

1. Environmental Management Plan (EMP)

1.1. Purpose of the EMP

The EMP contains the pre-requisite and necessary mitigation measures (and recommended actions), as well as the relevant timeframes, including the responsible persons, in respect of the sand mining operations.

The ultimate responsibility for the implementation of the EMP vests with the Municipality of Swakopmund who is the owner. The EMP is a legally binding document that forms an important part of the Environmental Assessment process and needs to be strictly adhered to.

Tenants/operators workers working in the mining, loading and hauling operation must be made aware of the EMP, including their responsibilities and all identified sensitive / 'no go' areas. Any transgressions must be treated as serious, with remedial action taken.

The EMP is divided into two parts, the operational and rehabilitation phase, with each containing its own set of mitigation measures. Water is not required for this specific mining operation.

1.2. Objectives of the EMP

This EMP has the following objectives:

- To outline functions and responsibilities of the responsible persons involved in the sand mining operations.
- To state standards and guidelines which are required to be achieved in terms of environmental legislation.
- To outline mitigation measures and environmental specifications which must be implemented to ensure environmental and social protection of the surrounding environment; and
- To prevent long-term or permanent environmental degradation.

1.3. Structure of the EMP

The EMP provides mitigation and management measures for the following phases of the project:

- Operational Phase

This section of the EMP provides management principles and environmental actions, procedures and responsibilities as required for this phase of the sand mining operation are specified.

- Rehabilitation Phase

This section of the EMP provides management principles for the decommissioning and rehabilitation phase of the project.

1.3.1. Key role players

- Borrow Pit Owner/Operator

The mining permit applicant (as owner and manager) is ultimately accountable for ensuring compliance with the EMP and conditions specified in the Environmental Authorisation Clearance Certificate (EIA).

A Health, Safety & Environmental Officer (HSEO) must be appointed by the applicant as an independent appointment, to objectively manage and monitor the implementation of all applicable environmental legislation, the conditions of the ECC, and the EMP for the project.

The applicant is further responsible for providing a mandate to enable the HSEO to perform his/her responsibilities.

- Borrow Pit Manager

The Manager has overall responsibility for managing the borrow pits, contractors, and consultants, and for ensuring that all environmental management requirements are met. All decisions regarding environmental procedures must be approved by the Manager. The Manager has the authority to stop any operational activity in contravention of the EMP.

- HSEO

The HSEO role is an independent appointment. His/her duty it is to objectively manage and monitor the implementation of applicable environmental legislation, the conditions of the ECC, and the EMP for the borrow pits. The HSEO must be on site prior to any site establishment/operations and must endeavour to form an integral part of the site's project team.

1.3.2. Environmental Awareness

Environmental awareness training should take place monthly, coordinated and monitored by the HSEO. Issues that pose a risk will be discussed and an understanding of the issues generated.

Any emergency situations will require immediate action by the Manager. Therefore the discussions must focus on situations which may arise to which the manager must be alerted.

It is of importance that workers are informed of 'no-go' areas and strictly abide by the EMP, Health and Safety Regulations, as well as conditions of the ECC, if granted by the

Competent Authority. The HSEO shall conduct initial induction training with the Applicant and workers prior to mining commencement.

Thereafter, the Manger is required to conduct monthly environmental awareness briefings, in consultation with the HSEO. Some issues that should form part of the training include:

- Demarcation of the accessory works area and access road footprint.
- Sensitive no go areas, such as fauna habitats.
- Interpretation of Signage on site.
- Vegetation that must be avoided.
- Fauna species that may not be harmed.
- Identification of alien species.
- Erosion control measures.
- Storage of fuels and chemicals on site and refuelling areas.
- The repairing of equipment and machinery on site.
- The use of toilets.
- Proper waste disposal.
- Spill and emergency plans.
- Health and Safety onsite.

1.4. Description of the environment likely to be affected by the proposed sand mining operation

The study area has been significantly disturbed and degraded as a result of historical and current sand mining activities. This has resulted in the disturbance of soils and in the alteration of the natural vegetation community.

No vegetation is evident throughout the entire borrow pits accessory works area.

1.5. Description of the proposed sand mining activity

Construction Phase: Not Applicable. There will be no construction phase. The site is already active and prepared for sand mining. The proposed activities going forward include:

- Environmental training and awareness for workers.
- The removal and storage of topsoil that will be kept for the rehabilitation and closure phase.
- The demarcation of the sand mining site and 'no-go' areas.
- The erecting of signage and site boundaries.
- The placement of portable toilets, bins, spill kits and first aid kits.
- Maintaining the existing access road to the borrow pits.
- Preparing equipment and vehicles for operation.
- Ensuring that there are no protected fauna on site; and

- Implementing erosion control on site.

Operations Phase:

The mineral proposed to be mined is coarse sand with clay content (0.075mm) of not exceeding the limit given in table 1 of SANS 1083, 2002 and based on these properties, this material is fit to be used in concrete, plaster, and mortar after being sieved before use, for the purpose of removing lumps and oversize stones.

The method that is currently employed and continue to be used is, a very basic form of Open Cast Mining. Extraction of sand will be facilitated through the use of an excavator and/or front end loader. The 55.97 hectares accessory works area will be demarcated for sand mining and will not compromise any infrastructure, watercourses or wetlands.

An excavator and/or front end loader must be used to strip the top 30cm of topsoil, which will be stockpiled along the northern and southern flanks of the pits for later rehabilitation use purposes.

The topsoil stockpiles must be positioned to create a wind barrier thus preventing wind erosion across the pits, and shields the working equipment from creating excessive dust.

The excavator and/or front end loader will excavate sand from the pit to a depth of 1m to 3m, and stockpile the alluvial coarse sand on the western side of the pits. The sand will be deposited onto the stockpile area within the permit site and loaded onto tipper trucks by the front end loader for transport off the site, and for sale to the local market. This process does not require the use of any water.



Picture 1 Sand mining borrow pits accessory works area with test pits positions.

Decommissioning Phase:

As part of the basic Assessment process a Closure and Rehabilitation Plan has been formulated to guide the decommissioning of the sand mining borrow pits as contained in the EMP.

1.5.1. Planned life of the borrow pits

A geotechnical study was done concurrently with this EIA and, based on visual assessment and test results, there is enough sand mining reserves of roughly 406,000 m³. The borrow pits will initially operate for a three-year permit period as per ECC validity and will be renewable further thereafter if in compliance with the conditions of the EMP and ECC conditions.

1.6. Health and Safety

The proponent and its operators onsite must adhere to the Labour Act 11 of 2007 No. 156 Labour Act, 1992: Regulations relating to the health and safety of Employees at work. This includes, but is not limited to the following:

- Workers must be provided with dust masks when working in conditions that require such protective measures.
- All workers on site undergo annual occupational medicals to ensure fitness to work in a sand mining operational environment.
- Operators of equipment and vehicles must be licenced/registered and properly trained.
- Vehicles must be properly maintained. Hooters and lights must be in working order.
- Clean water must be provided to workers in a suitable container.
- There must be a registered first aider and medical equipment, should emergency situations arise.
- Sand mining operations should be limited to day light hours between 07h00 to 17h00.
- Sand mining should not occur in adverse weather conditions.
- The sand mining area must be restricted to the public and relevant signs made clearly visible.
- The site must be clearly demarcated, with no-go areas identified and avoided.
- Accidents on site must be immediately reported and suitable action taken.
- Spill kits must be available in case of emergency situations.
- Acceptable, well maintained sanitation must be provided to workers; and
- Rehabilitation must ensure the site is left in safe condition.

2. Potential Impacts of the sand mining operations and risks of the proposed activity

Positive impacts associated with the project include:

- Job opportunities
- The borrow pits has the potential to contribute to the maintenance of and development of new infrastructure in and around the Swakopmund and Walvisbay areas.
- Sand will not be mined from the Swakop riverbed.

Negative Impact associated with the project.

- The sand mining activities will cause noise and dust issues; however, this is easily mitigated.
- Negative impacts with regards to the biophysical environment include potential contamination of the area due to spillage by hydrocarbon products.
- Loss of soil resources
- Change of current land use

2.1. Proposed impact management objectives and the impact management outcomes for inclusion in the EMP.

The EMP addresses the environmental impacts associated with the project during Operation, Decommissioning and Post Closure Phases of the project. The objectives of the EMP will be to provide detailed information that will advise the planning design of sand mining activities to avoid and/or reduce impacts that may be detrimental to the environment.

The following environmental management objectives are recommended for the current sand mining activity.

- Development planning must restrict the area of impact to a minimum and designated area only.
- Closely monitor the sand extraction volumes.
- Prevent illegal sand mining.
- Monitor and prevent contamination and undertake appropriate remedial actions.
- Limit the visual and noise impact on receptors.
- Avoid impact on possible heritage finds.
- Promote health and safety of workers.
- Limit dust and other emissions to within allowable limits.

- Manage soils to prevent erosion.

2.2. Impact Assessment

To ensure uniformity, the impacts are addressed in a standard manner so that their significance can be compared. Each impact is identified in terms of probability (likelihood of occurring), extent (spatial scale), intensity (severity) and duration (temporal scale).

Each rating scale is assigned a numerical value, and the sum of the numerical rating is multiplied by the probability of that impact occurring to give the resulting significance of the impact. The numerical values used for each rating scale are presented below.

Nature of impact: A brief description of the type of impact the mine will have on the affected environment.

Extent/Scale: The physical extent of the impact.

1. **Footprint:** The impacted area extends only as far as the actual footprint of the activity.
2. **Site:** The impact will affect the entire or substantial portion of the site/property.
3. **Local:** The impact could affect the area including neighbouring properties and transport routes.
4. **Regional:** Impact could be widespread with regional implication.
5. **National:** Impact could have a widespread national level implication.

Duration: The duration of the impact.

1. **Short term:** The impact is quickly reversible within a period of one year, or limited to the construction phase, or immediate upon the commencement of floods.
2. **Medium term:** The impact will have a short-term lifespan (project lifespan 1 – 10 years).
3. **Long term:** The impact will have a long-term lifespan (project lifespan > 10 years).
4. **Permanent:** The impact will be permanent beyond the lifespan of the development.

Intensity: This criterion evaluates intensity of the impact and are rated as follows:

1. **Minor:** The activity will only have a minor impact on the affected environment in such a way that the natural processes or functions are not affected.
2. **Low:** The activity will have a low impact on the affected environment
3. **Medium:** The activity will have a medium impact on the affected environment, but function and process continue, albeit in a modified way.
4. **High:** The activity will have a high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

5. Very high: The activity will have a very high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

Determination of significance: Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the extent, duration, intensity, and probability of the impacts.

1. No significance: The impact is not substantial and does not require any mitigatory action.
2. Low: The impact is of little importance but may require limited mitigation.
3. Medium: The impact is of importance and therefore considered to have a negative impact.
4. Mitigation is required to reduce the negative impacts to acceptable levels.
5. High: The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation and management are essential.

The following assessment scale is used to determine the significance of the identified potential impacts on the environment.

Significance = (probability + duration + scale) x intensity

- Probability: 1 – 5
- Extent: 1 – 5
- Duration: 1 – 4
- Intensity: 1 – 10

Significance rating criteria:

- >75 High environmental significance
- 50 – 75 Medium environmental significance
- <50 Low environmental significance

2.2.1. Impact Assessment

13.2.1.2. Environmental characteristics

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Inherent Risk	Mitigation	Residual Risk
1. Impact on functional contribution of the larger ecosystem (e.g. terrestrial bird breeding and feeding, insect breeding and habitat for migrating small game)	Operations	-ve	Local	Medium	Medium	Medium	High	<ol style="list-style-type: none"> 1. Before mining operations can commence, the Manager in consultation with the HSEO must clearly demarcate the mining footprint and the access road Footprint. 2. If applicable, No go and sensitive areas (Various wetlands and indigenous vegetation) must be clearly marked and avoided. 3. Disturbance of indigenous fauna and flora, and the natural ecology in the surrounding areas must be avoided. 4. Disturbance of mammals, birds, reptiles, other animals, and their habitats must be prevented. 5. Invasive alien plants must be removed from site. 6. A rehabilitation plan must be implemented once mining operations cease. 7. Rehabilitation of sand mining should be conducted in accordance with Roads Authority's rehabilitation of borrow pits along the national road network, environmental guidelines, July 2013 	Medium

13.2.1.3. Soil characteristics and geology

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Inherent Risk	Mitigation	Residual Risk
1. Soil stockpiles that are left unattended.	Operations	-ve	Site	Short	Medium	High	High	<ol style="list-style-type: none"> 1. Prior to sand mining, all topsoil must be stockpiled for use during the Rehabilitation Phase. 2. Stockpiled topsoil should be used as the final cover for all disturbed areas where re-vegetation is required. 3. Stockpiled soil should be protected by erosion-control berms if exposed for a period of greater than 14 days during the wet season. 4. Soil stockpiles should be located away from drainage lines and areas of temporary inundation. 5. If possible, seeding of the stockpiles with suitable local vegetation is recommended 6. vegetation is recommended 	Low
2. Soil pollution and contamination during operations.	Operations	-ve	Local	Short	Medium	Medium	High	<ol style="list-style-type: none"> 1. The upper clayish layer should not be exceeded. 2. Deeper excavation would involve soils that are heavily saturated and difficult to work with. 3. Should diesel be stored on site, it will need to be stored on a hard surface and 50m away from any drainage lines. 4. Store fuel, chemicals, and other hazardous substances in suitable secure weather-proof containers with impermeable and bunded floors to limit pilferage, spillage 	Low

								<p>into the environment, flooding, or storm damage.</p> <ol style="list-style-type: none"> 5. Repairs to vehicles and equipment on site should be avoided. 6. If necessary, repairs must be undertaken on hardened surfaces. 7. Under no circumstances should oil or diesel to be disposed of at the site. 8. A Spill Contingency Plan should be adopted. 	
3. Dust pollution due to exposure to loose soils.	Operations	-ve	Local	Short	Medium	Medium	High	<ol style="list-style-type: none"> 1. Soil should be exposed for the minimum time possible once cleared of topsoil, i.e. the timing of clearing and grubbing should be coordinated as much as possible to avoid prolonged exposure of soils to wind and water erosion. 	Low
4. Compaction of soils by use of site heavy mobile equipment	Operations	-ve	Local	Short	Low	Medium	Medium	<ol style="list-style-type: none"> 1. Where roads have become compacted, they shall be ploughed, ripped and revegetated. 	Low
2. Soil Erosion	Operations	-ve	Local	Medium	Medium	Medium	High	<ol style="list-style-type: none"> 1. Keep surrounding vegetation, especially shrubs, to create a screen that reduces erosion impacts. 2. During the mining activities, there shall be the protection of areas susceptible to erosion by installing necessary temporary and permanent works as soon as possible. 3. 	Low

13.2.1.4. Fauna and Flora

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Inherent Risk	Mitigation	Residual Risk
1. Impact on faunal activity on surrounding properties during activity (e.g. trapping of animals, construction vehicles, etc.).	Operations	-ve	Local	Medium	Medium	Medium	High	<p>1. The total depth of pits must be minimized so that the pits do not create a safety hazard or barrier / obstruction to the movement of wildlife.</p> <p>2. Any fauna found on the stockpile site needs to be relocated without causing any damage or harm.</p> <p>3. Any nesting sites of avifauna species must not be disturbed or impacted on and a buffer implemented.</p> <p>4. Workers may not bring pets onto sand mine site.</p> <p>5. Any malicious damage to any fauna species present on site will be considered a punishable offence, and the appropriate measures will be followed.</p> <p>6. Invasive alien plants must be removed from site.</p> <p>7. No go and sensitive areas must be clearly marked and avoided.</p> <p>8. A rehabilitation plan must be implemented once mining operations cease.</p>	Low
2. Impact on vegetation (in stockpiling areas)	Operations	-ve	Local	Short	Medium	Medium	High	<p>1. Limit the removal of any vegetation to the sand mining footprint.</p> <p>3. Prevent illegal removal of any protected vegetation.</p> <p>4. Minimise scarring of the soil surface and land features.</p> <p>5. Minimise disturbance and loss</p>	Low

									of topsoil. 6. Keep any surrounding vegetation, to create a screen that reduces flooding impacts.	
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13.2.1.5. Archaeological, historical, and cultural significance

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Inherent Risk	Mitigation	Residual Risk
1. Impact on sites with valuable archaeological, history and cultural significance.	Operations	-ve	Site	Short	Minor	Low	Medium	1. Should any archaeological artefacts be exposed during excavation, work on the area where the artefacts were found, shall stop immediately and the HSEO should notify the Heritage Council as soon as possible.	Low

13.2.1.6. Socio-economic impacts

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Inherent Risk	Mitigation	Residual Risk
1. Direct and indirect employment creation.	Operations	+ve	Local	Short	Minor	High	Medium	1. No mitigation required	Medium

13.2.1.7. Safety and security

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Inherent Risk	Mitigation	Residual Risk
1. Potential for increased security risk to adjacent properties and the residents thereof.	Operations	-ve	Local	Short	Medium	Low	Medium	1. Staff should be informed that access to adjacent properties is strictly off-limits and that it will be deemed a serious offence (i.e. no fences should be jumped at any time and no gates are to be opened without permission from the relevant landowner).	Low
1. Similarly, operational activities on site may pose various risks to worker's safety.	Operations	-ve	Local	Short	Medium	Low	Low	1. The site and crew are to be managed in strict accordance with the Labour Act 11 of 2007 No. 156 Labour Act, 1992: Regulations relating to the health and safety Of Employees at work	Low
2. Traffic and spills transporting sand to the market	Operations	-ve	Local	Short	Medium	Low	Low	1. When transporting silica sand on public roads, these should be kept clear of spills, leaks, mud and sand. Should any mud and sand deposited onto public roads by the mining activities, it will need to be cleared immediately	Low
3. Slope stability	Operations	-ve	Local	Medium	Medium	Medium	High	1. This site is literally covered by dune sand with small, scattered outcrops, therefore, any slopes created on site within the transported and residual soil horizons should be battered back to 1V:1.5H to ensure temporary safe working conditions.	Medium

									Excavations in very loose sand may be battered 1V:1H, and in medium dense sand or better at 2V:1H. Steeper excavated slopes were observed in borrow pit areas; therefore, it is recommended that all excavations exceeding a depth of 1,0m should be trimmed/battered back at 30° to the vertical to ensure the safety of construction personnel.	
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13.2.1.8. Potential environmental impacts

Nature	Phase	Type	Extent	Duration	Intensity	Probability	Inherent Risk	Mitigation	Residual Risk
1. Increase in air pollution (dust). 2. Impact on the ambient air quality due to HME tailpipe emissions from increased traffic volumes.	Operations	-ve	Local	Short	Medium	High	Medium	1. Air filters on all mechanized equipment must be properly designed and maintained. 2. Onsite burning of waste is not permitted. 2. Speeds on the gravel access road should be kept to a minimum 20km/h to reduce dust liberation	Low
3. Increase in ambient noise level affecting surrounding properties.	Operations	-ve	Local	Short	Low	High	High	1. Silencers on diesel-powered equipment must be properly designed and maintained. 2. Construction activities should be limited to normal office hours. 3. Adjacent landowners should be notified of extremely noisy activities at least 24 hours prior to such activities commencing. 4. Mining should take place between 07:00- 17:00. Mondays to Fridays.	Low

4. Increase in waste	Operations	-ve	Local	Long	Low	High	High	1. Waste generated on site must be collected, taken with and disposed of at operator's waste bins in Swakopmund. 3. No waste may be stored, buried or burned onsite.	Low
5. Impact on water quality and quantity	Operations	-ve	Local	Short	Low	Medium	Low	1. All watercourses including drainage lines must be strictly avoided. 3. Prohibit the washing of vehicles or machinery on site 4. Chemical toilets must be provided by the contractor. 5. Measures must be put in place to ensure water saving techniques are implemented.	Low

2.3. Operational Phase EMP

The mitigations measures proposed herein must be implemented and managed continuously during the operations phase and, includes the necessary mitigation and recommended actions as well as the timeframe and person responsible for the actions.

Aspects and hazards	Impacts	Mitigation/Management Action measures (objectives and targets)	Timeframe	Responsible Party
Aesthetics	<ul style="list-style-type: none"> Land pollution 	<ul style="list-style-type: none"> The site shall be kept visually and aesthetically pleasing. The HSEO shall regularly inspect the site to ensure that it is neat and clean. 	Continuous	Tenants/Operators HSE Officer
Archaeology and heritage	<ul style="list-style-type: none"> Destruction of Archaeological sites. 	<ul style="list-style-type: none"> If any artifact on site is uncovered, work in the immediate vicinity shall be stopped immediately. Should any archaeological sites be uncovered during operations, their existence shall be reported to the National Heritage Council immediately. The position of any known sites shall be demarcated and such areas shall be marked as no go areas. Artifacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. The permit shall be obtained from the National Heritage Council by a reputed Archaeologist. 	Continuous	Tenants/Operators HSE Officer
Site Establishment and sanitation	<ul style="list-style-type: none"> Soil pollution Water pollution 	<ul style="list-style-type: none"> Site establishment shall take place in an orderly manner and all required amenities shall be installed before the main workforce move onto site. 	Continuous	Tenants/Operators HSE Officer

		<ul style="list-style-type: none">• All the necessary ablution facilities with chemical toilets at must be installed onsite.• The Tenants/Operators shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities.• Ablution facilities shall be within 100m from workplaces but not closer than 50m from any natural water bodies.• Toilets shall be serviced regularly• The Tenants/Operators shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at Municipal skips in town.• The disposal of waste shall be in accordance with all relevant legislation.• Under no circumstances may solid waste be burnt on site.• Ensure that the HME equipment is properly maintained. Equipment must be regularly serviced and inspected to make sure there are no leaks of oil, diesel, fuel, detergents or hydraulic fluids.• Servicing and maintenance of vehicles as far as possible must occur outside of the boundaries of accessory works area. If maintenance does occur on site due to breakdown, all steps must be undertaken to avoid hydrocarbon spills/leakages.• Minimise petrol, diesel, and oil leaks by allocating a loading zone, which is protected against such leaks. Drip trays must be secured and emptied regularly.		
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		<ul style="list-style-type: none"> • Should diesel be stored on site, it will need to be stored on a hard surface. • Store fuel, chemicals and other hazardous substances in suitable secure weather-proof containers with impermeable and bunded floors to limit pilferage, spillage into the environment, flooding or storm damage. • Spilled hydrocarbon must be treated as a hazardous waste and must be disposed of as it occurs in appropriate hazardous waste containers and removed off site as soon as possible. • No washing of equipment or machinery may occur on the permit site or in any watercourse 		
Limit the disturbance and destruction of vegetation, fauna and habitat	<ul style="list-style-type: none"> • Intentional or unintentional killing of fauna on site. • Unnecessary removal of flora. 	<ul style="list-style-type: none"> • The HSEO and Manager must establish and clearly demarcate the mining footprint and the access road footprint and prohibit any vehicle or activity outside of the demarcated footprint areas. • The “no go” areas where possible must be clearly demarcated. There shall be no unauthorised entry, litter, stockpiling, dumping or storage of equipment or materials within the demarcated “no go” areas. If this does occur the Manager shall be liable for rehabilitation. • The surrounding areas are inhabited by sparse woody shrubs of the Dollar bush and the hardy shrub Ink/Pencil bush and there are no trees. • The only species of fauna found in the areas to be developed are geckos, lizards, beetles and birds • Special care should be taken not to damage or remove any such species unless absolutely necessary. • Permits for removal must be obtained should such species be affected. 	Continuous	Tenants/Operators HSE Officer

		<ul style="list-style-type: none"> • All shrubs and bush not interfering with the operation of the developments shall be left undisturbed, clearly marked and indicated on the site plan. • All effort must be made to minimise the disturbance of wild animals on and within the close vicinity of the borrow pits accessory works area. • The tenants/operators must ensure that no faunal species are disturbed, trapped or killed during the operations phase. • Any nesting sites of avifauna species must not be disturbed or impacted on and a buffer implemented • The tenants/operators and their employees shall not bring any domesticated animals onto the site. • The tenants/operators shall ensure that the work site be kept clean, tidy and free of rubbish that would attract animals. • Any fauna found on the stockpile site needs to be relocated without causing any damage or harm. • The total depth of pits must be minimized so that the pits do not create a safety hazard or barrier / obstruction to the movement of wildlife. 		
Occupational Health and Safety	<ul style="list-style-type: none"> • Health and Safety of employees on site 	<ul style="list-style-type: none"> • The operations phase is expected to present the most challenges from a health and safety point of view. • A clear operating plan should be in place to guide the health and safety requirements during the construction phase. 	Continuous	Tenants/operators HSE Officer

		<ul style="list-style-type: none"> • This plan should guide construction staff in terms of their responsibilities in terms of health and safety during the construction phase. • It should be ensured that construction activities are conducted in such a manner that it does not increase the risk of injury or fatalities of construction staff and that the appropriate measures are in place to prevent any incidents and accidents 		
Clearing and Grubbing & Erosion Control	<ul style="list-style-type: none"> • Topsoil • Flora 	<ul style="list-style-type: none"> • The extent of all sand mining site footprints will be minimised and limited to existing and / or already disturbed areas wherever possible. • The areas needing to be mined and the extent of mining required will be determined and demarcated in consultation with the HSEO before sand mining begins. • The tenants/operators shall at all times carefully consider what machinery is appropriate to the task while minimising the extent of environmental damage. • Prior to sand mining, all topsoil and as much of the existing vegetation must be stockpiled away from the pits and above the margin of the pits. Because of the extended time of storing stock piled material, seeding the stockpiles with suitable local vegetation is recommended. • All topsoil removed during the mining phase must be conserved and used in the rehabilitation and close out phase. No topsoil may be sold. This soil must be kept safe from erosion • Topsoil shall be cleared of woody vegetation, and specifically exotic vegetation, before ripping and removing. 	Continuous	Tenants/Operators HSE Officer

		<ul style="list-style-type: none">• The topsoil is regarded as the top 30 cm of the soil profile• Topsoil is to be handled twice only – once during clearing and stockpiling & once during rehabilitation• Soil stockpiles shall not be higher than 2.5m or stored for a period longer than one year.• Stock piles of top soil should be positioned so that they act as a barrier between wind and other elements and the borrow pits.• The slopes of soil stockpiles shall not be steeper than 1 vertical to 2.5 horizontal.• Excavated filled slopes and stockpiles must be kept at a stable angle and be capable of accommodating normal expected water flows.• Stockpile area will be covered with gravel during mining operations to prevent erosion.• Gravel will be removed on completion of mining.• The topsoil will be used as a berm for the stockpile pad and ramp, to protect the area from prevailing winds and rain water erosion.• During the sand mining activities, the Manager shall protect areas susceptible to erosion by installing necessary temporary and permanent works.• On any areas where the risk of erosion (due to sand mining operations) is evident, special measures may be necessary to stabilise the areas and prevent erosion. These may include, but not be restricted to:<ul style="list-style-type: none">• Using mechanical cover or packing structures such as geofabric to stabilise steep slopes or		
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		<p>hessian, gabions and mattress and retaining walls</p> <ul style="list-style-type: none"> • Constructing anti-erosion berms • No vehicles shall be allowed access onto the stockpiles after they have been placed. • Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation. • The tenants/operators shall apply soil conservation measures to the stockpiles to prevent erosion. • Where erosion does occur on any completed work/working areas, these areas shall be reinstated to previous condition. • Rehabilitation must be treated as an on-going process to ensure erosion is controlled and its impacts limited 		
Prevention of disease	<ul style="list-style-type: none"> • Health of workers 	<ul style="list-style-type: none"> • The tenants/operators shall take all the necessary precautions against the spreading of disease such as flu, TB, etc. • All employees that come onsite must obey Covid-19 protocols and measures must be put in place. • The workforce shall also be sensitised to the effects of sexually transmitted diseases, especially HIV/AIDS. • General health issues shall be brought under the attention of the site staff. 	Continuous	Tenants/Operators HSE Officer
Site Buildings / Construction Camp	<ul style="list-style-type: none"> • Visual pollution • Aesthetics • Injury to workers and damage to property 	<ul style="list-style-type: none"> • The planning and design for the Construction Camp must ensure that there is minimal impact on the environment. • The Construction Camp will be placed within an existing disturbed area as far as possible. 	Continuous	Tenants/Operators HSE Officer

		<ul style="list-style-type: none"> • The Construction Camp site will be identified by the Contractor in consultation with the HSEO, and negotiated by the Site Manager with the Town Planner of the Municipality of Swakopmund • All site buildings to be of a container or prefabricated type. No permanent structures will be permitted. • With the decommissioning of the structures all compacted platforms and slab foundations must be ripped and removed. • All buildings will be soundly built and will not pose a danger to personnel. • No fires are allowed outside the Construction Camp. • Adequate and well maintained fire fighting equipment according to the fire hazard strategies must be maintained on site during the construction period (at least two all purpose 12.5 kg extinguishers). • The tenants/operators shall be liable for any costs related to extinguishing fires started by the tenants/operators representatives / employees. • Additional penalties for infringements will also be imposed by the HSEO or Site Manager. 		
Storm water management	<ul style="list-style-type: none"> • Hydrology and Storm water • Downstream siltation • Erosion 	<ul style="list-style-type: none"> • It is expected that storm water will be adequately managed during the operations phase. • Storm water will be allowed to be absorbed into the soil through the assistance of the gravel distributed especially on the soil surface of the area where infrastructure is located. 	Continuous	Tenants/Operators HSE Officer

Natural Drainages	<ul style="list-style-type: none"> • Blocking and diversion of natural Watercourses • Downstream siltation • Erosion 	<ul style="list-style-type: none"> • Under no circumstances shall the tenants/operators interfere with any watercourses in the vicinity of the site. • Should deviation of such watercourses be required as part of the contract design specification, the specifications shall be adhered to strictly. • The HSEO shall ensure that all watercourses are adequately protected to prevent downstream siltation due to erosion on site • The normal flow of runoff water must not be impeded, as this will enhance erosion 	Continuous	Tenants/Operators HSE Officer
Groundwater	<ul style="list-style-type: none"> • Groundwater pollution 	<ul style="list-style-type: none"> • No impacts are expected on the groundwater of the area during the operational phase as there is no groundwater sources • Containment of waste water will be put in place and to prevent runoff 	Continuous	Tenants/Operators HSE Officer
Access roads to the site	<ul style="list-style-type: none"> • Impacts on traffic movement • Nuisance traffic • Congestion 	<ul style="list-style-type: none"> • The gravel access road to the accessory works area is established and shall be used as far as possible. • Construct approved vehicle turning areas, avoiding selected ecological sensitive areas or species, and have turning area routes approved by the HSEO. • All agreements reached should be documented and no verbal agreements should be made. • Continual use of dirt access roads by heavy machinery and increased transport loads means they will have to be carefully monitored and regularly graded as soon as potholes or rutting occurs. • Vehicle access must be strictly contained onsite. 	Continuous	Tenants/Operators HSE Officer

		<ul style="list-style-type: none"> • Vehicles may only use designated roads and access points as determined by the HSEO and Manager. • The tenants/operators shall properly mark all access roads. • Roads not to be used shall be marked with a "NO ENTRY " sign. • When transporting sand on public roads, spills, leaks, mud and sand must be prevented. Should any mud and sand be deposited onto public roads by the mining activities, it will need to be cleared immediately. • Access road and loading area will be properly maintained, and this includes appropriate storm water management and dust control. • Temporary access roads must be rehabilitated after usage 		
Waste Management	<ul style="list-style-type: none"> • Land pollution • Soil pollution • Visual pollution 	<ul style="list-style-type: none"> • Waste generated on site must be stored and taken back to Swakopmund at the end of each shift and disposed off in the municipal skips. • No waste may be buried or burned on site. • Provide portable toilets where work is being done. • Workers onsite must be informed of correct waste management practises, • The use of toilets must be adhered to. No open urination and defeaction must be allowed. 	Continuous	Tenants/Operators HSE Officer
Claims for damages	<ul style="list-style-type: none"> • Theft • Reputational damage • Negative publicity 	<ul style="list-style-type: none"> • The HSEO shall keep a photographic record of any damage to areas outside the demarcated site area. 	Continuous	Tenants/Operators HSE Officer

		<ul style="list-style-type: none"> • The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. • All claims for compensation emanating from damage should be directed to the HSEO for appraisal. • The tenants/operators shall be held liable for all unnecessary damage to the environment. • A register shall be kept of all complaints from the community. • All claims shall be handled immediately to ensure timeous rectification/payment by the responsible party. 		
Public Safety	<ul style="list-style-type: none"> • Theft of equipment on site • Injury and fatalities 	<ul style="list-style-type: none"> • Access to the construction site should be strictly controlled by a security company. • Trespassing on private / commercial properties adjoining the site is forbidden 	Continuous	Tenants/Operators HSE Officer
Dust pollution	<ul style="list-style-type: none"> • Land pollution 	<ul style="list-style-type: none"> • The tenants/operators shall be responsible for dust control on site to ensure no nuisance is caused to the neighbouring Communities at NONIDAS. • Speed limits can also be installed, especially on private dirt roads leading to the site to minimise dust liberation and the need of watering of access roads. • Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the tenants/contractors. 	Continuous	Tenants/Operators HSE Officer
Air Pollution	<ul style="list-style-type: none"> • Coughs, wheezing and shortness of breath. • Cardiovascular and respiratory diseases. 	<ul style="list-style-type: none"> • Reduce the unnecessary idling of diesel engine exhausts of plant and other vehicles 	Continuous	Tenants/Operators HSE Officer

	<ul style="list-style-type: none"> • Lung cancer. • Strokes. • Exacerbation of asthma. 	<ul style="list-style-type: none"> • Wear appropriate PPE, such as the correct type of respiratory protective equipment (RPE) depending on the task. • Reduce exposure to dusts and fibres, such as silica, as well as the fumes and gases emitted by vehicles and machinery. • Never burn waste materials. • Use low sulphur diesel to power equipment and vehicles. • Improve existing equipment by using particulate filters and catalyst converters. • Use water sprays or sprinklers to control some types of dust and stop it spreading. 		
Littering	<ul style="list-style-type: none"> • Land pollution • Visual pollution 	<ul style="list-style-type: none"> • Littering by the employees of tenants/operators shall not be allowed under any circumstances. • The HSEO shall monitor the neatness of the work sites. 	Continuous	Tenants/Operators HSE Officer
Hazardous waste and materials	<ul style="list-style-type: none"> • Soil pollution • Health 	<ul style="list-style-type: none"> • Compliance to local, national and international legislation and management practices with regard to the storage, transport, use and disposal of fuel, chemicals, harmful and hazardous substances and materials will be enforced. • Fuel, chemical, harmful and hazardous waste throughout the site must be stored in appropriate, well maintained containers. • Any accidental chemical / fuel spills to be cleaned up immediately. • Storage of all hazardous material is to be safe, tamper proof and under strict control. • Emergency procedures for dealing with spills or releases of solvents and fuel must be put in place. 	Continuous	Tenants/Operators HSE Officer

		<ul style="list-style-type: none"> • The training and education of all personnel on site who will be handling the material about its proper use, handling and disposal must be put in place. 		
Noise Pollution	<ul style="list-style-type: none"> • Noise pollution • Local residents experience varying levels of stress, • Sleep disturbance or high blood pressure. • Workers gradual hearing loss 	<ul style="list-style-type: none"> • Use quiet power tools and equipment to manage noise pollution. • Where possible, use modern HME equipment that has been designed specifically to produce less noise. • Schedule work during sociable hours rather than when residents are likely to be sleeping. For example, between 8h00 Am to 17h00 on weekdays and half days on Saturdays. • Also notify local residents of the working hours and keep them updated on the project. • Machinery and vehicle silencer units are to be maintained in good working order. • Offending machinery and / or vehicles will be banned from use on site until they have been repaired. • Switch off plant when it's not in use. • Near source employees must be provided with appropriate personal protective clothing and equipment such as earplugs and earmuffs where required. • The movement and operation of heavy mobile equipment and machines will be restricted to daytime operational hours only. 	Continuous	Tenants/Operators HSE Officer
Interaction with Affected Parties	<ul style="list-style-type: none"> • Relations with next door neighbours • Health and safety of next door neighbours 	<ul style="list-style-type: none"> • The success of any project depends mainly on the good relations with the Municipality of Swakopmund and its Communities. • It is therefore required that the HSEO and the tenants/operators establish good relations with 	Continuous	Tenants/Operators HSE Officer

		<p>all the affected parties in the immediate vicinity of all operational activities.</p> <ul style="list-style-type: none"> • All negotiations for any reason shall be between the HSEO, the affected parties and the tenants/operators. • NO verbal agreements shall be made. All agreements shall be recorded in writing and all parties shall co-sign the documentation. • The affected parties shall always be kept informed about any changes to the operations programme should they be involved. • If the HSEO is not on site the tenants/operators should keep the affected parties informed. • The contact numbers of the tenants/operators and the HSEO shall be made available to the affected parties. • This will ensure open channels of communication and prompt response to queries and claims. • All contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be respected at all times 		
Infrastructure	<ul style="list-style-type: none"> • Nuisance to communities • Inconveniencing next door neighbours 	<ul style="list-style-type: none"> • No interruptions other than those negotiated shall be allowed to any essential services. • Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the tenants/operators. • A record of any damage and remedial actions shall be kept at the Municipality. • All existing private access roads used for operational purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties. Speed limits 	Continuous	Tenants/Operators HSE Officer

		<p>shall be enforced in such areas and all drivers shall be sensitized to this effect.</p> <ul style="list-style-type: none"> Any possible disruptions to essential services must be kept to a minimum and should be well advertised and communicated to the Municipality of Swakopmund and surrounding Communities. 		
Traffic impacts	<ul style="list-style-type: none"> Injured or fatalities as a result of being struck by moving plant vehicles or their loads striking people, particularly when reversing vehicles striking services and obstructions manufacturers instructions for safe use being disregarded inadequate training of drivers and signallers; and unsafe loading and transportation of materials on vehicles. Obstruction of adjacent roads Increased heavy mobile equipment traffic in neighbourhood lost productivity, added project costs, and 	<ul style="list-style-type: none"> Drivers of the operational vehicles should be in possession of valid and appropriate driving licenses The routes need to be suitable for the persons or vehicles using them, in suitable positions and sufficient in number and size Provision and maintenance of safe workplaces, safe vehicles, safe drivers and safe work practices. Drivers must not be allowed to operate vehicles and machinery while impaired due to medication, alcohol, drugs and medical conditions. Selecting and maintaining vehicles; and implementing safe driving and working practices. Control entry to the work area; and Employers should take steps to make sure that all workers are fit and competent to operate the vehicles, machines and attachments they use on site. Install turning circles so that vehicles can turn without reversing. Safe loading, hauling and offloading zones must be identified onsite. Make sure that all drivers and pedestrians know and understand the routes and traffic rules on site. Use standard road signs where appropriate. 	Continuous	Tenants/Operators HSE Officer

	<ul style="list-style-type: none">• bad public relations with the surrounding communities.	<ul style="list-style-type: none">• Provide induction training for drivers, workers and visitors and send instructions out to visitors before their visit.• Install aids for drivers, plant and vehicle marshalls, lighting and pedestrians on site should wear high-visibility clothing• Set up appropriate vehicle movement signage on local roads/intersections surrounding the project site to direct traffic flow in a safe manner.• Whenever feasible, HME's should avoid leaving the site at peak traffic periods (07:00 to 08:30 AM, 12:00PM to 14:00PM and (17:30PM to 18:30 PM).• All necessary reflective and lighting signs should be placed on project and HME's to maximize visibility and reduce potential accidents that may have occurred otherwise.		
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Aspects and hazards	Impacts	Mitigation/Management Action (objectives and targets)	Timeframe	Responsible Party
Environmental Health and Safety	<ul style="list-style-type: none"> Environmental pollution 	<ul style="list-style-type: none"> A health & safety and environmental management training session(s) prior to commencing work on site shall be conducted for all tenants/operator's staff members. A follow up session(s) shall be conducted as needed to ensure all staff members have received training. 	Continuous	Tenants/Operators HSE Officer
Lack of enforcement	<ul style="list-style-type: none"> Manpower support 	<ul style="list-style-type: none"> Employ qualified and competent teams and manpower to implement all the practical environmental conservation measures as proposed in this EMP. Manage the programme i.e., coordinating with an environmental consultant. Implement necessary prevention or best practice method in the event of poor environmental quality. 	Continuous	Tenants/Operators HSE Officer
Visual impact	<ul style="list-style-type: none"> Adjustment of terrestrial habitat 	<ul style="list-style-type: none"> Morning Take 5 talks to be made routine and all employees must be given and undergo induction. Always determine the route of activities beforehand and restrict all activities to demarcated areas. Reinstate and rehabilitate where necessary during operational activities. 	Continuous	Tenants/Operators HSE Officer
Sewerage management	<ul style="list-style-type: none"> Attraction of pests Offensive odours Visual pollution 	<ul style="list-style-type: none"> Only portable flush toilets equipped with French drains/septic tanks will be erected at operational sites. 	Continuous	Tenants/Operators HSE Officer

	<ul style="list-style-type: none"> • Nuisance to neighbours • Community complaints 	<ul style="list-style-type: none"> • No foreign object may be flushed down the toilets to prevent damage and maintain integrity of the sewer system and maintain a healthy environment. 		
HME equipment	<ul style="list-style-type: none"> • Visual impact • Loss of aesthetic value 	<ul style="list-style-type: none"> • Only key and required mobile equipment and machinery needed must be kept on site in and on the operational site in an orderly fashion. 	Continuous	Tenants/Operators HSE Officer
Dust liberation	<ul style="list-style-type: none"> • Dust generation from construction and excavation activities exposure to land and next-door neighbours 	<ul style="list-style-type: none"> • All personnel working in dusty areas and or around heavy mobile equipment will be provided with dust masks. • Dust spraying methods to be implemented for high volume or frequently used roads and surfaces to be excavated in especially those near boundaries to suppress dust liberation. 	Continuous	Tenants/Operators HSE Officer
Dust liberation and storm runoff on excavated land and open trenches	<ul style="list-style-type: none"> • Soil erosion • Dust liberation • Downstream siltation 	<ul style="list-style-type: none"> • Excavation, handling and transporting of layer materials must be minimised under high wind conditions. • Dust protection masks must be provided to all staff members working in dust polluted environment. • All vehicles' speeds should be controlled to reduced dust production; hence appropriate road signs should be placed to control the traffic speed. • Excavated and disturbed land should be contoured and landscaped after excavation activities. • Artificial drainage systems should be erected where natural drainage systems have been cut off, interrupted to rerouted. 	Continuous	Tenants/Operators HSE Officer

Occupational Health and HIV and AIDS	<ul style="list-style-type: none"> • Prevalence of HIV might increase due to the developments. • The immigration of mainly single persons to the construction site presents a perfect opportunity for sex workers and for local community members to engage in unsafe, sex-for-cash sexual relations. 	<ul style="list-style-type: none"> • HIV/AIDS awareness and prevention, and general hygiene training programmes should be developed and implemented. • The main target group is the staff members, but the public may also be encouraged to attend. • Follow up awareness raising, and education should be conducted at least every six months. 	Continuous	Tenants/Operators HSE Officer
General Nuisance of the Construction Activities	<ul style="list-style-type: none"> • Aesthetics and inconvenience caused to persons trying to access/exit the construction site, or other general nuisances arising from the construction activities. 	<ul style="list-style-type: none"> • Tenants/operators should always maintain housekeeping and tidiness on site. • Contractors must ensure that all excavations are rehabilitated at the end of operations to reduce unwanted aesthetic impacts. • Tenants/operators should always keep “an open-door policy” towards the local community. This will encourage cooperation and strengthen relationships. 	Continuous	Tenants/Operators HSE Officer

Aspects and hazards	Impacts	Mitigation/Management Action (objectives and targets)		Responsible Party
Safety and Security	<ul style="list-style-type: none"> • Earthmoving equipment used on site may increase the possibility of injuries to both staff members and the public. • The presence of equipment and materials not securely stored may encourage theft of equipment and material. 	<ul style="list-style-type: none"> • The Contractor must ensure that all staff members are briefed daily about the potential risks of injuries on site. • All staff members shall receive health and safety training prior to working on any construction work. • Flammable materials (e.g., fuel for construction vehicles) should be stored as far as possible from sensitive receptors. • Storage of hazardous materials and substances shall be strictly in accordance with the appropriate risk and fire prevention standards. • Material Safety Data Sheets (MSDS's) for all chemicals and any hazardous substance used on site should be always readily available on site. • The tenants/operators are urged to ensure that adequate emergency facilities, including first aid kits, are available on site. • Adequate traffic and safety signs must be placed at the operational site to warn and inform all stakeholders about the operations and traffic conditions. • The tenants/operators must adhere to all relevant laws, regulations, guidelines, and policies with regards to labour aspects, health and safety standards. • Remote CCTV cameras should be installed at the borrow pit access road T-junction of the gravel 	Continuous	Principal contractor Contractors Municipality of Swakopmund

		<p>road into the B1 Highway to record and monitor how many loads of sand leaves the site per day and to keep an accounting balance in the absence of a weighbridge.</p> <ul style="list-style-type: none"> • Correct signage must be erected at the main access road and entrance of haul road to mining areas - includes mining authorization, access authorization, warning of mining activity, safety warning signs (protective equipment, fire & medical equipment) and contact numbers. • Concrete traffic barrier bars should be erected alongside the B1 highway on the borrow pits accessory works area to prevent illegal entry and exit from the borrow pits. Exit and entry should be confined to the gravel access road covered by the remote CCTV system proposed to prevent and deter illegal harvesting and theft of sand. • Any person or institution or company not complying with these specifications are liable to fines and penalties as indicated in relevant contracts conditions, relevant laws, and regulations. 		
Protection of Biodiversity and Cultural Heritage	<ul style="list-style-type: none"> • Motorised disturbances that could threaten biodiversity, ecosystems functions and services and cultural heritage. 	<ul style="list-style-type: none"> • Site Management Plans depicting preferred site for permanent way for materials collection and storage, etc. need to be developed by the tenants/operators with the assistance of the Manager. • These plans need to be documented, reviewed, updated, and implemented prior to the commencement of work at any location. 	Continuous	Principal contractor Contractors

		<ul style="list-style-type: none"> • There are no structures of cultural heritage observed during assessments at the project site. • Construction works can only resume with written approval from the relevant authorities the Heritage Council. • To minimise land degradation, no off-road driving is allowed except on demarcated access and hauling roads. • The confines of the site, especially haul and access roads shall be clearly marked and signposted by the Contractors at the direction of the HSEO. • All necessary measures should be implemented to minimise fauna displacement and flora destruction. • No fires are always allowed on site. • Soils from areas infested with invasive flora should not be hauled from those specific areas. The risk of such species dispersing and displacing natural vegetation is very high, thus the HSEO should be always consulted to ensure that invasive plants are not accidentally dispersed. • Any person or institution or company not complying with these specifications are liable to fines and penalties as indicated in relevant contracts conditions, relevant laws, and regulations. 		
Job creation, Skills development and business	<ul style="list-style-type: none"> • Positive socio-economic impacts and spinoffs 	<ul style="list-style-type: none"> • Semi-skilled and unskilled jobs should target local community members. 	Continuous	Principal contractor Contractors

opportunities		<ul style="list-style-type: none"> • Prioritise local employment and spend in local business where reasonably possible. • Enhance the use of local labour and local skills as far as reasonably possible. • Ensure that goods and services are sourced from the local and regional economy as far as reasonably possible. 		
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2.4. Closure and rehabilitation Phase EMP

The operational phase is followed by the closure and rehabilitation phase of a project. This is also a site-specific plan drawn up to ensure that appropriate environmental management practices are put in place during the finalisation of the Municipal Council borrow pits and to put in place remediation measures of works.

Closure and rehabilitation phase.

- Provide site specific and fit for purpose mitigation measures to finalise operational phase, site clean-up, remediation of contaminated sites, waste and restoration activities.
- Reduce and eradicate any long-term liability issues related to the sand mining operations.
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The mitigation measures and activities should commence during the operational phase and be finalised at closure and completion of operational activities.

Aspects and hazards	Impacts	Mitigation/Management Action (objectives and targets)	Timeframe	Responsible Party
Soil erosion	<ul style="list-style-type: none"> • Erosion of site 	<ul style="list-style-type: none"> • All topsoil removed during the sand mining operations must be conserved and used in the rehabilitation and close out phase. • No topsoil may be sold. This soil must be kept safe from erosion. 	Continuous	Principal contractor Contractors

		<ul style="list-style-type: none"> • Stockpile area will be covered with gravel during construction operations to prevent erosion. • Gravel will be removed on completion of construction. The topsoil will be used as a defensive wall for the stockpile pad and ramp, to protect the area from prevailing winds and rainwater erosion. • Topsoil and vegetation from the ramp must be used to create a defensive wall along the perimeter of the ramp and stockpile area. The pile should be used as windbreaks to shield the ramp and stockpile area from the prevailing winds. • Stockpiles should be stabilised by securing with nets or other suitable sheeting material. • The stockpile pad will be re-shaped to remove any steep embankments during the final rehabilitation and closure phase. • After rehabilitation is complete, no topsoil shall be left over 		
Rehabilitation of access roads and surrounding site	<ul style="list-style-type: none"> • Visual pollution 	<ul style="list-style-type: none"> • Any access road or portions thereof, constructed by the tenants/operators shall be removed and or rehabilitated to the satisfaction of the HSEO. • Any gate or fence erected by the tenants/operators which is not required by the landowner, shall be removed and the land restored to the pre-construction state 	Continuous	Principal contractor Contractors
Removal of construction equipment, vehicles, machinery and infrastructure	<ul style="list-style-type: none"> • Visual pollution • Nuisance • Infrastructure 	<ul style="list-style-type: none"> • All construction equipment/vehicles and machinery should be removed immediately from the site at the end of defects liability period. • The removed materials should be transported and kept in safe place for use by the owners and tenants/operators in other works. • The area should be cleaned and all domestic wastes, debris/waste metals, grease and oils must be cleaned up 	Continuous	Principal contractor Contractors

		<p>and disposed of in a manner approved by competent authorities.</p> <ul style="list-style-type: none"> • There must be a removal of all portable toilets, bins, machinery, and other equipment on site as according to relevant legislation 		
Monitoring	<ul style="list-style-type: none"> • Compliance management 	<ul style="list-style-type: none"> • Monthly HSEO inspections will take place during construction and during rehabilitation to ensure that objectives are being met. 	Continuous	Principal contractor Contractors

2.5. Implementation of the EMP

All operations activities will be carried out in compliance with the relevant legal requirements. No significant impacts are anticipated for the activities that have been identified and management and mitigation measures are in place for potential risks and mitigation.

This EMP.

- Has been prepared pursuant to identified aspects and hazards involved in sand mining operations at the Swakopmund Municipality sand mining borrow pits and their tenants/operators will be required to comply and will be a contractual requirement.

2.6. Location of the Environmental Management Plan

The HSEO should ensure that a copy of this EMP is always available on site. This includes any EMP, or other document used to guide the overall management of environmental, health and safety aspects of the entire sand mining operations.

The following are also examples of documents to be kept on site or at the tenants/operations offices:

- Site Diary
- I & AP Complaints register.
- Environmental incidents register.
- Non-conformance Reports.
- Method Statements.
- Material Safety Data Sheets (MSDS).
- Written Corrective Action Instructions.
- Safe disposal certificate for all types of waste disposed of.
- Health, Safety and Environmental Training Records.
- Notification of Emergencies and Incidents.
- Copies of monthly reports
- Minutes of site meeting including discussions on environmental issues

2.7. Compliance Assessment

The HSEO should ensure that the requirements contained in this EMP are complied with. Clear records of compliance issues and/or the compliance status with this EMP should be kept for assessment either as part of any environmental audits or performance assessments conducted for the land servicing and construction developments.

Should any issues of non-compliance be identified, these should be rectified immediately, or a clear action plan compiled to ensure that the issues are addressed as quickly as possible.

2.8. Conclusion

This EMP has a long-term objective to ensure that:

- Environmental management considerations are implemented from the design phase of the project.
- Contractors can and shall include any costs of compliance with this EMP into the tender prices.
- Precautions against environmental damage and claims arising from such damage are taken timeously.
- The completion date of the various contracts is not delayed due to environmental problems with the landowner, communities or Regulatory Authorities arising during the project execution.

This EMP is legally binding because it will form part of the contract between the Municipality of Swakopmund and the tenants/operators and their staff members.

It is crucial for all recommendations made in this EMP to be appropriately implemented on site during the sand mining operations. Compliance monitoring by an appropriately qualified HSEO will serve as a means of verifying the degree to which the EMP is being implemented on site.