

ENVIRONMENTAL MANAGEMENT PLAN FOR QUARRY ACTIVITIES AT EPL 3524 IN DOROB NATIONAL PARK

Table (?) is the Environmental Management Plan (EMP). For effective implementation, the EMP should be incorporated into the Management Control System for the quarry project. Biannual reporting must be done against the commitments outlined in the EMP.

The overall responsibility lies with the Quarry activities Manager. If he/she is not permanently on site, he/she must appoint a person responsible of the implementation of the EMP during his or her absence.

Issue	Aspect	Potential	Mitigation measures/recommendations/explanation
Governance	<p>To establish and ensure a strong commitment to environmental management throughout exploration</p> <p>To ensure that the roles and responsibilities for implementation of the EMP are defined</p>	<p>Poor commitment by management to adequate resources and support will result in poor implementation success.</p>	<p>Provision is made in the budget for</p> <ul style="list-style-type: none"> • Environmental awareness and training • Implementation of commitments on this EMP, • Rehabilitation cost, • Communication with relevant stakeholders, • Regular auditing and reporting. <p>Formal appointment of a senior person to ensure overall responsibility for environmental management.</p> <p>Appointment of qualified environmental officer to implement the EMP.</p> <p>A culture of respect for the environment and commitment to manage environmental impact is promoted.</p>

			<p>Senior quarry staff understands their role and are taking responsibility for implementing the EMP.</p> <p>Regular liaison with MET (specifically DPW) whenever new activities (e.g. additional access roads, new disposal site etc) are planned.</p>
Environmental awareness/briefing /training	<p>To implement environmental awareness briefing/training for all individuals who work on the site and the visitors.</p>	<p>If personnel are not aware of their roles and responsibilities and do not understand the rationale for the environmental management, effective implementation is unlikely to take place</p>	<p>All personnel who work on or visit the site are inducted so that they are aware of the contents of the EMP and the rules of the Dorop National Park.</p> <p>Regular environmental awareness campaigns/ briefing are held to ensure that personnel improve their understanding on environmental issues.</p> <p>Training on specific issues (e.g. rehabilitation, waste management, etc) will be undertaken regularly.</p>
Relationship with government authorities	<p>To maintain sound relationship with landowner (MET – Parks and Wildlife).</p> <p>To ensure compliance to the terms of the</p>	<p>Failure to establish and maintain good relationships with regulators may make it difficult for JJD contractor services to maintain its license to operate.</p>	<p>Ensure regular liaison with Department of Parks and Wildlife (e.g. Chief Warden) whenever new activities (e.g. additional access roads, camps, new disposal site etc) are planned.</p> <p>Establish the protocol regarding activities that are involved moving across the Dorop National Park boundary.</p>

	<p>environmental contract (MET – DEA)</p> <p>To ensure compliance with all issues regarding water consumption and disposal (MWAF – DWA)</p> <p>To ensure compliance with all matters pertaining to quarry activities safety.</p> <p>To ensure compliance to all Health and Safety requirements (Ministry of Labour)</p>		<p>Report to the Department of Parks and Wildlife (Chief Warden) in the event of road kills, removal of plants or when other misdemeanor occurs.</p> <p>Report regularly to the Department of Water Affairs in terms of conditions laid out in the water extraction permit.</p> <p>Obtain permit when collecting or removal of plants or trees is required.</p> <p>Report bi-annually to MET (DEA)</p>
<p>Safety and health of personnel on site</p>	<p>To ensure that a workplace contributing to safety and health personnel is maintained.</p>	<p>The protection of workers health and safety is paramount. Failure to establish good safety and health practices could result legal disputes that</p>	<p>Develop a Safety and Health Management Plan (not included as part of this EMP).</p> <p>Appoint and train a safety officer.</p> <p>Implement the Safety and Health Management Plan.</p>

		negatively affect the corporate.	
Driving in the Park	Corporate image, tourist, dust, health and safety	Negative publicity Accidents with or without injuries Injuries to animals or death of animals Dust etc.	Governors will be installed in all operating on site to ensure compliance with site and Dorob National Park speed limits.
Dust created during drilling (quarry activities)	To manage dust generated at drill	Deterioration in air quality from PM10s, fallout dust and long lived radioactive dust Deterioration in safety due to bad visibility Deterioration in health due to the inhalation of dust.	Establish a dust monitoring programme for relevant dust producing activities on the site (The erf). Fall out dust, radioactive dust and PMs should be monitored. Ensure that all personnel working on drill site wear appropriate PPE when dust is being generated. Whenever possible, minimize dust generation by adopting different technology or applying dust suppressant.
Management of	To avoid and minimize	Damage to structure and	Prevent pollution of soil.

soil pollution	the pollution of soil	composition of soil. This will make it difficult for plants and animals to re-establish once the activities start.	Ensure that all drill rigs and fuel trucks have hydrocarbon spill prevention equipment on site and are using it e.g. drip tray, oil absorbent materials etc.
Management of soil compact and erosion	To minimize compaction and erosion	The desert soils typically form crust that is very stable and once they are disturbed, they are prone to erosion and easily lost.	<p>Minimize compaction of soil by keeping the disturbance footprint (vehicle tracks, camp site, and drill site) as small as possible.</p> <p>Promote use of boardwalks at the site to limit compaction from footpaths.</p> <p>Avoid sharp bends in roads as these typically become eroded and the soil blows away leaving holes.</p> <p>Use three point turn to turn the a vehicle around the road footprint and to avoid disturbance of areas adjacent to the road.</p> <p>Rehabilitation of disturbance of disturbed sites must be done carefully to minimize the potential for wind and water erosion. The use of fine mist sprays or dust suppression products is one technique that might be the tried to help re-establish the soil crust.</p>

Construction of groundwater	To avoid over extraction of groundwater	Decrease local and possibly regional water supply. Reduce or avoid negative public perceptions regarding mining use of groundwater.	Establish water monitoring programme that encompasses the relevant groundwater use activities on the site (Erf). Quantities used, rest water level, and quality should be monitored if possible. Groundwater level data must be recorded for all new boreholes.
Pollution of groundwater	To avoid the pollution of any water and prevent polluted water from entering the stream channels or underground aquifers.	Pollution of ground water has the potential to impact on water users such as plants, animals or downstream users. Breaking of law as the water act forbids the pollution of any water bodies in Namibia.	There will be no discharge of untreated effluent (sewerage, grey water and water from the drill site) into the environment. All effluent must be contained and, if necessary must be treated before discharge to the environment.
Management of biodiversity	To avoid or minimize disturbance to biodiversity	Permanent destruction or long term disturbance to plants, animals, habitats on which they live and ecosystem processes in which they depend.	Avoid disturbance of the welwitschia plains. Avoid activities on rocky outcrops and ridges. Avoid damage to all protected plants, trees, and animals.

			<p>If disturbance is unavoidable, ensure that the necessary permits are obtained before plants are removed or destroyed.</p> <p>The area of disturbance resulting from quarry activities must be kept to a minimum.</p> <p>Open water reservoir are discouraged as the they attract wildlife and insects.</p> <p>Quarry drill site must be fenced off to prevent access by wildlife.</p>
			<p>Minimize the opportunity for scavenging by enforcing strict litter and waste disposal control.</p> <p>Minimize the potential for road kills by observing park speed limits.</p> <p>Report all animals kills to DPW.</p> <p>Minimize the amount of light to reduce the potential for insect fatalities.</p> <p>Feeding of wildlife is not permitted.</p>

			Collection of plants or animals is prohibited. Plants may only be removed where necessary with relevant permit.
Management of impact on visual environment and the sense of place	<p>To preserve the scenic aspects of the target area and the surroundings.</p> <p>To minimize visual impacts created by quarry activities as far as reasonably possible.</p>	EPL is located in the Dorob National park. This section has a high visual appeal and a special sense of place that will be compromise by quarry activities and this may impact on tourism.	<p>Ensure that any future campsite is established in areas of low visual, intrusion and are to be designed and built in such a way as to minimize visibility from tourist routs and view points</p> <p>Minimize lighting at camp to reduce light pollution at night.</p> <p>Minimize the number of access roads and tracks created.</p> <p>Minimize dust.</p> <p>Ensure strict waste management, especially littering along roads and at drill sites.</p>

			<p>Avoid damage of plants and animals.</p> <p>Maintain a neat and orderly operation.</p> <p>Rehabilitate drill sites and tracks as soon as possible after drilling has ceased.</p> <p>Rehabilitate illegal tracks.</p> <p>Maintain access roads in good condition.</p> <p>Ensure the geological features are worth preserving, or that could be potential sites of scientific interest, are not defaced.</p> <p>The Quarry camp and any other area disturbed by quarry activities are rehabilitated in consultation with Department of Parks and Wildlife</p>
Management of domestic waste	To maintain a clean , tidy area safe site at all times	Disturbances to biodiversity (scavenging), visuals impact (litter),soil (spillages)	<p>It is recommended that the following waste management procedures are:</p> <ul style="list-style-type: none"> ● Minimize waste generation, ● Separate and recycle waste as far as practically feasible, ● Dispose domestic waste at the landfill site in Swakopmund, ● Provide waste containers with lids (to prevent wind brome

			<p>and scavenging) at he camp.</p> <ul style="list-style-type: none"> ● Remove litter from drill sites on daily basis and dispose of in the waste bins at camp. <p>Illegal dumping and littering will not be tolerated.</p>
<p>Management of hazardous substances</p>	<p>To minimize the risk of pollution through the implementation of all reasonable measures to prevent leakage, spillage or inappropriate disposal of hazardous substances.</p> <p>To minimize the risk of hazardous substances affecting the health of all individuals and plant and animal life.</p> <p>To use biodegradable products as far as is reasonably possible</p>	<p>Disturbances to biodiversity (scavenging), visuals impact (litter) , soil (spillages), safety and health of personnel.</p>	<p>Develop a hazardous materials register.</p> <p>Identify how each hazardous substance must be stored, handled and will be disposed.</p> <p>Train relevant personnel in the safe handling of hazardous substances</p> <p>Follow all regulations outlined in the law regarding the storage and handling of hazardous waste.</p> <p>Wherever possible substitute hazardous substances with less harmful equivalents. (preferably environmentally friendly/bio-degradable).</p> <p>Develop emergency spillage procedures for the hazardous products kept on site.</p> <p>Deal with spills immediately by containing and then treating the spill. All spill sites must be rehabilitated once the spill has</p>

			<p>been cleaned up</p> <p>Soil contaminated by hazardous materials must be disposed of at the appropriate disposal facility.</p> <p>Report hazardous spills to the Chief Warden and other relevant authorities</p> <p>Dispose of hazardous waste at the appropriate disposal facility. A disposal register should be develop that explains where and how each hazardous material will be disposed.</p>
<p>Establishment of access Roads and Tracks for quarry activities</p>	<p>To minimize the impact that roads and tracks have on the environment</p>	<p>Impacts on soils, biodiversity, visual, sense of place, and archeological sites</p>	<p>Access to the EPL will be restricted to the official assess roads as discussed with the Chief Warden of the Park</p> <p>As far as possible existing tracks will be used</p> <p>As far as possible avoid the creation of sharp bends in the road as these areas become badly eroded very quickly and are difficult to rehabilitate. However try to avoid the entailment of completely straight tracks as these are very visible.</p> <p>Rehabilitate drill tracks as soon as possible after drilling ceases.</p> <p>Maintain access roads in good condition to prevent people to</p>

			<p>having to drive on the curb thus widening the road.</p> <p>Implement dust suppression on roads where there is a lot of activity.</p>
Site rehabilitation	To rehabilitate all sites disturbed as a result of quarry activities to the pre extraction state or a state predetermined by MET and other relevant stakeholders	<p>Visual impact</p> <p>Tourism activities</p> <p>Soil erosion</p> <p>Re-establishment of vegetation</p>	<p>The following rehabilitation measures are to be carried out as a minimum requirement:</p> <p>Infrastructure is removed</p> <p>Boreholes drill cores as remove from site.</p> <p>All drill chips are disposed of at the old quarry Mine as per agreement with DPW.</p> <p>All debris, scrap metal etc is removed before moving to a new drill site.</p> <p>The drill site and access tracks are rehabilitated as per the rehabilitation procedure.</p> <p>Rehabilitation of the soils should be done to meet both visual and ecological objectives.</p> <p>Transplanting of plants is undertaken if necessary.</p>

Pictures of the Project area



View towards the mountain: This area will be affected



Waste dumps at the project site



Existing quarry with steep unsafe walls



Abandoned un-rehabilitated stockpiles



Abandoned structures



Waste dumps