

**DEVELOPMENT, CONSTRUCTION AND OPERATIONS OF
THE MINING AND PROCESSING OF CALCITIC MARBLE,
ERONGO REGION, NAMIBIA**

ENVIRONMENTAL MANAGEMENT PLAN



Assessed by:



Updated March 2020
Prepared by Oliver Krappmann

Assessed for:

Gecko Limestone (Pty) Ltd

Project:	DEVELOPMENT, CONSTRUCTION AND OPERATIONS OF THE MINING AND PROCESSING OF CALCITIC MARBLE, ERONGO REGION, NAMIBIA: ENVIRONMENTAL MANAGEMENT PLAN	
Report: Version/Date:	Version 2.0 March 2020	
Prepared for:	Gecko Limestone (Pty) Ltd P.O. Box 81307 Windhoek Namibia	TEL.: (+264-61) 225826 FAX.: (+264-61) 228304
Lead Consultant	Geo Pollution Technologies (Pty) Ltd PO Box 11073 Windhoek Namibia	TEL.: (+264-61) 257411 FAX.: (+264) 88626368
Main Project Team:	Quzette Bosman (BA. Geography/Sociology); (BA Environmental Management) André Faul (B.Sc. Zoology, Biochemistry); (B.Sc. (Hons) Zoology); (M.Sc. Conservation Ecology) Pierre Botha (B.Sc. Geology/Geography); (B.Sc. (Hons) Hydrology/Hydrogeology) Oliver Krappmann (MSc Geology, Geokey cc, Gecko Namibia)	
Cite this document as:	Bosman Q, Faul A, Botha P, 2016. SwaCa Project: Development, Construction and Operations for the Mining and Processing of Calcitic Marble - Environmental Management Plan	
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I _____ acting as Gecko Limestone (Pty) Ltd representative, hereby confirm that the project description contained in this report is a true reflection of the information which the Gecko Group of Companies has provided to Geo Pollution Technologies.

Signed at ___ Windhoek ___ on the _26th_ day of __March__ 2020


Gecko Group of Companies

Geo Pollution Technologies

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1 OBJECTIVES OF THE EMP

Gecko Limestone (Pty) Ltd (hereafter referred to as SwaCa) are proposing to mine calcitic marble from their Exclusive Prospecting Licence (EPL) 4185 located in the Swakopmund Townland boundary of the Erongo Region. It is further proposed that once the material has been mined, the raw material be transported to a processing and bagging plant located 4 km south of the EPL at the Nonidas Industria development. The company requires an Environmental Clearance Certificate (ECC) for these proposed activities. In support to an application for such an ECC, an Environmental Scoping Assessment has been conducted. Mitigation measures as mentioned in the Scoping Report have been included in this related Environmental Management Plan (EMP) which will be submitted with the Scoping Report to the Department of Environmental Affairs (DEA) of the Ministry of Environmental Affairs and Tourism. Should the ECC application be successful, this EMP will become legally binding.



Figure 1. Location of EPL 4185 and Nonidas Industria

The (EMP) provides management options to ensure that impacts of construction and operations are minimised. An EMP is a tool used to take pro-active action by addressing potential problems before they occur. This should limit the corrective measures needed, although additional mitigation measures might be included if necessary. The EMP acts as a stand-alone document, which can be used during the various phases (planning, construction, operational and decommissioning) of any proposed activity or development. The construction phase includes the establishment of all infrastructure components required for the mining, transportation and processing of the raw Material.

SwaCa as well as all contractors and sub-contractors taking part in the construction and operations of the mining, transportation and processing should be made aware of the contents of the EMP, so as to plan the relevant activities accordingly in an environmentally sound manner.

The objectives of the EMP are:

- ◆ to include all components of the various activities;
- ◆ to prescribe the best practicable control methods to lessen the environmental impacts associated with the construction and operations of the development;
- ◆ to monitor and audit the performance of construction and operational personnel in applying such controls; and
- ◆ to ensure that appropriate environmental training is provided to responsible construction and operational personnel.

Nonidas Industria may choose to implement an environmental management system. At the heart of an EMS is the concept of continual improvement of environmental performance with resulting increases in operational efficiency, financial savings and reduction in environmental, health and safety risks. An effective EMS would need to include the following elements:

- ◆ A stated environmental policy which sets the desired level of environmental performance;
- ◆ An environmental legal register;
- ◆ An institutional structure which sets out the responsibility, authority, lines of communication and resources needed to implement the EMS;
- ◆ Identification of environmental, safety and health training needs;
- ◆ An environmental program(s) stipulating environmental objectives and targets to be met, and work instructions and controls to be applied in order to achieve compliance with the environmental policy; and
- ◆ Periodic (internal and external) audits and reviews of environmental performance and the effectiveness of the EMS.

2 THE EMP

The following general guidance for the EMP is based on the findings of the EA and risk assessment carried out by Geo Pollution Technologies.

2.1 Land Use, Planning, Design, Operations – Identified Impacts

- ◆ **Dust** at both sites as well as along the connecting road (construction- and operational phase), Windy conditions are a common occurrence in the area. During site excavation activities of the construction and operational phase, dust may become a nuisance and health risk to construction personnel and neighbours. Special care must be taken during periods of strong winds. The haul are will be unpaved and this may result in an increase of dust levels and impairment of vision of road users.
- ◆ **Loss of habitat** (construction phase). Sensitive fauna species have been identified to may occur on site. In relation sensitives areas have been identified as the marble ridge (south of the site which will be traversed by the proposed new section of the haul road; the Dolerite outcrops (along the haul road – which is existing; as well as on Portion B of the proposed mining area) and drainage lines and related washes occurring at the proposed mining area. Some of these area will be obliterated and / or fragmented during mining operations.
- ◆ **Loss of ecosystem functioning** (construction phase). Earthworks and active mining may alter sensitive areas, such as the Dolerite ridges and drainage lines which are important contributors to the continued functioning of certain ecosystems.
- ◆ **Direct and indirect benefits to the local and regional economy** (Mining and manufacturing sectors)(planning-, construction- and operational phases). Expenditure on labour are one of the contributions to the local and regional economy. However the conversion of a natural resource to a usable commodity will further generate revenue in the mining and manufacturing industries.
- ◆ **Changes in the demographic profile, reduction of unemployment** (construction- and operational phases). Both construction and operations of mining and processing will provide employment opportunities to residents of Swakopmund and Nonidas. The operational phase will make use of employees from the region in order to create permanent employment opportunities.
- ◆ Increased economic workforce stability (planning-, construction and operational phases)

3 THE IMPLEMENTATION OF THE EMP

Tables 1 to 4 outline the management of the environmental elements that may be affected by the different activities, grouped in each phase of the development. These groups are as follows:

- ◆ Planning Phase
- ◆ Construction Phase
- ◆ Operational Phase
- ◆ Decommissioning Phase

As per the Environmental Scoping Report which had been completed for the proposed development, no decommissioning phase is planned for as it is foreseen that mining and processing activities will be in excess of 50 years. However, decommissioning activities have been included, should such an eventuality occur for whatever reason.

Furthermore, all **reporting** as referred to in the tables 1 – 4 of this report, is suggested to be combined in a **single report annually** which should be submitted to the **Department of Environmental Affairs (DEA)** of the Ministry of Environmental Affairs and Tourism. The purpose of the report will not only serve as an indication on the compliance of this EMP, but will also serve to report on all monitoring requirements and grievances received.

In addition to the reporting requirements as mentioned above, an additional report should be compiled once the construction phase has been completed. This report should be submitted to the DEA.

Table 1. Planning for Construction, Operations and Future Decommissioning of the Project

Activity	Objective	Action	Timing	Proof of Compliance	Responsible Body
Compliance	To comply with all legal requirements for the construction and operations of the development in Namibia.	Apply for the necessary permits from the various ministries, local authorities and any other bodies that governs the construction and operations of the proposed development. These include Hazardous Waste storage and transportation permits as well as permits from the department of health to analyse hazardous materials.	Prior to commencement of construction	All contracts, permits, certificates and other legal documents on file.	Proponent
Baseline	Determine baseline pollution conditions.	Collect soil and water samples where required (such as boreholes to be used for dust suppression and groundwater levels) and analyse for chemicals of concern.	Prior to commencement of construction	Borehole logging / Analysis results on file	Independent Specialist Consultant
Appointments	To appoint reputable contractors and operational personnel and establish the EMP, a legal requirement that forms part of the contract with the contractor and employees.	Appoint a contractor and employees and enter into an agreement which includes the EMP. Ensure that the contents of the EMP are understood by the contractor, sub-contractors, employees and all personnel who will be present on site.	Prior to commencement of construction and operations	Contracts on file	Proponent; Contractor
Management	Establish a management system to implement and monitor Health, Safety and Environment.	Make provisions to have a Health, Safety and Environmental Coordinator to implement the EMP and oversee occupational health and safety as well as general environmental related compliance at the site. Have the following emergency plans, equipment and personnel in place to deal with all emergencies: Risk Management / Mitigation / Environmental Management Plan/ Emergency Response Plan and HSE Manuals	Prior to commencement of and during construction and operations	Documentation on file Personal Protection Equipment (PPE) on site Signage related to restricted areas, dangerous areas, and PPE requirements on site Emergency response material on site	Proponent; Contractor

Activity	Objective	Action	Timing	Proof of Compliance	Responsible Body
		<p>Adequate protection and indemnity insurance cover for incidents;</p> <p>Comply with the provisions of all relevant safety standards;</p> <p>Procedures, equipment and materials required for emergencies.</p>			
Fauna & Flora	To mitigate adverse impacts on the identified sensitive species and features on site.	Appoint a reputable specialist to compile a specific Fauna and Flora Management Plan.	Prior to the construction phase.	Report to be kept on file and on site during construction.	Proponent
Restoration Fund/Insurance	To set aside funds for future environmental restoration or pollution remediation if ever required.	To set aside funds for future ecological restoration of the project site should project activities cease and the site is decommissioned and environmental restoration or pollution remediation is required.	Prior to commencement of and during construction and operations	Shareholders directive to the financial manager to budget for these eventualities.	Proponent
Reporting	To establish a reporting system to report on monitoring aspects of construction, operation and decommissioning as outlined in the EMP.	<p>Establish a reporting system to report on aspects of construction, operation and decommissioning as outlined in the EMP.</p> <p>Keep monitoring reports on file for submission with Environmental Clearance Certificate renewal applications where needed.</p>	During construction and operations as well as possible future decommissioning of the development	Monitoring Reports	Proponent; Contractor
Grievance Mechanism	To establish a grievance mechanism through which community members can voice their complaints as managed by a community liaison officer.	<p>Identify a community liaison officer</p> <p>Establish a grievance mechanism</p>	Prior to the construction phase	Complaints register	Proponent
Environmental Clearance Renewal	To renew the Environmental Clearance Certificate every Three years.	Appoint an environmental consultant to update the EIA and EMP and apply for renewal of the Environmental Clearance Certificate.	Prior to expiry of Environmental Clearance Certificate	Renewed Environmental Clearance Certificate	Proponent; Independent Specialist Consultant

Table 2. The Construction Phase

Criteria	Nature	Mitigation	Monitoring	Responsible Body
Enhanced skills and technology transfer to Swakopmund & Nonidas and subsequent promotion of economic development	People need skills to perform their jobs. The technology to do something is often not found locally. Development of people and technology are key to economic development.	Local Namibians must be employed. Deviations should be justified.	Proof of appointment of local contractors on file.	Proponent; Directors & Public Relations personnel.
Increased spread of HIV/AIDS; Increased influx to Nonidas; Increased informal settlement and associated problems; Reduced property values	New and existing developments attract people who seek work. This in turn can increase the extent of informal settlements and its associated problems. Additional interaction between people could contribute to the spread of HIV / AIDS. It is possible that these can affect property prices in the area depending on the proximity to a residential site.	Appointing reputable contractors who implement educational program on HIV/AIDS for all staff, in particular the truck drivers, is imperative. Restricted employment for local people only should be practiced. Deviations from this practice should be justified appropriately. Training of local people should be considered from the start. These measures will reduce the influx of newcomers to the area and thereby reduce growth in the informal settlement and maintain property prices.	Proof of appointment of local contractors on file.	Proponent; Directors & Public Relations Personnel.
Employment	The construction as well as operational phases requires the employment of contactors as well as employment and training of staff for the development.	Where skills exist local Namibian contractors must be employed. Deviations from this must be justified.	Proof of appointment of local contractors on file.	Proponent; Directors & Public Relations Personnel.
Traffic	Construction activities are expected to have some impact on the movement of traffic when construction material and equipment are transported to the site. Dust may be generated which can impair vision of road users.	Regulation of traffic during deliveries for construction. Appropriate signage and warnings. Proper planning prior to construction. Dust abatement measures to be implemented.	Any complaints received regarding traffic issues should be recorded together with steps taken to mitigate the impacts. Record water abstraction from boreholes for dust suppression. All information and reporting to	Contractor; Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
			be included in the final environmental report once construction finishes.	
Fire	Construction activities near flammable materials may result in fires.	<p>All equipment and tools must comply with standards which allow certain tools and equipment near flammable sources. Safety distances must be adhered to as well as safe work procedures. Safety talks and job hazard analysis to be done before work starts.</p> <p>Fire fighting measures as per the Material Safety Data Sheets of the product should be adhered to.</p> <p>In addition to this, all personnel have to be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials including rubbish, dry vegetation, and hydrocarbon-soaked soil from the vicinity of the construction. Regular inspections should be carried out to check for these materials at the site.</p> <p>It must be assured that sufficient fire fighting resources are available. A holistic fire protection and prevention plan is needed. This holistic plan must include an emergency response plan and fire fighting plan. Regular surveys of the fire-fighting equipment and water supply should be carried out.</p> <p>.</p>	<p>Supervision of work is required and reports of safe and unsafe practice to be brought to the attention of the HSE department.</p> <p>Any incidents reported must be recorded together with steps taken to mitigate the impacts.</p> <p>All information and reporting to be included in the final environmental report once construction finishes.</p>	Contractor; Proponent
Health, Safety and Security	During the construction phase, construction personnel will access the site. Different excavation, earthmoving and transport equipment will be onsite. This increases the possibility of injuries. A risk to site security and personnel health and safety exists during this period.	<p>All Health and Safety standards specified in the Labour Act should be complied with. The responsible contractor must ensure that all staff members are briefed about the potential risks of injuries on site.</p> <p>The Contractor should be obliged to adhere to the following:</p> <ul style="list-style-type: none"> ◆ Adhere to Health and Safety Regulations pertaining to personal protective clothing, first aid kits, warning signs, etc.; ◆ Ensure that adequate emergency facilities, 	<p>A register of all incidents must be maintained. This should include measures taken to ensure that such incidents do not repeat itself.</p> <p>All information and reporting to be included in the final environmental report once construction finishes.</p>	Contractor; Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
		<p>including first aid kits, are available on site;</p> <ul style="list-style-type: none"> ◆ In consultation with the Traffic Department devise and submit a traffic management programme for sections of the roads to be closed or traffic diverted if necessary during the delivery of equipment or infrastructure construction; ◆ Equipment that must be locked away on site and must be placed in a way that does not encourage criminal activities; ◆ Induction training for all who enter the site is required; and ◆ Security personnel to prevent unauthorised entry of the construction site. <p>Refer to the Emergency Response Plan (ERP) and or the ERP Guidebook 2008 and associated SANS document, Material Safety Data Sheets (MSDS) and management system manuals.</p>		
Dust	Dust may be generated through travelling on unpaved road and earthworks. This might be aggravated during periods of strong winds which occurs regularly in Namibia during the winter months.	<p>It is recommended that regular dust suppression be included during construction, when dust becomes an issue. Personnel are to be issued with dust masks for health reasons when needed.</p> <p>Excavations during strong north-easterly wind conditions should be avoided to prevent dust from being a nuisance if dust suppression is not adequate.</p>	<p>Regular visual inspection.</p> <p>A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.</p> <p>All information and reporting to be included in the final environmental report.</p>	Contractor; Proponent
Noise	Noise pollution will exist due to heavy vehicles accessing the site with building materials, as well as the audible warning noises from trucks and heavy equipment. Compaction, cement mixing, drilling and excavating will be	The Municipality has no regulations with regard to noise levels. The World Health Organization (WHO) guideline on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment can be followed during the construction phase. This limits noise levels to an average of 70 dB over a 24 hour period with maximum noise levels not exceeding 110 dB during the period. It is recommended	<p>A complaints register must be maintained in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.</p> <p>All information and reporting to be included in the final</p>	Contractor; Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
	some additional noise producing activities.	that a survey of the noise levels be carried out if complaints are received. Construction workers to be issued with hearing protection where needed.	environmental report.	
Waste Production	<p>The ability of products and building rubble to act as a waste which must be cleaned up or removed off-site.</p> <p>The construction at the facility will produce waste in the form of domestic waste, building rubble or any other waste as a result of spillage or leakage from cleaning and painting materials.</p> <p>Any soil polluted by hydrocarbons that may be encountered during the construction phase should be treated as hazardous waste. Chemical toilets present a risk of contamination.</p>	<p>Due to the nature of some hazardous materials they should be disposed of in an appropriate way at an appropriately classified waste disposal facility. See the MSDS available from suppliers if the user is not sure how to dispose of the substance.</p> <p>Liaise with the Municipality regarding waste and appropriate handling of hazardous waste.</p> <p>Temporary waste disposal facilities should be present on site. This should include separate containers for products that can be re-used or recycled.</p> <p>Removal of waste should be at regular (weekly) intervals to maintain visual orderliness, but more so to not give time for liquid waste to enter the soil substrate. Dry waste is at risk of increasing the dust / litter impact so should be removed regularly.</p> <p>Securely fasten or place all chemical toilets.</p> <p>This includes any asbestos waste that may be produced on site.</p>	<p>Regular visual inspection.</p> <p>A register of waste produced and disposal methods should be maintained.</p> <p>All information and reporting to be included in the final environmental report.</p>	Contractor; Proponent
Groundwater, Surface Water and Soil Contamination	<p>Porous surface substrate can allow unwanted hazardous and ecologically detrimental substances to seep down to the water table either at the site of spill or after being washed away by surface flow.</p> <p>Leakages from construction vehicles, accidental spills of fuel, paints and other chemicals might</p>	<p>All precautions are to be taken to prevent contamination of the soil as this could enter the ecosystem.</p> <p>Appointing qualified and reputable contractors is essential. Proper training of construction personnel would reduce the possibility of the impact occurring.</p> <p>Any hydrocarbon spill of 200 l or more must be reported and remediation action taken.</p> <p>Polluted soil and building rubble must be transported away from the site to an approved, appropriately</p>	<p>Report form for all spills or leaks during construction is to be completed by Contractor and submitted to the HSE department.</p> <p>All information and reporting to be included in the final environmental report.</p>	Contractor; Proponent; Independent Specialist Consultant

Criteria	Nature	Mitigation	Monitoring	Responsible Body
	occur. Groundwater might spread pollutants to neighbouring receptors.	classified waste disposal site. Polluted soil can be remediated. Confirm MSDS information for any oils and other HFO products, lubricants or chemicals that must be discarded.		
Heritage Impact	Sites with archaeologically or culturally important significance might be uncovered during excavations. These can include graves or cultural artefacts.	If such a site is found during the construction phase the construction process must be halted and the relevant authorities must be informed. Construction may only continue at that location once permission has been given. Firstly, the Namibian Police must be informed. Secondly, the National Monuments Council dealing with heritage should be informed. Chance-find procedures should be adopted.	Record of any discoveries and proof of notifications to authorities on file. All information and reporting to be included in the final environmental report.	Contractor; Proponent
Cumulative Impact	Possible cumulative impacts associated with the construction phase include increase in traffic, dust generation, municipal planning, loss of habitat and disturbance of natural migration patterns.	All other preventative measures for the different impacts will help prevent this impact.	The final environmental report based on all other impacts must be created to give an overall assessment of the impact of the Construction Phase.	Contractor; Proponent

Table 3. The Operational Phase

Criteria	Nature	Mitigation	Monitoring	Responsible Body
Enhanced skills transfer and technology transfer to Nonidas and subsequent promotion of economic development	People need skills to perform their jobs. The technology to do something is often not found locally. Development of people and technology are key to economic development.	Employ local Namibian residents. Any deviation should be well motivated.	Bi-Annual environmental report to provide a summary based on actual training and the enhancement of skills and transfer of technology should be compiled.	Proponent; Directors & Public Relations personnel.
Increased spread of HIV/AIDS; Increased influx to Nonidas; Increased informal settlement and associated problems; Reduced property values	New and existing developments attract people who seek work. This in turn can increase the extent of informal settlements and its associated problems. The increased number of people and associated interaction may contribute to the spread of HIV / AIDS. It is possible that these can affect property prices and future residential planning in the area.	Preferential employment for Swakopmund / Nonidas dwellers only should be practiced. Deviations from this practice should be justified appropriately. Training of local people should be considered from the start. These measures will reduce the influx of newcomers to the town and thereby reduce growth in the informal settlement and maintain property prices.	Bi-Annual environmental report to provide a summary based on educational programmes and training conducted. Annual environmental report to provide a review of employee demographics.	Proponent; Directors & Public Relations Personnel.
Employment	Mining, transportation and processing will create permanent employment opportunities	None required	Bi-Annual environmental report to provide a summary based on employee records.	Proponent; Directors & Public Relations Personnel.
Traffic	Increased traffic leading to traffic congestion, higher collision risk and increased deterioration of roads.	Maintenance of all signage, haul road and continued dust abatement measures.	Any complaints received regarding traffic issues should be recorded in the bi-annual environmental report .	Proponent & Roads Authority
Security	Unauthorized entry leading to theft of equipment and/or product and/or fire hazard (not intentional arson).	Security procedures and proper security measures must be in place. Strict security that prevents unauthorised entry. Patrolling perimeter fence. Alarm systems and security personnel should be utilised. Strict security at the entry points must be adhered to.	Annual environmental report to provide a summary of all incidents reported.	Proponent; Security Supervisor.

Criteria	Nature	Mitigation	Monitoring	Responsible Body
		<p>Fitness for work certificates for every security officer to be issued on a monthly basis. Daily alcohol testing should be carried out by an authorised person at the start and at the end of a shift.</p>		
<p>Fire and Explosion Hazard</p>	<p>Outbreak of an uncontrolled fire. Oil and diesel are not as flammable as the more volatile hydrocarbons like petrol.</p>	<p>The following controls are typical measures for mitigating the threat of spillage of hazardous chemicals and possible fire outbreak:-</p> <ul style="list-style-type: none"> ◆ Storage according to Material Safety Data Sheet and SANS instructions ◆ Site inspection and maintenance ◆ Operational procedures and training ◆ Mechanical and electrical inspections ◆ Fire extinguishers ◆ Trained personnel ◆ Good housekeeping ◆ Reporting of leaks/spills <p>All conditions to be adhered to as prescribed by the Chief Inspector regarding the storage of explosives (as per conditions of the permit).</p> <p><i>Fire Fighting and Fire Prevention:</i></p> <p>All fire precautions and fire control at the site must be in accordance with relevant SANS regulations or better. Firefighting measures as per the Material Safety Data Sheets of the products should be adhered to.</p> <p>In addition to this, all personnel have to be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials including rubbish. Regular inspections should be carried out to check for these materials at the site.</p> <p>A holistic fire protection and prevention plan is needed. This plan must include an emergency response plan, firefighting plan and spill recovery plan.</p>	<p>Bi-Annual environmental report to provide a summary of all incidents reported. The annual environmental report should contain dates when fire drills were conducted and when fire equipment was tested.</p> <p>Explosives storage approval kept on file and on site with required additional documentation.</p>	<p>Proponent</p>

Criteria	Nature	Mitigation	Monitoring	Responsible Body
Health & Safety	<p>Mining and processing procedures are subject to risks to human beings. These risks are assessed in terms of the predicted impact if realised. Typical examples are:-</p> <ul style="list-style-type: none"> ◆ Breathing in excessive chemical fumes ◆ Slipping on wet surfaces ◆ Chemical product contact with eyes and skin ◆ Staff not wearing protective clothing 	<p>Typical mitigating measures within the health and safety management systems are:-</p> <ul style="list-style-type: none"> ◆ Operational and procedural manuals ◆ Health and Safety Training ◆ Housekeeping rules ◆ Colour coding areas, pipes, equipment and substances ◆ Signage for Personal Protective Equipment (e.g. protective clothing like safety boots and hard hats) ◆ Safe work procedures and permits to work ◆ Clearance certificates for confined spaces ◆ Emergency response plans ◆ Material Safety Data Sheets (MSDS) ◆ First aid treatment and training ◆ Medical procedures and emergency services ◆ Daily safety moments and/or drills <p>The MSDS give health related medical responses for personnel assisting staff who are exposed to the hydrocarbons.</p>	<p>Inventory of necessary information and administrative documentation to be kept on a weekly basis</p> <p>Bi-Annual environmental report to provide a summary of all incidents reported. The annual environmental report should contain dates when training was conducted and when safety equipment and structures were inspected and maintained.</p>	Proponent
Noise	Noise pollution will exist due to operation of HVM and machines..	<p>The Development is situated in an industrial area so there is no restriction on the times of operation. The World Health Organization (WHO) guideline on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment for workers on site can be followed. This limits noise levels to an average of 70 dB over a 24 hour period with maximum noise levels not exceeding 110 dB during the period.</p> <p>Public address systems may not be used on site without prior arrangement with the Municipality.</p>	<p>Any complaints received regarding excessive noise should be recorded with notes on action taken.</p> <p>All complaints and additional data, if available, to be compiled in an annual environmental report.</p>	Proponent; Independent Specialist Consultant
Waste Production	The ability of a product to act as a waste which must be cleaned up. These can be soils that become contaminated with oil and/or other diesel products. Domestic waste from bins, offices and ablution facilities.	<p>See the MSDS for handling hazardous substances. Contaminated oil and HFO products that can no longer be used in the market must be disposed of in the hazardous waste section of a municipal dump or where possible converted for beneficial use.</p> <p>All other domestic waste should be disposed of timorously to</p>	A register of hazardous waste disposal should be kept. This should include type of waste, volume as well as disposal method/facility.	Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
		<p>maintain visual orderliness, but more so to not give time for liquid waste to enter the soil substrate.</p> <p>Contaminated soils can be remediated in accordance with accepted procedures at a site dedicated for this purpose.</p> <p>The oil water separators on site must be properly maintained.</p> <p>Liaise with the municipality regarding waste and handling of hazardous waste (especially from the chemical laboratory). All water disposed from the waste water treatment plant to be of an adequate quality for plant.</p> <p>Spilled hydrocarbons may not be washed off using surfactants like soap. Surfactants will cause the oil/water separator to malfunction leading to hydrocarbons entering the sewers.</p>	<p>Water quality samples from the waste water treatment plant to be taken weekly.</p> <p>Any complaints received regarding waste should be recorded with notes on action taken.</p> <p>All data to be compiled in a report and a summary included in the bi-annual environmental report.</p>	
<p>Groundwater, Surface Water and Soil Contamination</p>	<p>Porous surface substrate can allow unwanted hazardous and ecologically detrimental substances to seep down to the water table.</p> <p>Groundwater is not utilized in the area for human consumption but should still be protected at all costs.</p> <p>Proper containment mechanisms installed should contain any release that might take place from spillages (at fuel storage facilities) during operation of the development.</p>	<p>The following measures must be employed to prevent Hydrocarbon spillage into surface water drainage channels and groundwater sources:-</p> <ul style="list-style-type: none"> ◆ Spill control structures and procedures must be in place according to SANS standards or better, including impounding around the loading areas by bunding with appropriate slopes of 1:100. ◆ All handling of oil and diesel should be conducted on surfaces provided for this purpose. E.g. Concrete slabs with regularly maintained seals between slabs. ◆ The procedures followed to prevent environmental damage during service and maintenance, and compliance with these procedures, including the correct use of sumps and regular reporting of spillages must be audited and corrections made where necessary (especially with regards to the waste Water Treatment plant). ◆ Proper training of operators must be conducted on a regular basis. ◆ Any spillage of more than 200 l must be reported to the relevant authorities and remediation instituted. 	<p>Annual samples must be taken from monitoring holes and analysed for any hydrocarbon pollutants present.</p> <p>A bi-annual environmental report should be compiled relating all spills or leakages reported. The bi-annual environmental report should contain the following information:</p> <ul style="list-style-type: none"> ◆ date and duration of spill ◆ product spilled ◆ volume of spill ◆ remedial action taken ◆ Comparison of pre-exposure baseline data with post remediation 	<p>Proponent</p>

Criteria	Nature	Mitigation	Monitoring	Responsible Body
		<ul style="list-style-type: none"> ◆ Spill clean-up means must be available on site as per the relevant MSDS. 	<ul style="list-style-type: none"> data (e.g. soil hydrocarbon concentrations) ◆ Copy of documentation in which spill was reported to Ministry of Mines and Energy 	
Cumulative Impact	<p>Possible cumulative impacts associated with the operational phase include increase in traffic frequenting the site. Wear and tear on the roads and increased risks of road traffic incidences could increase. Additional traffic and operational noise would further increase noise impacts in the area. Ecological impacts (once the surrounding area has been developed). The cumulative effect of lighting on birds due to urban developments may increase the risk of collisions and interference with bird flight paths at night.</p> <p>The cumulative effect of hydrocarbon pollution as well as residual pollutants in semi purified sewage effluents could also have a negative effect on the bird species that live on and near that site.</p>	<p>Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.</p> <p>Reviewing annual reports for any new or re-occurring impacts or problems would aid in identifying cumulative impacts and help in planning if the existing mitigations are insufficient.</p>	<p>The bi-annual environmental report should summarise all other impacts. This will give an overall assessment of the compliance to the Operational Environmental Management System.</p>	Proponent

Table 4. Decommissioning Phase

Criteria	Nature	Mitigation	Monitoring	Responsible Body
Waste Production	<p>The ability of product to act as a waste which must be cleaned up.</p> <p>Upon decommissioning waste will be produced in the form of building rubble, obsolete equipment and structures, obsolete or residual products and equipment or structures that can be used elsewhere or sold as scrap.</p> <p>Soil polluted by hydrocarbons must be treated as hazardous waste.</p>	<p>To reduce the amount of waste all re-usable pipelines, pumps, tanks, valves and other equipment must be removed to another site owned by the Gecko group of companies or sold.</p> <p>Those items that can not be used again must be scrapped in the appropriate manner.</p> <p>Upon demolition of the buildings and concrete the rubble must be removed from the property and taken to an approved dumpsite designated by the Walvis Bay Municipality.</p> <p>Rehabilitation if necessary are to be done using funds designated for the purpose.</p>	<p>Regular visual inspection.</p> <p>A register of waste produced and disposal methods should be maintained.</p>	Proponent; Contractor
Ecological Impact	<p>Operations spanning many years may create new habitat for fauna and flora. Upon decommissioning these habitats will be destroyed.</p>	<p>Nonidas Industria would have to ensure that no new habitat is created for flora and fauna. Before decommissioning the HSE would need to inspect every structural facility to ensure that the dismantling and removal of any structure would not affect any organism that has become dependent on those structures for survival, shelter or breeding.</p> <p>Where new habitats were created, that is now occupied by fauna or flora, Nonidas Industria must contact MET or other appropriate organizations to establish the conservation status of it.</p> <p>The possibility of relocating the fauna or flora must be investigated and executed. Should the species be listed as vulnerable to extinction, or worse, a meeting should be held with MET in order to determine the appropriate handling of the situation.</p>	<p>A final environmental report will provide a summary of any fauna and flora that established itself on the premises. The final environmental report should include all actions taken to relocate or deal with the situation.</p>	Proponent; Contractor
Employment	<p>Decommissioning of The Development may lead to retrenchments or re-location of staff no longer required.</p>	<p>Plan in advance for meeting the Labour Acts requirements for retrenching of staff if required.</p> <p>Where possible staff can be relocated to another facility or town where business continues in the same way.</p>	<p>The final environmental report that must be compiled should include the appropriate plans for handling of employees should the facility be decommissioned. This report should include budgeting for</p>	Proponent; Directors & Public Relations personnel or Human Resource Department.

Criteria	Nature	Mitigation	Monitoring	Responsible Body
			retrenchments and possible alternative positions elsewhere.	
Dust	Dust will be generated during the Decommissioning Phase and might be aggravated during periods of strong winds.	It is recommended that regular dust suppression be included in the Decommissioning Phase, when dust becomes an issue. Personnel should be issued with dust masks for health and safety reasons.	Regular visual inspection. A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.	Proponent; Contractor
Noise	Noise pollution will exist due to heavy vehicles accessing the site to collect rubble from demolished building materials. Hammers, diggers and drills will be used.	The development will be situated in an industrial area so there is no restriction on the times of operation. The Walvis Bay Municipality does not have any guidelines with respect to noise levels but the World Health Organization (WHO) guideline on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment is followed. This limits noise levels in industrial areas to an average of 70 dB over a 24 hour period with maximum noise levels not exceeding 110 dB during the period. All personnel must be issued with hearing protectors and neighbours must be notified of the time and duration of decommissioning. Notice of the start of the decommissioning should be given to the local authorities with an invitation to give feedback at any time with regards the noise impact.	A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon.	Proponent; Public Relations Personnel; Contractor.
Groundwater, Surface Water and Soil Contamination	Porous surface substrate can allow unwanted hazardous and ecologically detrimental substances to seep down to the water table.	All precautions are to be taken to prevent contamination of the soil as this could enter the ecosystem. Leakages from vehicles might occur especially if they are serviced on site. Care must be taken to avoid contamination of soil and groundwater. Groundwater might spread pollutants to neighbouring receptors and may create an impact on underground utilities (i.e. fresh water supply to buildings, sewerage system). Pollutants in the soil and building rubble must be transported away from the site to an approved, appropriately classified waste disposal site.	A site closure baseline report for all spills or leaks is to be completed by Contractor and submitted to the Nonidas Industria. A baseline study must be carried out after the decommissioning. This is to assess the condition of soil substrate and any	Proponent; Contractor

Criteria	Nature	Mitigation	Monitoring	Responsible Body
		<p>Confirm MSDS information for any remaining oils or HFO products that must be discarded.</p> <p>Regulations on sewage discharge and the chemicals that may and may not be put into the sewerage system must be followed.</p>	<p>groundwater present. Comparisons with pre-construction baseline data is to be made and any discrepancies must be addressed before the site can be signed over.</p>	
Health, Safety and Security	<p>During the Decommissioning Phase similar risks to human beings as with previous phases will be present. Once the tanks and pipelines have been emptied completely of their contents residual amounts of oil and other HFO products might exist. All other risks associated with demolitions must be considered.</p>	<p>The decommissioning of a recycled oil and HFO products facility can cause serious health and safety risks to workers on site. Occupational exposures are normally related to dermal contact with hydrocarbons during handling of such products. For this reason adequate measures must be brought in place to ensure safety of staff on site, and includes: (Provide forms for all end users who monitor)</p> <ul style="list-style-type: none"> ◆ Proper training of operators; ◆ First aid treatment; ◆ Medical assistance; ◆ Emergency treatment; ◆ Protective clothing, footwear, gloves and belts; safety goggles and shields; ◆ Manuals and training regarding the correct handling of materials and packages should be in place and updated as new or updated MSDS' become available; Risks might be lower but still exist especially if tanks must be entered for inspections. Confined Space Training will be required. ◆ 24-hour security surveillance in case of opportunistic activities. 	<p>A register of all incidents must be maintained on basis. This should include measures taken to ensure that such incidents do not repeat it self.</p>	<p>Proponent; Contractor</p>
Fire and Explosion Hazard	<p>Residual hydrocarbons could be present and might pose a risk to the teams dismantling the various structures. Fire and/or explosion events are still possible.</p>	<p>Various international occupational health and safety performances should be consulted for specific regulations regarding the decommissioning of the facility to ensure all risks are mitigated. All relevant regulations and precautions should be in place as it was during the Operational Phase. In addition to this, all personnel have to be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials including</p>	<p>A register of all incidents must be maintained on a daily basis. This should include measures taken to ensure that such incidents do not repeat it self.</p>	<p>Proponent; Contractor</p>

Criteria	Nature	Mitigation	Monitoring	Responsible Body
		<p>rubbish, dry vegetation, and hydrocarbon-soaked soil from the vicinity of the fuel storage facility. Regular inspections should still be carried out to inspect and test fire fighting equipment and pollution control materials at the oil recycling facility. All fire precautions and fire control at the recycled oil facility must be in accordance with SANS, or better. The holistic fire protection and prevention plan should still be utilised...</p>		

4 CONCLUSIONS

The above Environmental Management Plan, if properly implemented will help minimise adverse impacts on the environment. Where impacts occur, immediate action must be taken to reduce the escalation of effects associated with these impacts. To ensure the relevance of this document to the specific stage of project, it needs to be reviewed throughout all phases.

The Environmental Management Plan should be used as an on-site reference document during all phases of the proposed project, and auditing should take place in order to determine compliance with the EMP for the proposed site, and Parties responsible for transgression of the EMP should be held responsible for any rehabilitation that may need to be undertaken.

Monitoring reports must be kept available for possible submission with future renewal applications for environmental clearance certificates.

Geo Pollution Technologies
Q Bosman
Social and Environmental Assessment Practitioner