Environmental Concern	Management & Monitoring Recommendations	Project Phase			
		1 Plan	2 Constr	3 Ops.	4 Close
Termite consumption of encroacher bush stockpiles	• If bush is used, it is recommended to pave areas to be used for stockpiling in order to prevent termites from eating the material.	X	X	X	
Waste disposal	• Solid waste may be burned in the kiln if suitable for such use.	X	X	X	X
	• Alternatively all recyclable materials should be sent to Windhoek for recycling.		X	X	X
	• No waste shall be disposed of on site.		X	X	X
	• Monitor for litter.		X	X	X

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		1 Plan	2 Constr	3 Ops.	4 Close
Potential contamination of groundwater	• Establish water quality baseline data prior to commencement of construction.	X			
	• Site potential sources of contamination away from aquifers – i.e. where limestone and dolomite are on the surface.	X	X	X	X
	• Good housekeeping and proper sanitation and treatment of wastewater from the construction site camp.	X	X		
	• Potential sources of contamination referred to above are: - the site camp, plant, storage installations for liquid fuel, oil, chemicals etc, coal stockpiles, sewage treatment facilities and pipelines, vehicle parks.	X	X	X	X
	• Maintain all vehicles free of leaks (oil, hydraulic fluid etc).		X	X	X
	• Avoid disposal of any waste on site.	X	X	X	X
	• Concrete bunding of all liquid fuel, oil, chemicals etc sufficient to contain any potential spill.	X	X	X	X
	• Compact subsoil after removing topsoil over coal stockpile area.	X	X	X	X
	• Hazardous waste must be removed to the hazardous waste disposal site in Windhoek or Walvis Bay.		X	X	X
	• Periodic monitoring of water quality in boreholes on site and the quarry pit.				
Impacts on vegetation: Quarry and pit	• An effort should be made to avoid or minimize the mining of the most sensitive zone shown in dark green in Figure 5 – the "Steep limestone hill". This could possibly be achieved by expanding the quarry to the west after the first 25 years.	X	X	X	
	• A plant rescue operation by the NBRI is recommended for the zone shown in yellow in Figure 5 – the "Intermontane valley". This will need to be initiated by Ohorongo at the appropriate time(s) prior to removal of the topsoil and during or just after the rainy season.	X	X	X	
	• Clear vegetation only to the extent that is necessary for operation.	X	X	X	
	• Do not clear vegetation a long time in advance of the quarrying operation.	X	X	X	
	• Keep footprint of project as small as possible and enforce the operational boundaries through highly visible signs and regulatory mechanisms such as fines or similar.	X		X	
	• One contradictory guideline: in order to prevent the pit from becoming too deep, the mining area of the sand pit should be enlarged somewhat and the slopes should be gradual to the outside (this will facilitate rehabilitation). See Additional recommendations and notes for more on this aspect.	X		X	
	• Raise awareness through awareness campaigns and training of key staff.		X	X	
	• Leave large *Peltophorum* trees standing.	X	X	X	

Environmental Concern	Management & Monitoring Recommendations	Project Phase			
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	• Rescue ground orchids and aloes.	X	X	X	X
	• Strip topsoil before mining and stockpile in 2 m (maximum height) piles for restoration use after mining.	X	X	X	X
	• Once mining is completed, replace topsoil on affected areas according to a comprehensive restoration plan.			X	X
	• Conduct annual measurements of basic soil variables such as pH, carbon, organic matter (the latter two should be on an upward trend over time).			X	
	• A restoration plan should be compiled in consultation with a suitably qualified specialist for the pit and quarry. This plan should include monitoring in the post-operative phase. If restoration is not possible, a biodiversity offset project should be investigated by Ohorongo Cement.			X	
	• Area vs depth of sand pit: The principle recommend here is to minimise the alteration of physical landscape profile as much as possible. Natural geomorphology is the end result of a long list of natural processes that are in equilibrium with the resistance provided by the landscape material itself. If one creates un-natural profiles, the effective result is an increase in erosive forces and hence a hostile environment for plants and animals. This is why the recommended approach is that the sand mining pit should be made larger in area rather than deeper, even though this appears to be contrary to the above mentioned management option which is to keep the overall footprint as small as possible. There is not a "rule" that can be propose here as far as the recommended depth is concerned, because that is something that the mine planner and manager need to determine on the ground. Instinctively, however, the recommend maximum depth is 3m.	X		X	X
	• Additionally, since only a very small area will be mined each year, it is important to rehabilitate that area each year and not leave it until mining ceases in 25 years.	X		X	X
Impacts on biodiversity – large open pit & quarry	• Keep the depth of at least the sand mining area as shallow as possible. See above for more detail.	X	X	X	
	• Draw up a comprehensive Restoration Plan. The Restoration Plan has to include explicit guidelines for the handling, stockpiling and eventual replacement of topsoil on the sand pit area.	X	X	X	
	• Some general guidelines for restoration of **sand mining pit** (details must be developed in the restoration plan): ➢ The overall goal is to leave nature-friendly and landscape-friendly profiles after mining has ceased. ➢ All slopes must therefore be as shallow as possible and the ultimate depth must be as shallow as possible. Without knowledge of the actual mining process, this may require the	X		X	X

Environmental Concern	Management & Monitoring Recommendations	Project Phase			
		1 Plan	2 Constr	3 Ops.	4 Close
	re-profiling of pit walls, so that there is a gradual slope towards the middle of the area. ➢ Keep the form of the horizontal outline as natural as possible (don't make straight sides). ➢ Rehabilitation should commence after each year's campaign (i.e., do not leave the pit to achieve its ultimate size after 25 years before rehabilitation). ➢ Topsoil must be replaced as soon as possible after mining operations for the year have ceased and re-profiling has been completed. ➢ As far as possible, plant a diverse mix of the native trees that are characteristic for this habitat. ➢ It may be necessary to seed the area with some of the native grasses that are characteristic of the adjacent habitat. ➢ Monitoring is an integral part of restoration. • It may not be possible to rehabilitate the **limestone quarry** in any meaningful way. However, there are potentially many options to improve the ecological functioning and soften the visual impact of the quarry, and all of these should be considered in a comprehensive restoration plan. Some examples: ➢ Keep approach angles as shallow as possible and keep the pit as shallow as possible. ➢ Avoid large flat-sided expanses of rock – limestone is naturally very craggy and broken; the ultimate aim should be to leave an environment that is physically similar to the natural one or at least will be perceived by plants and animals to be similar. ➢ If at all possible, re-profile benches to create a more diverse physical structure (this will require a final blasting). ➢ If it is possible to stockpile topsoil before mining commences, this could be manually placed in cracks and fissures to provide instant growth medium. • If restoration is not possible, offsets for this impact should be defined	X		X	X
Impacts on vegetation: Plant and related areas, tracks	• Clear vegetation only to the extent that is necessary for operation. Vegetation will help to reduce surface wind speeds and minimize dust. • Keep vegetation corridors alongside tracks and sources of dust wherever possible as vegetation will help to trap dust.	X X	X X	X X	
Impacts on vegetation: Access Road	• Design for the "orange route" shown in Figure 2. • Minimise the width of vegetation cleared on either side of the road to reduce dust and noise. • Consider alternative access routes that are shorter.	X X X		 X	

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	cattle post) located on the access road must be relocated, either on a temporary or permanent basis. Prior to relocation, agreements need to be put in place with the people living in the homestead and cattle post, in liaising with the Ministry of Lands and Resettlement. Ohorongo Cement must follow the International Finance Corporation's guidelines on resettlement.				
	• Dust suppression on haul roads though the spraying of water.	X		X	
	• Monitoring the fallout dust at the closets sensitive receptor (i.e. above mentioned farm house) during the (and after) the mining activities to determine if there is an increase in ambient fallout dust levels.			X	X
Air quality from plant	• Design with state of the art technology to minimise air emissions from the kilns and grinding mills.	X	X	X	
	• Use encroacher bush to reduce toxic emissions from coal and also to "recycle" atmospheric carbon.	X	X	X	
Alteration of hydrological regime	• Stormwater berms will be established upstream of the proposed infrastructure to divert clean surface water around the operational area.	X	X	X	X
	• The limestone quarry will remain outside the 1:100 floodline of the drainage line.	X	X	X	X
	• Flood protection measures will be established on the western boundary of the limestone quarry.	X	X	X	X
Health & emergency services	• Planning of emergency procedures.	X	X	X	
	• Prior understandings with emergency service providers.	X	X	X	
	• Training of on-site personnel in first aid and emergency procedures.	X	X	X	
Occupational Health & Safety	• Design and manage to comply with SABS 1929 (2005) standard for dust in the workplace (or comparable EU standard).	X	X	X	X
	• Design and manage to comply with SABS 10083 (2004) standard for noise (or comparable EU standard).	X	X	X	X
	• Design and manage to comply with the Labour Act of Namibia.	X	X	X	X
HIV / AIDS	• Training and awareness creation of the risks of HIV/AIDS and prevention thereof.	X	X	X	
	• Ongoing training and up-skilling of staff to replace losses due to deaths from AIDS related diseases.	X		X	
Electricity Consumption	• Design to minimise electricity consumption.	X	X	X	
	• Install solar water heaters.	X	X	X	
	• Use energy efficient lighting, appliances and equipment.	X	X	X	
Potential stock and theft /	• Establish access control.	X	X	X	X

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security problems	• Conditions of employment should include security requirements.	X	X	X	X
Third parties safety, including: dangerous excavations; and hauling of limestone near houses	• Establish a fence along the perimeter of the working area in order to control access by third parties and wildlife. The entrance gate will be staffed while mining activities are underway. During times when mining is not taking place, the entrance gate will be locked.	X	X	X	X
	• Mining will take place to a depth of 10 metres below ground level.	X		X	
	• A ramp will be established which will enable people or animals who have fallen into the excavations to get out.			X	X
	• During decommissioning and closure, the sides of the pit and quarry will be made safe to prevent any future harm once mining activities have ceased.				X
	• The alternative access route for the limestone quarry away from the 3rd parties should be the preferred option.	X			
	• Should the current access road to the limestone quarry be used, the people (homestead and cattle post) located on the access road must be relocated, either on a temporary or permanent basis. Prior to relocation, agreements need to be put in place with the people living in the homestead and cattle post, in liaising with the Ministry of Lands and Resettlement. Ohorongo Cement must follow the International Finance Corporation's guidelines on resettlement.	X		X	
Visual impacts	• Avoid lighting facades of tall buildings.	X			
Excessive public expectations of work opportunities	• Regular communications to the public.	X	X	X	X

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