

# THE CONSTRUCTION AND OPERATIONS OF A NEW BULK FUEL STORAGE FACILITY AT THE SHALI INDUSTRIAL ESTATE

## UPDATED ENVIRONMENTAL MANAGEMENT PLAN



**PROJECT No. NC/014/16**

**Assessed by:**



**Assessed for:**




**Client:**



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<b>Project:</b>	<b>UPDATED ENVIRONMENTAL MANAGEMENT PLAN FOR THE CONSTRUCTION AND OPERATIONS OF A NEW BULK FUEL STORAGE FACILITY AT THE SHALI INDUSTRIAL ESTATE</b>	
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## **Table of Contents**

<b>1</b>	<b>OBJECTIVES OF THE EMP</b> .....	<b>1</b>
<b>2</b>	<b>THE EMP</b> .....	<b>1</b>
2.1	LAND USE, PLANNING, DESIGN, CONSTRUCTION AND OPERATIONS – IDENTIFIED IMPACTS .....	1
2.2	LAND USE, PLANNING, DESIGN, CONSTRUCTION AND OPERATIONS – MITIGATING MEASURES .....	2
<b>3</b>	<b>THE IMPLEMENTATION OF THE EMP</b> .....	<b>2</b>
<b>4</b>	<b>CONCLUSIONS</b> .....	<b>23</b>

## **List of Tables**

TABLE 1.	PLANNING PHASE .....	3
TABLE 2.	THE CONSTRUCTION PHASE .....	5
TABLE 3.	THE OPERATIONAL PHASE .....	12
TABLE 4.	DECOMMISSIONING PHASE .....	19



## 1 OBJECTIVES OF THE EMP

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Om'kumoh Consulting Engineers and A1V2 Joint Venture who acts on behalf of the National Petroleum Corporation of Namibia (Pty) Ltd (hereon referred to as NAMCOR) requested Geo Pollution Technologies (Pty) Ltd to update their existing environmental management plan (EMP) in order to renew their existing environmental clearance certificate (ECC). The updated Environmental Management Plan (EMP) is for NAMCOR's proposed bulk fuel storage facility in the Shali Industrial Estate in Windhoek. The EMP provides management options to ensure impacts of the proposed activities and normal 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 future decommissioning) of any proposed activity or development. All contractors and sub-contractors taking part in the construction of this facility 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 the construction and operational personnel in applying such controls; and
- ◆ to ensure that appropriate environmental training is provided to construction and operational personnel.

NAMCOR may choose to implement an environmental management system for the facility. 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

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The following general guidance for the EMP is based on the findings of the initial EIA and Risk Assessment carried out by Geo Pollution Technologies (Faul et al. 2017).

### 2.1 Land Use, Planning, Design, Construction and Operations – Identified Impacts

The following is a summary of the identified impacts:

- ◆ The current zoning designates the area as suitable for the construction and operations of the bulk fuel storage facility;
- ◆ The planned construction is in line with the Environmental Management Act of Namibia of 2007 that came into force on 6 February 2012 and requires NAMCOR to maintain a valid Environmental Clearance Certificate with an up to date EIA and EMP;
- ◆ The immediate neighbours constitute like industry;

- ◆ The risk of an accident/incident causing fires or explosions is considered to be high. Human factors are being considered and the best engineering goes into maintaining very safe depots. If a fire or explosion was to occur and the necessary engineered structures were not in place there would be a significant possible impact on the adjoining industrial properties.

## **2.2 Land Use, Planning, Design, Construction and Operations – Mitigating Measures**

The following is a summary of the proposed Management Plan, which will make the Development safe, taking into consideration all the risk perceptions raised by all stakeholders:

- ◆ The appointment of a reputable contractor for the construction of the development will ensure that construction is carried out to industry specifications and that the best work practices are followed.
- ◆ To prevent product loss through the rupture of a pipeline or hose during the loading/offloading operations, all nozzles on the rail tankers, road tankers and storage tanks must be fitted with excess flow check valves. These are designed to allow only specific flow rates and the moment this is exceeded, the process is automatically stopped. Small quantities lying in the hose that could leak should be captured by spill containment structures.
- ◆ Fire and explosion events must be eliminated through the existence of suitable firefighting equipment.
- ◆ The development does not pose any substantial ecological threat to the environment in the vicinity of the Shali Industrial Estate. Contamination of soils or groundwater must be prevented through safe work practices, engineered safety devices and spill containment structures.

## **3 THE IMPLEMENTATION OF THE EMP**

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

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

The EMP is a living document that must be prepared in detail, and regularly updated, by the proponent as the project progress and evolve. The tables below act as a guideline for the EMP to be established by NAMCOR. Impacts addressed and mitigation measures proposed are seen as minimum requirements which have to be elaborated on. Delegation of mitigation and reporting activities should be determined by the proponent and included in the EMP.

All monitoring results must be reported on as indicated. These are important for any future renewals of the environmental clearance certificate and must be submitted to the Ministry of Environment, Forestry and Tourism.



Table 1. Planning Phase

Activity	Objective	Action	Timing	Proof of Compliance	Responsible Body
<b>Compliance</b>	To comply with all legal requirements for the construction and operations of the facility 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 activity.  Finalise negotiations and resolve any outstanding issues, if any, over the allocation of user rights and zoning of the property on which the proposed activity will be located.	Prior to commencement of construction	All contracts, permits, certificates and other legal documents on file.	Proponent
<b>Baseline</b>	Determine baseline pollution conditions.	Collect soil and water samples where required and analyse for chemicals of concern.	Prior to commencement of construction	Analysis results on file	Independent Specialist Consultant
<b>Appointments</b>	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
<b>Management</b>	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	Prior to commencement of 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>Manuals</p> <ul style="list-style-type: none"> <li>● Adequate protection and indemnity insurance cover for incidents;</li> <li>● Comply with the provisions of all relevant safety standards;</li> <li>● Procedures, equipment and materials required for emergencies.</li> </ul>			
<b>Restoration Fund/Insurance</b>	To establish a fund / insurance for future environmental restoration or pollution remediation if ever required.	To establish a fund 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 construction and operations	Financial statements of restoration fund/insurance	Proponent; Independent Specialist Consultant
<b>Reporting</b>	To establish a reporting system to report on monitoring aspects of construction, operation and decommissioning as outlined in the EMP.	Establish a reporting system to report on aspects of construction, operation and decommissioning as outlined in the EMP. Submit bi-annual monitoring reports to the Ministry of Environment, Forestry and Tourism to allow for Environmental Clearance Certificate renewal applications where needed.	During construction and operations as well as possible future decommissioning of the development	Bi-annual Reports Monitoring	Proponent; Contractor
<b>Environmental Clearance Renewal</b>	To renew the Environmental Clearance Certificate every three years.	Appoint a specialist 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 the Khomas Region 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.	Training must be provided to Namibians to ultimately employ a predominantly Namibian workforce. Trained personnel to be issued with training certificates or managerial reference letters.	Proof of appointment of local contractors on file.	Proponent; Directors & Public Relations personnel.
Increased spread of HIV/AIDS; Increased influx to Shali Industrial area or other areas of Windhoek; Increased informal settlement and associated problems; Reduced property values Employment	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 trucking and distribution of goods to and from Windhoek could contribute to the spread of HIV / AIDS.	Restricted employment for local people only should be practiced. Deviations from this practice should be justified appropriately.  Educational programs on HIV/AIDS.	Proof of appointment of local contractors on file.	Proponent; Directors & Public Relations Personnel.
Traffic	The construction industry plays an important role in providing employment to locals.  The proposed sites are located within a new industrial area. Construction activities are expected to have some impact on the movement of traffic when construction material and equipment must be transported to	If skills exist locally Namibians must be employed. Alternatively training must be provided to Namibians to ultimately employ a predominantly Namibian workforce. Deviations from this practice should be justified appropriately.  At the tank farms, diversion of traffic may be required when cranes and flatbed truck vehicles frequent the site when installing the fuel tanks.  Should road closure occur, the contractor must liaise with neighbours who might be impacted. The contractor must also liaise with the relevant traffic department to ensure that traffic flow along the	Proof of appointment of local contractors on file.	Proponent; Directors & Public Relations Personnel.  Contractor, Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
	the site. Cranes and flatbed trucks may frequent the site.	affected route is minimally disrupted. Alternative roads should be clearly indicated with signs and/or personnel directing traffic.	recorded in the report together with steps taken to mitigate the impacts.	
<b>Fire</b>	Flammable products like fuel, lubricants, paints used during construction pose a risk of fire and explosion through improper handling.	<p>Construction workers may only be allowed to make fires for preparation of food in designated areas.</p> <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>All fuel storage and handling facilities in Namibia must comply with strict safety distances as prescribed by SANS. SANS is adopted by the Ministry of Mines and Energy as the national standard. If the setting-out of the site and the safety distances to the nearest adjacent property were adhered to, then any development can be safely built on the neighbouring property.</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</p>	<p>All information and reporting to be included in bi-annual report.</p> <p>Supervision of work is required and reports of safe and unsafe practice to be brought to the attention of the HSE.</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 bi-annual reports.</p>	Contractor, Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Health, Safety and Security</b>	During the construction phase, construction personnel will access the sites. Different excavation, earthmoving and transport equipment will be onsite. This increases the possibility of injuries. A high risk to site security and personnel health and safety exists during this period.	<p>and water supply should be carried out.</p> <p>Experience has shown that the best chance to rapidly put out a major fire is in the first 5 minutes. It is important to recognise that a responsive fire prevention plan does not solely include the availability of fire fighting equipment, but more importantly, it involves premeditated measures and activities to timeously prevent, curb and avoid conditions that may result in fires. An integrated fire prevention plan should be drafted before construction commences.</p> <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"> <li>● Adhere to Health and Safety Regulations pertaining to personal protective clothing, first aid kits, warning signs, etc.;</li> <li>● Ensure that adequate emergency facilities, including first aid kits, are available on site;</li> <li>● In consultation with the Windhoek 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 and excavation of pipeline trenches;</li> <li>● The contractor must use local media to make the public aware of construction activities that may pose safety risks;</li> <li>● Proper barricades and signage must be in place to warn and direct pedestrian and vehicle traffic away from construction sites;</li> <li>● Equipment that must be locked away on site and must be placed in a way that does not encourage</li> </ul>		
			<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 itself.</p> <p>Inventory of all stock to be reported on a weekly basis.</p> <p>All information and reporting to be included in bi-annual reports.</p>	Contractor, Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Underground Utilities</b>	<p>The nature of the construction is such that excavations will be made on the tank farm sites. Underground utilities like telecommunications, water supply and sewers are at risk of being damaged.</p> <p>These impacts may result in sections of Windhoek being left without amenities.</p>	<p>criminal activities;  <ul style="list-style-type: none"> <li>● Induction training for all who enter the site is required; and</li> <li>● Security personnel to prevent unauthorised entry of the construction site</li> </ul> <p>Refer to Emergency Response Guidebook 2008 and associated SANS document, MSDS and management system manuals.</p> <p>Appointing qualified and reputable contractors is essential. Proper training of construction personnel would reduce the possibility of the impact occurring.</p> <p>The contractor must determine exactly where amenities and pipelines are situated before construction commences, e.g. ground penetrating radar surveys or similar to reduce the risk. Liaison with the Municipality and suppliers of services is essential.</p> <p>Emergency procedures and contact details of emergency response teams for dealing with the possible consequences of this impact must be in place before construction commences.</p> </p>	<p>Maps and location information of existing underground amenities on file.</p> <p>A register of all incidents must be maintained on a daily basis. This should include measures taken to ensure that such incidents are not repeated.</p> <p>All information and reporting to be included in bi-annual reports.</p>	Contractor, Proponent
<b>Ecological Impact</b>	<p>The removal of indigenous and protected vegetation.</p> <p>Spills or leaks from construction vehicles.</p>	<p>Any camel thorn trees on site should be incorporated into the design of the facility where possible. Otherwise the necessary permits must be obtained from the City of Windhoek for the removal of this protected species.</p> <p>Pollution of the environment must be prevented.</p> <p>Report any extraordinary fauna or flora sightings to the Ministry of Environment and Tourism.</p> <p>As offset for the removal of the protected trees, NAMCOR in consultation with other land owners, the estate body corporate (if any), and the City of Windhoek, can identify a suitable area on or around</p>	<p>Proof of permits to remove trees and reporting of sightings on file.</p> <p>All information and reporting to be included in bi-annual reports.</p>	Contractor, Proponent

<b>Criteria</b>	<b>Nature</b>	<b>Mitigation</b>	<b>Monitoring</b>	<b>Responsible Body</b>
<b>Dust</b>	Dust may be generated during construction if it involves the exposure of soil before new concrete surfaces are laid and due to increased traffic to and from the site for deliveries and removals. This might be aggravated during periods of strong winds which occurs regularly in Namibia during the winter months.	<p>the estate where indigenous trees can be planted.</p> <p>It is recommended that regular dust suppression be included during construction when dust becomes an issue.</p> <p>Personnel are to be issued with dust masks for health reasons when needed.</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 bi-annual reports.</p>	Contractor, Proponent
<b>Noise</b>	Noise pollution will exist due to heavy vehicles accessing the sites with building materials. Cement mixing, drilling and excavating will be some additional noise producing activities.	<p>The site is situated in an industrial area and no limitations on the operating hours exist.</p> <p>The site is situated within the Windhoek municipal area and the City of Windhoek Council Resolution Guidelines 215/09/2006 with regards to noise emissions should be followed.</p> <p>Hearing protectors must be issued as part of PPE if needed.</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 bi-annual reports.</p>	Contractor, Proponent
<b>Waste Production</b>	<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 of the development 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>Due to the nature of some hazardous materials, they should be disposed of in an appropriate way at an appropriately classified waste disposal facility e.g. asbestos containing material. See the Material Safety Data Sheets available from suppliers if the user is not sure how to dispose of the substance. 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, or sooner if necessary, to maintain</p>	<p>A register of hazardous waste disposal should be kept. This should include type of waste, volume as well as disposal method/facility.</p> <p>Any complaints received regarding waste should be recorded with notes on action taken.</p> <p>All information and reporting to be included in bi-annual reports.</p>	Contractor, Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Groundwater, Surface Water and Soil Contamination</b>	<p>Porous surface substrate can allow hazardous and ecologically detrimental substances to seep down to the water table either at the location of the spillage or after being washed away by surface flow.</p> <p>Leakages from construction vehicles, accidental spills of fuel, paints and other chemicals might occur. Groundwater might spread pollutants to neighbouring receptors and may create an impact on underground infrastructure.</p>	<p>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>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 spill of fuel of 200 l or more must be reported and remediation must take place as soon as possible.</p> <p>Polluted soil and building rubble must be transported away from the site to an approved, appropriately classified waste disposal site. Hydrocarbon polluted soil may be remediated.</p> <p>Confirm MSDS information for any fuels, oils, lubricants or chemicals that must be discarded.</p> <p>The construction of the existing borehole must be assessed and suitably altered to reduce the risk of the borehole forming a pathway to the groundwater.</p>	<p>A soil pollution baseline study must be carried out before construction on the sites commences. This will allow assessment of the condition of soil substrate during operational and after decommissioning phases.</p> <p>A report form for all spills or leaks during construction is to be completed by Contractor and submitted to the proponent.</p> <p>All information and reporting to be included in bi-annual reports.</p>	<p>Contractor, Independent Consultant</p> <p>Proponent, Specialist</p>
<b>Visual Impact</b>	<p>This is an impact that affects the aesthetic appearance.</p>	<p>Regular upkeep of the construction area will ensure continuous low visual impact.</p>	<p>Any complaints received regarding the visual appearance of the site must be recorded with notes on action taken.</p> <p>All information and reporting to be included in bi-annual reports.</p>	<p>Contractor; Proponent</p>
<b>Heritage Impact</b>	<p>Protection of cultural resources falls under the National Heritage Act (Act 27 of 2004) and the National Monuments Act No 28 of 1969 as amended until 1979 - Ministry of Youth, National</p>	<p>If any archaeological remains such as treasures, accumulations of bones or shells and ash dumps are uncovered at any stage, the Contractor shall stop work immediately and contact the relevant authorities. If human remains or burial sites are uncovered, the matter has to be immediately reported to the nearest</p>	<p>Record of any discoveries and proof of notifications to authorities on file.</p> <p>All information and reporting to be included in bi-annual reports.</p>	<p>Contractor; Proponent</p>



Criteria	Nature	Mitigation	Monitoring	Responsible Body
<p><b>Cumulative Impact</b></p>	<p>Service, Sport and Culture.</p> <p>Possible cumulative impacts associated with the construction phase include increase in traffic frequenting the site. This impact will however be short lived. This will also aggravate noise levels when combined with the noise generated by construction. Construction sites tend to draw people looking for employment. Increased traffic together with increased movement of people around the constructions site may lead to amplified health and safety risks.</p>	<p>Namibian Police Office. No work may continue at the site until the relevant authority has issued permission to do so.</p> <p>Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.</p>	<p><b>Bi-annual</b> reports will provide an overall assessment of the impact of the Construction Phase.</p>	<p>Contractor; Proponent</p>

Table 3. The Operational Phase

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Skills, Technology &amp; Development</b>	Enhanced skills and technology transfer to the Khomas Region and subsequent promotion of economic development.	Training must be provided to Namibians to ultimately employ a predominantly Namibian workforce.	Copies of training certification or managerial references on file.  Bi-annual summary report based on actual training and the enhancement of skills and transfer of technology should be compiled.	Proponent
<b>HIV/AIDS, In-migration, Informal Settlements and Property Prices</b>	Increased spread of HIV/AIDS; Increased influx to Windhoek; Increased informal settlement and associated problems; Property prices.	Restricted employment for local people only should be practiced. Deviations from this practice should be justified appropriately.  Educational programs on HIV/AIDS.	Bi-annual summary report based on educational programmes and training conducted.  Bi-annual report and review of employee demographics.	Proponent
<b>Employment</b>	The facility will play an important role in providing employment to locals.	If skills exist locally Namibians must be employed. Alternatively training must be provided to Namibians to ultimately employ a predominantly Namibian workforce. Deviations from this practice should be justified appropriately.	Bi-annual summary report based on employee records.	Proponent
<b>Traffic</b>	The Development is located within an industrial area. Movement of traffic to and from the site is assessed. Trucks must enter and leave the sites for every loading and off-loading event.  The distribution of fuel by truck from the depot will vary in intensity depending on demand. Limited parking for trucks exists in the streets leading to the entrances.  Due to the nature of the neighbouring industries, trucks will frequent the areas	Uploading of fuel is normally during working hours. However, allowing extended fuelling times after hours may reduce congestion. NAMCOR together with the neighbouring industries may have to convene a meeting to discuss a workable solution should traffic congestion become a significant problem. Careful planning and scheduling of truck arrival for unloading events might be required. Furthermore:  <ul style="list-style-type: none"> <li>● Trucks should not be allowed to park in the streets, outside the erven, for extended periods of time.</li> <li>● Trucks are not allowed outside the depot earlier than 1 hour prior to the depot opening time, and should leave</li> </ul>	A register of trucks arriving and leaving the premises must be kept.  Any complaints received regarding traffic issues should be recorded in the report and corrective action taken noted.  A report should be compiled every 6 months of the daily number of trucks processed and complaints received.	Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
	<p>around the development. This may cause traffic disruptions, especially during times of increased fuel demand and when trucks are waiting in the street to gain access to the respective industries.</p>	<p>within an hour after depot closing time.</p> <ul style="list-style-type: none"> <li>● Proper signage to direct traffic should be in place.</li> <li>● A speed limit of 40 km/h is recommended for the industrial area.</li> </ul>		
<p><b>Fire and Explosion Hazard</b></p>	<p>Volatile fuels like unleaded petrol can release considerable vapour at temperatures even below ambient, which readily form flammable mixtures. Vapours settle to ground level and may reach, via drains and other underground passages, ignition sources remote from the point of release. Product can accumulate a static charge, which may cause a fire or explosion.</p> <p>Exposure of the product to the air or ground where it can be ignited could be as a result of the following incidents or actions at the points of receipt, storage and uploading :-</p> <p>Fuel receipt (from fuel ship tankers, road gantries and pipelines) and loading (road and rail gantries):</p> <ul style="list-style-type: none"> <li>● Breakage of offloading pipe</li> <li>● Coupling malfunction</li> <li>● Containment insufficient</li> <li>● Pump and pipeline failure en route to storage or gantries</li> <li>● Open electrical equipment or electrical installations</li> <li>● Valve malfunction</li> <li>● Gasket, valves or pump seal leaks</li> <li>● Unauthorised entry of rail locomotive entering rail gantry</li> <li>● Running of tanker truck engines at gantry (engine suck in fuel</li> </ul>	<p><b>Fire Fighting and Fire Prevention:</b></p> <p>All fire precautions and fire control at the new site must be in accordance with SANS 10089, or better. Firefighting measures as per the Material Safety Data Sheets of the products should be adhered to.</p> <p>SANS 10089 is adopted by the Ministry of Mines and Energy as the national standard. The proposed facility exceeds the SANS safety distances. Safety distances given by SANS work on the premises that if the setting-out of the site and the safety distances to the nearest adjacent property are adhered to, then any development can be safely built on the neighbouring property. It is specifically appropriate to comply with these standards, as the proponent would have no control on the future placement of facilities around the proposed facility.</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 installation. Regular inspections should be carried out to check for these materials at the site.</p> <p>It must be assured that sufficient water is available for firefighting purposes. The development should ensure that the volume of water remains adequate for fire protection and is according to the SANS 10089 specifications.</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 for dealing with spills.</p>	<p>A report should be compiled every 6 months of all incidents reported. The report should contain dates when fire drills were conducted and when fire equipment was tested.</p>	<p>Proponent</p>

Criteria	Nature	Mitigation	Monitoring	Responsible Body
	<p>vapours, causing truck to misfire and create ignition source)</p> <ul style="list-style-type: none"> <li>◆ Grounding and bonding cables defective</li> <li>◆ Driving off with offloading pipe and earth cable connected</li> <li>◆ Failure to stop pumps from gantry resulting in overfilling of tanks</li> <li>◆ Pipe coupling/nozzle popping off tank nozzle</li> <li>◆ Drain back facility coupling/nozzle popping out of tank inlet</li> <li>◆ Not following procedures</li> <li>◆ Working on under pressurised pipelines</li> <li>◆ Cell phones and open flames</li> <li>◆ Spilled product from leaking valves and nozzles</li> <li>◆ Housekeeping</li> <li>◆ Leaking tanks</li> <li>◆ Leaking pipelines</li> </ul> <p>Storage:</p> <ul style="list-style-type: none"> <li>◆ Not following procedures for correct storage</li> <li>◆ Poor housekeeping (cleanliness and packing)</li> <li>◆ Flammable organic material not removed (plants, paper &amp; dirty rags)</li> <li>◆ Heat exposure in sun</li> <li>◆ Cell phones and open flames</li> <li>◆ Reckless driving – infrastructure collision</li> <li>◆ Overfilling storage tanks</li> <li>◆ Broken or cracked bund walls leaking product to source of ignition off site</li> </ul>	<p><b>Mitigation</b> Experience has shown that the best chance to rapidly put out a major fire is in the first 5 minutes. It is important to recognise that a responsive fire prevention plan does not solely include the availability of firefighting equipment, but more importantly, it involves premeditated measures and activities to timeously prevent, curb and avoid conditions that may result in fires. An integrated fire prevention plan should be drafted before “start-up” of the facilities. Special note must be taken of the regulations stipulated in sections 47 and 48 of the Petroleum Products and Energy Act, 1990 (Act No. 13 of 1990).</p>		

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Health, Safety &amp; Security</b>	<ul style="list-style-type: none"> <li>● Poorly sealed containment</li> <li>● During operational times, all procedures for offloading, storage and loading of fuels can pose a risk to people. These risks are assessed in terms of the predicted impact if they occur. Typical examples are:- <ul style="list-style-type: none"> <li>● Tripping over an earthing cable</li> <li>● Falling off the rail tanker or tanker truck</li> <li>● Breathing in excessive fumes</li> <li>● Slipping on wet surfaces</li> <li>● Product contact with eyes and skin</li> <li>● Staff not wearing protective clothing</li> <li>● Muscular injury from incorrect lifting techniques</li> <li>● Working at heights</li> </ul> </li> <li>● Security risks associated with theft and sabotage.</li> </ul>	<p>All Health and Safety standards specified in the Labour Act should be complied with.</p> <p>All staff members to be briefed about the potential risks of exposure to hydrocarbons or injuries on site.</p> <p>Adhere to the following:</p> <p>Health and Safety Regulations pertaining to personal protective clothing, first aid kits being available on site, warning signs, etc.;</p> <p>Selected personnel should be trained in first aid. The contact details of all emergency services must be readily available;</p> <p>Dermal contact with hydrocarbons must be avoided and all products handled according to their MSDS.</p> <p>Typical mitigating measures within the health and safety management systems are:-</p> <ul style="list-style-type: none"> <li>● Operational and procedural manuals</li> <li>● Health and Safety Training</li> <li>● Housekeeping rules</li> <li>● Colour coding areas, pipes, equipment and substances</li> <li>● Signage for Personal Protective Equipment (e.g. protective clothing like safety boots and hard hats)</li> <li>● Safe work procedures and permits to work</li> <li>● Clearance certificates for confined spaces</li> <li>● Emergency response plans</li> <li>● Material Safety Data Sheets (MSDS)</li> <li>● First aid treatment and training</li> <li>● Medical procedures and emergency services</li> <li>● Daily safety moments and/or drills</li> </ul>	<p>A report should be compiled bi-annual of all incidents reported. The report should contain dates when training was conducted and when safety equipment and structures were inspected and maintained.</p>	<p>Proponent</p>
<b>Air Quality</b>	<p>Gases which are detrimental to living organisms are assessed under this section. Many petroleum products are volatile and vapours can accumulate in</p>	<p>Fuel spills, especially ULP, will quickly vaporize and emissions will disperse quickly downwind and hydrocarbon gases are heavier than air.</p> <p>Staff and clients should be kept away from areas where large</p>	<p>Bi-annual testing of air at various points around the storage tanks, pipelines, immediate vicinity of the</p>	<p>Proponent; Independent Specialist Consultant</p>

<b>Criteria</b>	<b>Nature</b>	<b>Mitigation</b>	<b>Monitoring</b>	<b>Responsible Body</b>
	<p>the environment.</p> <p>Hydrocarbon vapours will normally be released during loading and offloading procedures and if spills occur.</p>	<p>spills occur, resulting in strong vapours, until the vapours have dispersed.</p>	<p>property and selected distances further away from outside of the property. More frequent testing should be received or if an increase in released gases is suspected.</p> <p>All data to be compiled in a Bi-annual report and reviewed by an independent specialist.</p>	
<b>Noise</b>	<p>Noise pollution will exist due to heavy vehicles and trains accessing the site to transport fuel to and from the sites.</p>	<p>The site is situated in an industrial area and no limitations on the operating hours exist.</p> <p>The site is situated within the Windhoek municipal area and the City of Windhoek Council Resolution Guidelines 215/09/2006 with regards to noise emissions should be followed.</p> <p>Hearing protectors must be issued as part of PPE if needed.</p>	<p>Any complaints received regarding excessive noise should be recorded with notes on actions taken.</p> <p>All complaints and additional data, if available, to be compiled in a report Bi-annually</p>	Proponent
<b>Waste Production</b>	<p>The ability of a product to act as a waste which must be cleaned up. These can be soils that become contaminated with fuel. Domestic waste from bins, offices and ablution facilities.</p> <p>Contamination of fuel through accidental mixing of products results in waste.</p>	<p>Consult the relevant MSDS for handling hazardous substances. Contaminated fuel products that can no longer be used in the market must be transferred to waste oil recycling facilities where possible or disposed of in the hazardous waste section of the municipal dump.</p> <p>Hazardous waste should be stored in a bunded area before disposed of to prevent contamination of surrounding areas.</p> <p>Oil-Water Separators must be cleaned regularly and contaminated products disposed of at the hazardous waste section of the municipal dump.</p> <p>Contaminated soils can be remediated in accordance with accepted procedures at a site dedicated for this purpose.</p> <p>All other domestic waste should be disposed of regularly.</p>	<p>A register of hazardous waste disposal should be kept. This should include type of waste, volume as well as disposal method/facility.</p> <p>Any complaints received regarding waste should be recorded with notes on action taken.</p> <p>All data to be compiled in a bi-annual report.</p>	Proponent
<b>Groundwater,</b>	<p>Porous surface substrate can allow</p>	<p>The following measures must be employed to prevent</p>	<p>Bi-annual reports of all spills</p>	Proponent,

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<p><b>Surface Water and Soil Contamination</b></p> <p>hazardous and ecologically detrimental substances to seep down to the water table.</p> <p>Limited surface runoff from the sites is expected due to low rainfall. Runoff of pollutants from the tanks is not expected to reach any nearby surface water due to the bund walls and the design of the facility.</p> <p>Groundwater is utilized in the area for human consumption and should be protected.</p> <p>Proper containment mechanisms installed should confine any release that might take place from spillages during operation of the facility.</p>	<p>spillage into surface water drainage channels and groundwater sources:-</p> <ul style="list-style-type: none"> <li>● Spill control structures and procedures must be in place according to SANS 10089 standards or better, including impounding around the loading areas by bunding with appropriate slopes of 1:100.</li> <li>● All fuelling should be carried out on surfaces provided for this purpose. E.g. Concrete slabs with regularly maintained seals between slabs.</li> <li>● 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.</li> <li>● Proper training of operators must be conducted on a regular basis.</li> <li>● Any spillage of more than 200 l must be reported as per the Petroleum Products License.</li> <li>● Spill clean-up kit must be available on site as per the relevant Material Safety Data Sheets</li> <li>● Proper bund areas at the rail gantry right up to the exit gate will ensure that any product leaked on the premises is collected.</li> <li>● Contingencies for the changes in pressure and temperature between Walvis Bay and Windhoek must be in place when filling rail tankers in Walvis Bay.</li> <li>● Overfilling of the tanks in Walvis Bay can cause product loss on route as release valves compensate for volume changes due to lower pressure and higher temperatures at the destination. Rail tankers arriving in the morning could release liquid fuel as temperatures rise. If these tankers are not positioned over bunded areas, soil contamination will occur.</li> <li>● During the rainy season, this fuel can be carried away to nearby drainage systems or infiltration towards the water table can ensue.</li> <li>● Regular groundwater monitoring for the presence of</li> </ul>	<p>or leakages reported should be compiled. The report should contain the following information:</p> <ul style="list-style-type: none"> <li>● date and duration of spill</li> <li>● product spilled</li> <li>● volume of spill</li> <li>● remedial action taken</li> <li>● Comparison of pre-exposure baseline data with post remediation data (e.g. soil hydrocarbon concentrations)</li> <li>● Copy of documentation in which spill was reported to Ministry of Mines and Energy</li> </ul> <p>Bi-annual testing of groundwater for hydrocarbons at various points around the storage tanks and pipelines. More frequent testing should a leak be suspected.</p> <p>All data to be compiled in a bi-annual report and reviewed by an independent specialist.</p>	<p>Independent Specialist Consultant</p>	

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Ecological Impact</b>	Probability of the site creating a habitat for indigenous flora and fauna to establish is relatively low, but birds may nest on structures.	<p>hydrocarbons.</p> <p>The nesting of birds should be discouraged.</p> <p>Pollution of the environment must be prevented by adhering to SANS and petroleum industry standards.</p>	<p>Regular inspection must be performed to monitor for bird nesting. Mitigation measures must be investigated and implemented if required.</p> <p>All data to be compiled in a bi-annual report.</p>	Proponent
<b>Visual Impact</b>	This is an impact that affects the aesthetic appearance.	<p>No specific measures need to be implemented to maintain a similar visual impact to other industrial buildings.</p> <p>Routine maintenance on infrastructure will ensure that the longevity of structures is maximised. However, it is important that the real integrity of the structures is considered in the long term and not just appearances.</p>	A report should be compiled every 6 months of all complaints reported and remediation action taken.	Proponent
<b>Cumulative Impact</b>	<p>Possible cumulative impacts associated with the operational phase include increase in traffic frequenting the site and along the section of road near the fuel depot due to increased demand for fuel and the need to perform regular maintenance. Therefore increase in noise may occur and emissions from these vehicles can decrease the air quality around the proposed establishment.</p> <p>Wear and tear on the road and increased risk of road traffic incidences could increase.</p> <p>Accumulated lack of maintenance on bund walls and tanks could reduce the integrity safety of the whole depot and affect many of the impacts discussed.</p>	<p>Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.</p> <p>Reviewing biannual and annual reports for any new or re-occurring impacts or problems would aid in identifying cumulative impacts and help in planning, if the existing mitigations are insufficient.</p>	Bi-annual summary report based on all other impacts must be created to give an overall assessment of the impact of the Operational Phase.	Proponent



Table 4. Decommissioning Phase

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Waste Production</b>	<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>To reduce the amount of waste, all re-usable pipelines, pumps, tanks, valves and other equipment must be removed to another site or sold.</p> <p>Those items that cannot 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 City of Windhoek.</p> <p>Rehabilitation, if necessary, is 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>	<p>Proponent; Contractor</p>
<b>Employment</b>	<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>During normal operations of the facility an annual report must be compiled that includes the appropriate plans for handling of employees should the facility be decommissioned. The report should include budgeting for retrenchments and possible alternative positions elsewhere.</p>	<p>Proponent; Directors &amp; Public Relations personnel or Human Resource Department.</p>
<b>Ecological Impact</b>	<p>Operations spanning many years may create new habitat for fauna and flora. Upon decommissioning these habitats will be destroyed.</p>	<p>MME would have to take into consideration any new flora and fauna habitats created. 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 and occupied by fauna or flora, NAMCOR must contact MET or other appropriate organizations to establish the conservation status.</p> <p>The possibility of relocating the fauna or flora must be investigated and executed. Should the species be listed as vulnerable to extinction, a meeting should be held with MET</p>	<p>A report should be compiled of any fauna and flora that established itself on the premises. The report should include all actions taken to relocate or deal with the situation.</p>	<p>HSE, DM &amp; Contractor</p>

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Employment &amp; Secure Fuel Supply</b>	Decommissioning of the depot may lead to retrenchments or re-location of staff no longer required. Fuel supply to the region and Namibia as a whole may be negatively influenced if alternative depots cannot handle demand.	<p>in order to determine the appropriate handling of the situation.</p> <p>Plan in advance for meeting the Labour Act's 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>Alternative petroleum companies must be informed of the decommissioning plans to allow them to adequately plan for increased demand of fuel Nationally.</p>	During normal operations of the depot an annual report must be compiled that includes the appropriate plans for handling of employees should the depot be decommissioned. The report should include budgeting for retrenchments and possible alternative positions elsewhere. An annual report should be compiled with total volumes of fuel handled in order to appropriately cater for the increase in demand for fuel at alternative depots.	Directors & Public Relations Personnel or Human Resource Department.
<b>Dust</b>	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. Accumulation of rubble that may cause dust should not be allowed and must be taken to the dumpsite within reasonable time.	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 and Contractor
<b>Noise</b>	Noise pollution will exist due to heavy vehicles accessing the site to collect waste and rubble.	The site is situated in an industrial area and no limitations on the operating hours exist. The site is situated within the Windhoek municipal area and the City of Windhoek Council Resolution Guidelines 215/09/2006 with regards to noise emissions should be followed. Hearing protectors must be issued as part of PPE if needed.	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.

<b>Criteria</b>	<b>Nature</b>	<b>Mitigation</b>	<b>Monitoring</b>	<b>Responsible Body</b>
<b>Visual Impact</b>	This is an impact that affects the aesthetic appearance of the site.	Visual impact could pose one of the most significant impacts. Visual impacts could be limited through keeping all decommissioned areas clean and orderly at all times. Good housekeeping also reduces the risk of injuries. 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 visual 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.	Proponents and Contractor
<b>Groundwater, Surface Water and Soil Contamination</b>	Porous surface substrate can allow hazardous and ecologically detrimental substances to seep down to the water table.	<p>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.</p> <p>Confirm MSDS information of any remaining fuels, oils or lubricants that must be discarded.</p> <p>Regulations on sewerage discharge and the chemicals that may and may not be put into the sewerage system must be followed.</p>	<p>Report form for all spills or leaks is to be completed by Contractor and submitted to the HSE.</p> <p>A baseline study must be carried out after the decommissioning. This is to assess the condition of soil substrate and any 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>	HSE, DM, Contractor, GPT
<b>Health, Safety and Security</b>	During the Decommissioning Phase, similar risks to people as with previous phases will be present. Once the tanks and pipelines have been emptied completely of their contents, residual amounts of fuel might exist. All other risks associated with demolitions must be considered.	<p>The decommissioning of a bulk fuel storage facility can cause serious health and safety risks to workers on site. Occupational exposures are normally related to dermal contact with fuels and inhalation of fuel vapours during handling of such products. Excessive dust and noise also pose health risks. For this reason adequate measures must be brought in place to ensure safety of staff on site, and includes:</p> <ul style="list-style-type: none"> <li>● Proper training of operators;</li> <li>● First aid treatment;</li> <li>● Medical assistance;</li> <li>● Emergency treatment;</li> <li>● Prevention of inhalation of fumes (fuel);</li> </ul>	A register of all incidents must be maintained on a daily basis. This should include measures taken to ensure that such incidents are not repeated.	Proponent and Contractor

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Fire and Explosion Hazard</b>	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><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>● Protective clothing, footwear, gloves and belts; safety goggles and masks;</li> <li>● Manuals and training regarding the correct handling of materials should be in place and updated as new or updated material safety data sheets become available; Risks might be lower, but still exist especially if tanks must be entered for inspections. Confined space training will be required.</li> <li>● 24-hour security surveillance in case of opportunistic activities.</li> </ul>	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.	HSE, DM & Contractor
	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 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 fuel storage facility. All fire precautions and fire control at the fuel storage facility must be in accordance with SANS or better. The holistic fire protection and prevention plan should still be utilised. Experience has shown that the best chance to rapidly put out a major fire is in the first 5 minutes. It is important to recognise that a responsive fire prevention plan does not solely include the availability of fire fighting equipment, but more importantly, it involves premeditated measures and activities to timeously prevent, curb and avoid conditions that may result in fires.			

## 4 CONCLUSIONS

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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. Parties responsible for transgression of the EMP should be held responsible for any rehabilitation that may need to be undertaken. The proponent could use an in-house Health, Safety, Security and Environment Management System in conjunction with the environmental management plan. All operational personnel must be taught the contents of these updated documents.

Monitoring reports must be submitted to the ministry of Environment, Forestry and Tourism, Department of Environmental Affairs every 6 months to allow for the future renewal of the ECC. It is advised that an environmental consultant be involved in the monitoring and compilation of the monitoring reports and rehabilitation plans.