and authorised by the Municipality of Omaruru must be utilised. • As far as possible, no other routes shall be used by sand mining vehicles or personnel for the purpose of gaining access to the site. • If for any reason, the need arises for traffic diversion or road closure due to sand mining operations, the contractor should liaise with the relevant authorities. • Speed limits and warning signs for mining operations must be erected to minimize accidents. All users of access roads shall not exceed 20km/h. 	<p>Observations of the traffic flow of the authorised access roads in the area.</p> <p>Any complaints received regarding traffic issues should be recorded together with action taken to prevent impacts from repeating itself. A report should be compiled every 6 months of all incidents</p>	EHRO / Sand Mining Contractors

	<ul style="list-style-type: none"> • Sand mining vehicles must be tagged with reflective signs or tapes to maximise visibility of the vehicles and avoid accidents. • Make sure all loads are secure to prevent spillage during transportation of material. • Ensure public roads are kept clear of spills, mud and sand. Should any mud and sand be dropped onto public roads by the mining activities, it should be cleaned up immediately. • Damage to the existing access roads as a result of the mining activities shall be repaired. • The sand mining contractor shall ensure traffic safety at all times and shall implement all necessary safety measures. • Only mine on the approved allocated site and Permit holder shall identify the coordinates with recognisable markers, shall maintain the beacons in position and shall remove the beacons on closure of the pit. • A visible sign board must be place at the area where the removal of sand is taking place. 	<p>reported, complaints received, and action taken.</p>	
<p>Health and Safety</p>	<ul style="list-style-type: none"> • Ensure controlled access to the sand mining site, to restrict unauthorised personnel from entering the site. • Equipment and machinery operators should be equipped with ear protection equipment. • Operations should be strictly between 08H00 to 17H00. First aid and safety awareness training for contractors. • Always ensure the general safety and security by providing day and night security guards and adequate lighting within and around the premises. • The sand mining staff must be properly trained on safety and health issues of the project. • Well stocked first aid box which is readily available and accessible should be provided within premises. • Workers should be fully equipped with personal protective equipment gear. 	<p>Safety procedures evaluation. Health and safety incident monitoring.</p> <p>Any incidents must be recoded with action taken to prevent future occurrences. A report should be compiled every 6 months of all incidents reported. The report should contain dates when training was conducted and when safety equipment and</p>	<p>EHRO / Sand Mining Contractors.</p>

	<ul style="list-style-type: none"> The mining contractor must ensure that lists of all emergency telephone numbers/contact persons are available (and kept up to date) at the sand mining site and contractors mining fleet. All active mining sites and excavation areas must be clearly demarcated to prevent unauthorised persons from accessing the site, who could get injured on site. 	structures were inspected and maintained.	
Visual Impact	<ul style="list-style-type: none"> The sand mining contractor should always maintain tidiness on site. Take cognition when parking vehicles and placing equipment. Sand mining personnel should be attentive to the importance of not littering. Littering is unsightly and has a negative visual impact. Sufficient waste bins must be provided onsite and must be emptied regularly. Mining activities shall avoid causing unnecessary disruption and nuisance to adjacent landowners and the public. 	<p>Regular inspections by the EHRO will be undertaken using checklists to ensure that orderliness is maintained.</p> <p>A report should be compiled every 6 months of all complaints received and actions taken.</p>	EHRO / Sand Mining Contractors.
ecological Impacts	<ul style="list-style-type: none"> Limit clearing of vegetation to those areas within the footprint of construction, minimise open areas and reduce the frequency of disturbance. No vegetation should be removed outside the designated zones. Mining operational activities should not exceed the demarcated sand mining area. Minimise disturbance of animals on and within the close vicinity of the site. Sand mining contractor and its personnel must be aware that no intentional killing of any animal is not permitted, as faunal species are a benefit to society. Poaching is an illegal act, and it will be treated as such. Any employee caught poaching will be dismissed. 	<p>Regular site inspection.</p> <p>record should be kept of training provided. Ensure that all training is certified, or managerial reference provided (proof provided to the employees) inclusive of training attendance, completion, and implementation.</p>	EHRO / Sand Mining Contractors
Heritage	<ul style="list-style-type: none"> If such a site or any other archaeologically important piece is found during the development phase any work in that area must be halted and the relevant authorities must be informed. 	record of any discoveries and proof of notifications to authorities on file.	Sand Mining Contractors / Municipality of Omaruru

	<ul style="list-style-type: none"> • Mining may only continue at that location once permission has been granted. 	All information and reporting to be included in a final report.	
Employment opportunities	<ul style="list-style-type: none"> • Local Namibian's must be employed. Deviations from this must be justified. 	Bi-annual summary report based on employee records.	Sand Mining Contractors
Cumulative Impact	<ul style="list-style-type: none"> • These are impacts on the environment, which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of who undertakes such other actions. • Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. In relation to an activity, it means the impact of an activity that may not be significant, may become significant when added to the existing and potential impacts resulting from similar or diverse activities or undertakings in the area. Since there will be numerous sand mining permit holders, a cumulative impact on the river can be expected should no mitigation measures be implemented. • This can lead to increased erosion or biodiversity impacts. Similarly, traffic, waste, and pollution. 	<p>Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.</p> <p>Reviewing biannual and annual reports for any new or re-occurring impacts or problems would aid in identifying cumulative impacts and help in planning if the existing mitigations are insufficient</p> <p>Annual summary report based on all other impacts must be created to give an overall assessment of the impact of the operational phase.</p>	Proponent
Restoration/Rehabilitation	<ul style="list-style-type: none"> • A restoration ecologist to develop a restoration plan for the respective quarries. This plan must be executed during operations on mined out areas. 	Restoration plan on file. A report should be compiled every 6 months of all Restoration performed.	Independent Specialist Consultant (Restoration ecologists) / Proponent

5.2 Decommissioning and Rehabilitation

Decommissioning of the sand mines is an ongoing process during the operations of the mines 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. All mined areas must be 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.

Table 2: Proposed mitigation measures for decommissioning and rehabilitation

Environmental Issue	Mitigation Measures	Monitoring	Responsibilities
Decommissioning and Rehabilitation	<ul style="list-style-type: none"> • On completion of sand mining operations, all infrastructures, equipment, plant, temporary site office and other items used during the mining period must be removed from the site. • On completion of sand mining operations, the contractor (or permit holder) must rehabilitate and stabilise cleared areas as best as possible to prevent and control surface erosion. • Any infrastructure or fence erected by the sand mining contractor must be removed and the land restored to the pre-sand mining state. • Remove all contaminated soils from the sand mining site and dispose off at a recognized hazardous waste disposal facility. • Rehabilitate the access river-bank points to the river original shape (where required) by backfilling with original material excavated. • Ensure that the sand mining sites in the riverbed are left levelled and even, and in a natural state with no foreign debris, scrap, or other materials. • Maintain the integrity of the hydrological flow by ensuring that no foreign objects, materials, debris, or sand stockpiles are left in the riverbed that will 	<p>Inspection of all sand mining operational locations and access routes.</p> <p>A report must be compiled every six months of all areas mined and rehabilitated. This should include the surface area of such rehabilitated portions, rehabilitation methods as well as photographs of areas prior to mining, post mining and post rehabilitation.</p>	EHRO / Sand Mining Contractors.

	<p>result in attenuating or diverting the natural river flow.</p> <ul style="list-style-type: none">• Removal of these materials shall be done on a continuous basis and not only at the start of rehabilitation.• Riverine vegetation removed from areas, shall be re-established systematically in the approximate areas where they occurred before sand mining commenced.• Suppression of invader species at the location of the sand mining shall be instituted on a regular basis during operations.• On completion of sand mining operations, natural coarse material used for the construction of mining operational ramps must be removed and dumped into excavations.• Where necessary, fertilize all rehabilitated and re-established sand mining areas to allow vegetation to establish rapidly.• Rehabilitation of the project site by the sand mining contractor shall be completed within a specified period of time, and to the satisfaction of the EHRO and EM.		
--	--	--	--

6. CONCLUSIONS

The above Environmental Management Plan, 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.

The Environmental Management Plan 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.