

**UPDATED ENVIRONMENTAL MANAGEMENT PLAN  
EXISTING BULK STORAGE FACILITY AND FILLING  
OPERATIONS FOR LIQUEFIED PETROLEUM GAS, SOUTHERN  
INDUSTRIAL, WINDHOEK**



**Assessed by:**



**Assessed for:**



September 2021



<b>Project:</b>	<b>UPDATED ENVIRONMENTAL MANAGEMENT PLAN FOR THE EXISTING BULK STORAGE FACILITY AND FILLING OPERATIONS FOR LIQUEFIED PETROLEUM GAS, SOUTHERN INDUSTRIAL, WINDHOEK.</b>
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I, \_\_\_\_\_, acting as representative of V Triple J Energies (Pty) Ltd, hereby confirm that the project description contained in this report is a true reflection of the information which the Proponent provided to Geo Pollution Technologies. All material information in the possession of the proponent that reasonably has or may have the potential of influencing any decision or the objectivity of this assessment is fairly represented in this report and the report is hereby approved.

Signed at \_\_\_\_\_ on the \_\_\_\_\_ day of \_\_\_\_\_ 2021.

\_\_\_\_\_  
Triple J Energies (Pty) Ltd

\_\_\_\_\_  
2011/0091  
Business Registration/ID Number



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### **LIST OF ABBREVIATIONS**

<b>API</b>	American Petroleum Institute
<b>BLEVE</b>	Boiling Liquid Expanding Vapour Explosion
<b>EMP</b>	Environmental Management Plan
<b>EMS</b>	Environmental Management System
<b>GPT</b>	Geo Pollution Technologies
<b>HSE</b>	Health, Safety & Environment
<b>LPG</b>	Liquefied Petroleum Gas
<b>MEFT</b>	Ministry of Environment, Forestry and Tourism
<b>MME</b>	Ministry of Mines and Energy
<b>MSDS</b>	Material Safety Data Sheet
<b>SANS</b>	South African National Standards

# 1 BACKGROUND, INTRODUCTION AND JUSTIFICATION

Geo Pollution Technologies has been appointed by Triple J Energies (Pty) Ltd (the Proponent) to update their Environmental Management Plan (EMP) for their existing liquefied petroleum gas (LPG) bulk storage facility and filling operations, GasIt, in the Southern Industrial Area, Windhoek (Figure 1-1). Land use on the property is Formal Open Space with a railway servitude as the property is leased from TransNamib. There are residential areas between 100 and 200 m from the site

This EMP is based on potential impacts and risks identified during a desktop study and site visit carried out by Geo Pollution Technologies, and recommends guidelines and measures to help mitigate these potential impacts and risks.

Triple J Energies has been operating the LPG bulk storage facility and filling operation known as GasIt since 2014. Prior to 2014 the facility was operated by Autogas. Two bulk LPG storage tanks on site are filled by tanker trucks, travelling via road from South Africa. The railway siding is currently not being used for deliveries. On average, two trucks per week deliver gas to the facility. From the bulk LPG storage tanks, the gas is dispensed to smaller cylinders and supplied to clients. In addition to the LPG operations, a small mobile carbon dioxide (CO<sub>2</sub>) tank is located underroof at a CO<sub>2</sub> filling and storage area. See Figure 1-2 for a site layout map.

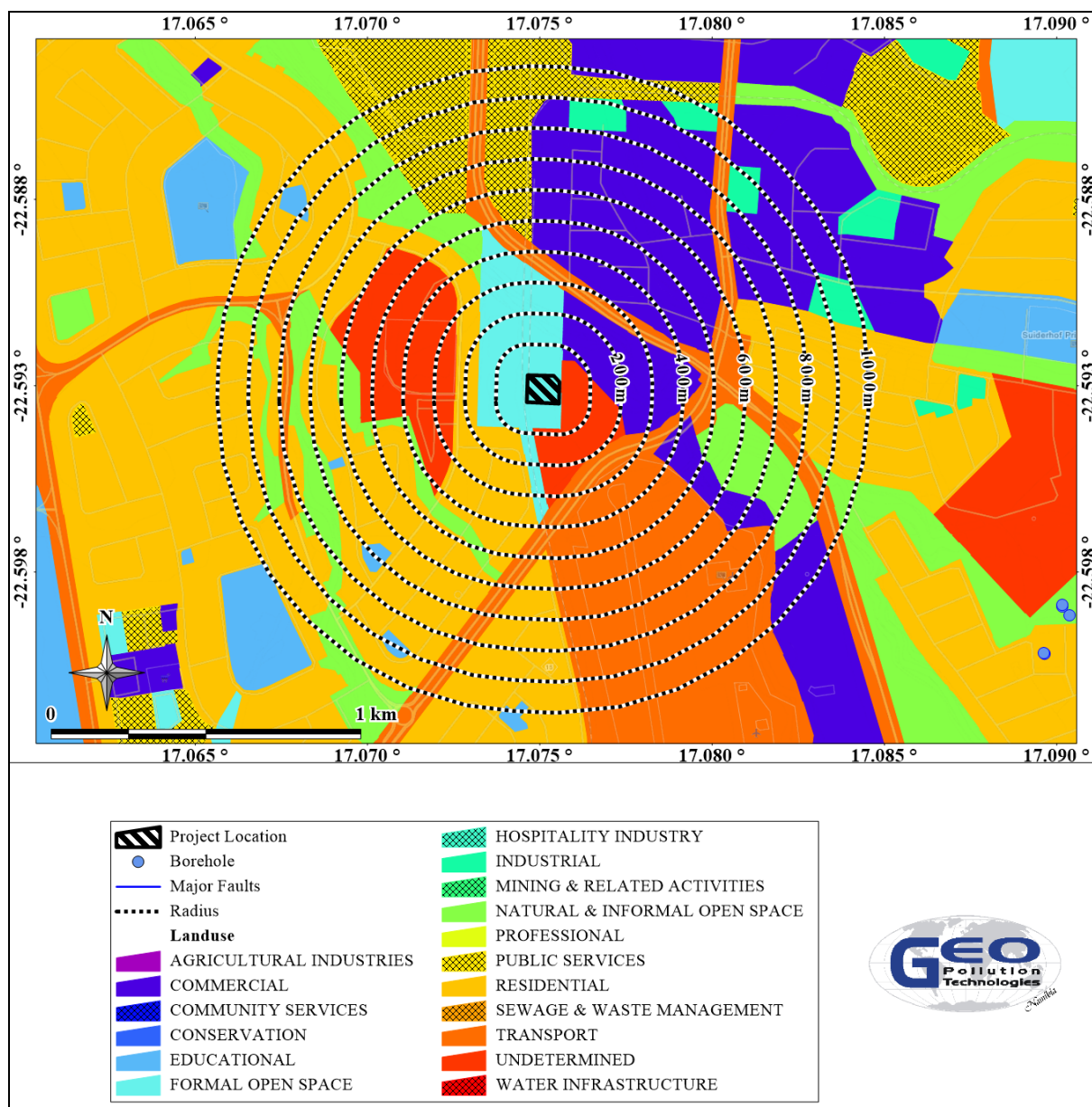
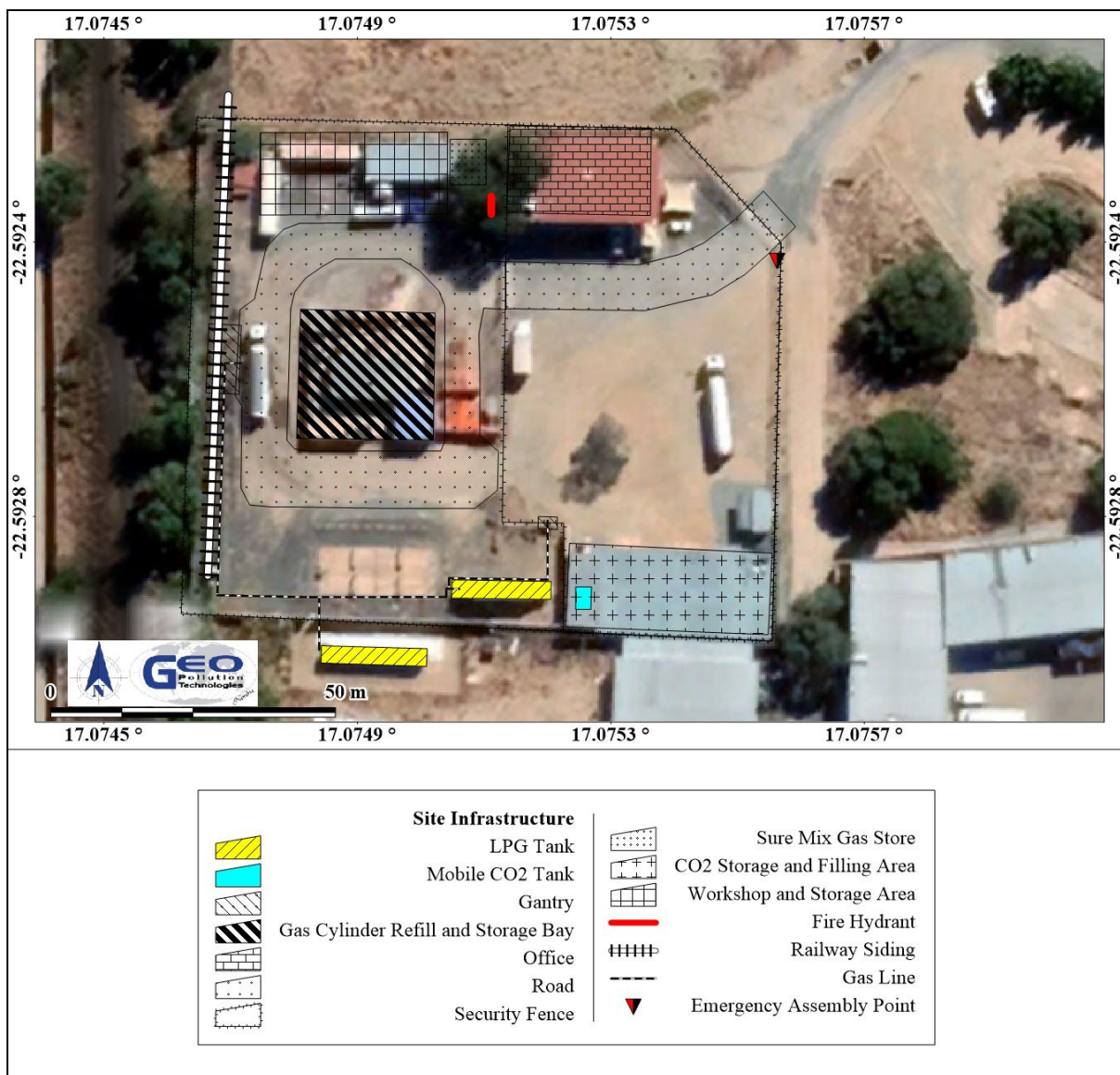


Figure 1-1. Land use Map

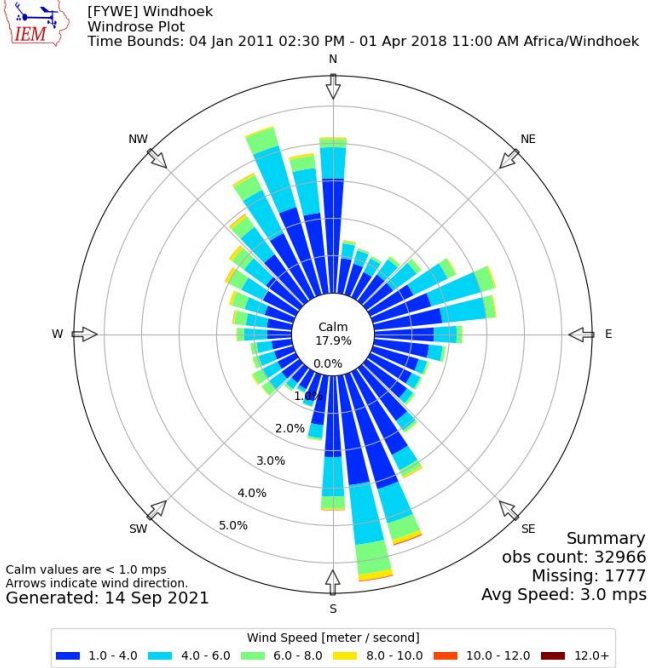


**Figure 1-2. Site layout**

The area is located in a previous disturbed land area and no ecological impacts are expected. In terms of climate, precipitation is sporadic and unpredictable, high intensity, highly localised storm events between October and April. The dominant wind direction in the area is north-northwesterly and south-southeasterly winds. Table 1-1 summarises the main climate characteristics of the area.



**Table 1-1. Summary climate data**

<b>Classification of climate</b>	Semi-arid highland savannah
<b>Precipitation</b>	Average annual rainfall 300-350 mm/a. Sporadic and unpredictable, high intensity, highly localised storm events between October and April.
<b>Variation in annual rainfall (%)</b>	30-40
<b>Average annual evaporation (mm/a)</b>	3,000-3,200
<b>Water deficit (mm/a)</b>	1,701-1,900
<b>Average annual temperatures (°C)</b>	19-20
<b>Windhoek Wind Summary 2013 - 2018</b>	 <p>[FYWE] Windhoek Windrose Plot Time Bounds: 04 Jan 2011 02:30 PM - 01 Apr 2018 11:00 AM Africa/Windhoek</p> <p>Summary obs count: 32966 Missing: 1777 Avg Speed: 3.0 mps</p> <p>Calm values are &lt; 1.0 mps Arrows indicate wind direction. Generated: 14 Sep 2021</p> <p>Wind Speed [meter / second]  1.0 - 4.0    4.0 - 6.0    6.0 - 8.0    8.0 - 10.0    10.0 - 12.0    12.0+</p>

## 2 OBJECTIVES OF THE EMP

The EMP provides management options to ensure any negative impacts during any construction and operational activities 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 activity or development. All contractors and sub-contractors taking part in the operations of this facility should be made aware of the contents of the EMP, so as to conduct 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 operations of the facility;
- ◆ to monitor and audit the performance of operational personnel in applying such controls; and
- ◆ to ensure that appropriate environmental training is provided to all operational personnel.

Triple J Energies may choose to implement an environmental management system for the GasIt 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.



**Photo 1. LPG Storage tanks with Fire Protection**



**Photo 2. Mobile CO<sub>2</sub> tank**



**Photo 3. Gantry for offloading LPG**



**Photo 4. Gas Cylinder filling bay**



**Photo 5. Fire hydrant**



**Photo 6. Emergency assembly point**

### **3 THE EMP**

The following general guidance for the EMP is based on possible impacts and risks associated with the facility, as identified by Geo Pollution Technologies.

#### **3.1 Land Use, Planning, Construction, Operations – Identified Impacts**

The following is the summary of the identified impacts:

- ◆ The current zoning designates the area as suitable for the continued operations of Triple J Energies' GasIt facility;

- ◆ The immediate neighbours constitute mixed land use;
- ◆ The risk of an accident/incident causing fire or explosions is possible. Human factors are still being considered and the best engineering still goes in to maintaining a very safe facility. If a fire or explosion was to occur and the necessary engineered structures were not in place there could be a significant impact on the adjoining properties.

### **3.2 Land Use, Planning, Construction, Operations – Mitigating Measures**

The following is a summary of the proposed management plan, which will make the facility safe taking into consideration all the risk perceptions identified:

- ◆ To prevent product loss and the possibility of fires and explosions the facility must adhere to SANS standards or better. Regular inspection of all pipelines, tanks, valves, connectors, etc. should be performed and records kept thereof.
- ◆ Adequate firefighting equipment should be present on site.
- ◆ The LPG storage tanks are pressurised tanks and designed not to open to the atmosphere like liquid storage tanks. There is absolutely no chance of LPG vapours being released from the storage tanks during normal operations or at any other time, except during emergencies where there is a build-up of pressure, exceeding a set threshold.
- ◆ The risk of ecological threat and the contamination of soils or groundwater is prevented through safe work practices and waste management plans.
- ◆ Strict operational procedures and emergency measures are implemented and enforced by Triple J Energies to manage potential risks.
- ◆ All personnel working on site to receive annual training on handling of gas and safety procedures. This will be applicable to Triple J Energies employees as well as contractors.

## **4 THE IMPLEMENTATION OF THE EMP**

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

- ◆ Planning for Operations and Future Decommissioning of the Project
- ◆ Future Construction/Maintenance 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. Impacts addressed and mitigation measures proposed are seen as minimum requirements which have to be elaborated on where needed. Delegation of mitigation and reporting activities should be determined by the proponent and included in the EMP.

The EMP and Environmental Clearance Certificate must be communicated to the site manager. 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 and Tourism during any renewal application.

With renewal of the environmental clearance certificate a summary report based on the monitoring prescribed in this EMP must be submitted to the Ministry of Environment and Tourism together with the application for renewal.

Table 4-1. Planning for operations and future decommissioning of the project

Activity	Objective	Action	Timing	Proof of Compliance	Responsible Body
<b>Compliance</b>	To comply with all legal requirements for the operations of the facility in Namibia.	Ensure all the necessary permits from the various ministries, local authorities and any other bodies that governs the operations of the activity is up to date and available.	Along with implementation of the EMP	All contracts, permits, certificates and other legal documents on file.	Proponent
<b>Appointments</b>	To appoint reputable contractors and operational personnel (if contractors are appointed for any activities) and establish the EMP, a legal requirement that forms part of the contract with the contractor and employees.	Appoint contractors 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 any new activities on the project, i.e., upgrades and construction and ongoing throughout operations.	Contracts should be kept on file.	Proponent; Contractor
<b>Management</b>	Establish / maintain a management system to implement and monitor Health, Safety and Environment.	Make provisions to have a responsible person to 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: <ul style="list-style-type: none"> <li>Risk Management / Mitigation / Environmental Management Plan/ Emergency Response Plan and HSE Manuals.</li> <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>	Along with the implementation of the EMP 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
<b>Restoration Fund/Insurance</b>	To ensure adequate funds / insurance are available for restoration and rehabilitation of	Establish a fund / obtain insurance for future restoration and pollution remediation (if necessary) of the project site should project activities cease and the site is	During operations	Financial statements of restoration fund/insurance	Proponent; Independent Specialist Consultant

Activity	Objective	Action	Timing	Proof of Compliance	Responsible Body
<b>Reporting</b>	the site on closure. Ensure record is kept of all monitoring aspects of construction, operations and decommissioning as outlined in the EMP.	decommissioned. Establish and / or maintain a six monthly reporting system to report on aspects of construction, operations and decommissioning as outlined in the EMP. Submit six monthly reports to the MEFT to allow for environmental clearance certificate renewal after three years. This is a requirement by Ministry.	During operations as well as possible future decommissioning of the development	Monitoring Reports	Proponent; Contractor
<b>Environmental Clearance Renewal</b>	To renew the Environmental Clearance Certificate every three years.	Appoint a specialist environmental consultant to update the 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 4-2. Future construction/maintenance phase

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Skills, Technology &amp; Development</b>	Training will be provided to employees in order to perform various functions for successful implementation and execution of the project. Skills will be transferred to an unskilled workforce for general tasks. New technologies are often investigated and introduced into the industry. Development of people and technology are key to economic development.	If the skills exist locally, contractors must first be sourced from the area, then the region and then nationally. Deviations from this practice must be justified. Training and skills development must be focussed on Namibians. Skills development and improvement programs to be made available as identified during performance assessments. Employees to be informed about parameters and requirements for references upon employment.	Record should be kept of training provided. Ensure that all training is certified or managerial reference provided (proof provided to the employees) inclusive of training attendance, completion and implementation. Bi-annual report based on records kept.	Proponent
<b>Demographic Profile and Community Health</b>	The project relies on labour. It is not foreseen that the project will create a change in the demographic profile of the local community, as employment will be sourced locally as far as possible. The community may still to some extent be exposed to factors such as communicable disease (e.g. HIV/AIDS) and alcoholism/drug abuse. This impacts on overall community health. Should an increase in foreign people (e.g. migrant workers) in the area take place, this may potentially increase the risk of criminal and socially / culturally deviant behaviour.	Employ only local people from the area, deviations from this practice should be justified appropriately. Adhere to all municipal by-laws relating to environmental health, such as sanitation requirements. Educational programmes for employees on HIV/AIDS and general upliftment of employees' social status. Appointment of reputable contractors.	Bi-annual summary report based on employee demographics, educational programmes and training conducted.	Proponent
<b>Revenue Generation and Employment</b>	An increase in semi-skilled, skilled and professional labour result from construction and maintenance activities. Increased economic resilience will realise for employees residing in the area.	The Proponent must employ local Namibians where possible. Deviations from this must be justified. If the skills exist locally, employees must first be sourced from the town, then the region and then nationally.	Bi-annual summary report based on employee records.	Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Traffic</b>	Increased possibility of congestion due to delivery trucks frequenting the site during construction. This increase will also result in road degradation, and may negatively influence the amount of accidents seen in the area.	<p>All drivers must be properly trained with valid driver's licences.</p> <p>Erect clear signage regarding access and exit points at the farm.</p> <p>Proper route determination to avoid problem areas if required.</p> <p>Training and information sharing with drivers of vehicles to ensure vigilance at accident hot spots.</p>	<p>Any complaints regarding traffic issues should be recorded together with action taken to prevent impacts from repeating itself.</p> <p>A bi-annual report should be compiled of all incidents reported, complaints received, and action taken.</p>	Contractor; Proponent
<b>Health, Safety and Security</b>	Unauthorized entry leading to theft of equipment and/or product and/or fire hazard. The risk of accidents or injuries during construction and the use of machinery.	<p>All health and safety standards specified in the Labour Act and other applicable legislation should be complied with.</p> <p>All staff members must be briefed about potential health risks and injuries on site.</p> <p>All staff involved in construction must at all times wear personal protective equipment (PPE).</p> <p>Safe working conditions must be provided when working at heights or in confined spaces.</p> <p>Selected personnel should be trained in first aid.</p> <p>The contact details of all emergency services must be readily available.</p> <p>Access to the site should always be strictly controlled.</p>	<p>Any health, safety and security related incidents must be recorded with action taken to prevent future occurrences.</p> <p>A report should be compiled bi-annually of all incidents reported. The report should also contain dates when training were conducted and when safety equipment and structures were inspected and maintained.</p>	Contractor; Proponent



<b>Criteria and Hazard</b>	<b>Nature</b>	<b>Mitigation</b>	<b>Monitoring</b>	<b>Responsible Body</b>
<b>Fire Explosion Hazard</b>	Fire resulting from construction activities causing sparks, electrical short circuits, etc. LPG is extremely flammable and a fire or Boiling Liquid Expanding Vapour Explosion (BLEVE) risk exists where LPG gas is stored near the construction area.	Construction activities that can ignite flammable gases must not be done in close proximity to LPG. Storage and handling of LPG must be according to their MSDS and all fire precautions and fire control at the storage facility must be in accordance with SANS or better. All pressure release valves and firefighting equipment must regularly be inspected and serviced. A holistic fire protection and prevention plan is needed. All fire precautions and fire control at the facility must be up to date.	A report should be compiled bi-annually of all incidents reported. The report should contain dates when fire drills were conducted and when fire equipment was tested.	Contractor; Proponent
<b>Noise</b>	Noise as a result of operations of trucks and heavy machinery may lead to hearing loss in operators of such machinery and can be a nuisance to nearby receptors	Follow the City of Windhoek Council Resolution Guidelines 215/09/2006 with regards to noise emissions. Personnel working in noisy environments must be issued with hearing protectors.	Any complaints received regarding excessive noise should be recorded with notes on action taken. All complaints and additional data, if available, to be compiled in a bi-annual report.	Contractor; Proponent
<b>Waste Production</b>	Any waste, including hazardous waste or domestic waste.	All waste produced on site must be removed and disposed of at a recognised disposal facility. Items that can be recycled must be kept separate and sent to approved recyclers.	A register of hazardous waste disposal should be kept. This should include type of waste, volume as well as disposal method/facility. Any complaints received regarding waste should be recorded with notes on action taken. All data to be compiled in a bi-annual report.	Contractor; Proponent



Criteria	Nature	Mitigation	Monitoring	Responsible Body
<p><b>Groundwater, Surface Water and Soil Contamination</b></p>	<p>Leakages from vehicles and accidental fuel, oil or hydraulic fluid spills</p>	<p>All vehicles must be serviced and maintained regularly. Spill control by making use of drip trays if there is a need to repair machinery on site. All hydrocarbon based fluids must be removed from site and disposed of at a recognised hazardous waste disposal facility. Any polluted soil or water to be treated as hazardous waste.</p>	<p>A bi-annual report should be compiled of all spills or leakages reported. 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> </ul>	<p>Contractor; Proponent</p>
<p><b>Ecological Impact</b></p>	<p>The effect of construction activities on the ecosystem functioning and biodiversity.</p>	<p>The facility has been operating for many years and no further biodiversity loss is expected. The release of waste into the environment could negatively impact on surrounding habitats, such as the Arebbusch River which is located approximately 160 m north of the site.</p>	<p>A record should be kept of any extraordinary fauna sightings or encounters on site and compiled into a bi-annual report.</p>	<p>Contractor; Proponent</p>
<p><b>Visual Impact</b></p>	<p>This is an impact that affects the aesthetic appearance of the site that is under construction.</p>	<p>Regular maintenance and general upkeep of the facility will ensure continuous low visual impact.</p>	<p>A register of all complaints must be maintained. This should include measures taken to ensure that such incidents do not repeat themselves. All information and reporting to be included in a bi-annual report.</p>	<p>Contractor; Proponent</p>

<b>Table 4-3. Operational phase</b>		<b>Mitigation</b>	<b>Monitoring</b>	<b>Responsible Body</b>
<b>Criteria</b>	<b>Nature</b>	<b>Mitigation</b>	<b>Monitoring</b>	<b>Responsible Body</b>
<b>Skills, technology and development</b>	Training will be provided to employees in order to perform various functions for successful implementation and execution of the project. Skills will be transferred to an unskilled workforce for general tasks. New technologies are often investigated and introduced into the industry, thus aiding in operational efficiency. Development of people and technology are key to economic development.	If the skills exist locally, employees must first be sourced from the area, then the region and then nationally. Deviations from this practice must be justified. Training and skills development must be focussed on Namibians. Skills development and improvement programs to be made available as identified during performance assessments. Employees to be informed about parameters and requirements for references upon employment.	Record should be kept of training provided. Ensure that all training is certified or managerial reference provided (proof provided to the employees) inclusive of training attendance, completion and implementation. Bi-annual report based on records kept.	Proponent
<b>HIV/AIDS, In-migration and Informal Settlements</b>	The project relies on labour. It is not foreseen that the project will create a change in the demographic profile of the local community, as employment will be sourced locally as far as possible. The community may still to some extent be exposed to factors such as communicable disease (e.g. HIV/AIDS) and alcoholism/drug abuse. This impacts on overall community health. Should an increase in foreign people (e.g. migrant workers) in the area take place, this may potentially increase the risk of criminal and socially / culturally deviant behaviour.	Employ only local people from the area, deviations from this practice should be justified appropriately. Adhere to all municipal by-laws relating to environmental health, such as sanitation requirements. Educational programmes for employees on HIV/AIDS and general upliftment of employees' social status.	Bi-annual summary report based on employee demographics, educational programmes and training conducted.	Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<p><b>Revenue Generation and Employment</b></p>	<p>An increase in semi-skilled, skilled and professional labour result from the project. Increased economic resilience will realise for employees. Sales contribute to the economy of Namibia. Employment will be sourced locally while skilled labour/contractors may be sourced from other regions.</p>	<p>The Proponent must employ local Namibians where possible. Deviations from this must be justified. If the skills exist locally, employees must first be sourced from the town, then the region and then nationally.</p>	<p>Bi-annual summary report based on employee records.</p>	<p>Proponent</p>
<p><b>Traffic</b></p>	<p>Increased vehicle traffic frequenting the area for deliveries and collections.</p>	<p>Traffic signs to be placed at strategic locations to direct traffic and warn oncoming traffic of risks. All drivers must be properly trained with valid driver's licences. Trucks waiting to enter the premises, should avoid waiting in the road and obstructing traffic.</p>	<p>Any complaints received regarding traffic issues should be recorded together with action taken to prevent impacts from repeating itself. A bi-annual report should be compiled of all incidents reported, complaints received, and action taken.</p>	<p>Proponent</p>

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<p><b>Fire and Explosion Hazard</b></p>	<p>LPG are extremely flammable and a fire or BLEVE risk exists. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise.</p>	<p>Storage and handling of LPG and other gases must be according SANS 10087. All fuel storage and handling facilities in Namibia must comply with strict safety distances and fire precautions and control as prescribed by API Standards and/or SANS. SANS is adopted by the Ministry of Mines and Energy as the national standard.</p> <p>All pressure release valves and firefighting equipment should regularly be inspected and serviced.</p> <p>A holistic fire protection and prevention plan is needed.</p> <p>All fire precautions and fire control at the facility must be up to date.</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 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.</p>	<p>A bi-annual report should be compiled 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
<b>Health, Safety &amp; Security</b>	<p>LPG gas can rapidly result in asphyxiation when inhaled. Skin or eye contact with LPG gas leaking or escaping from high pressure vessels can result in frostbite or irritation. Lifting of heavy cylinders or equipment can result in injuries.</p> <p>Access to site by unauthorised persons with the intent of arson, theft or sabotage of product or equipment.</p>	<p>The operations of the storage facility can cause serious health and safety risks to workers on site. Occupational exposures are normally related to inhalation or dermal contact. 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>● Regular toolbox talks;</li> <li>● First aid treatment;</li> <li>● Medical assistance;</li> <li>● Emergency treatment;</li> <li>● Prevention of inhalation of fumes (LPG);</li> <li>● Protective clothing, footwear, gloves and belts; safety goggles and shields</li> </ul> <p>Manuals and training regarding the correct handling of LPG should be in place and updated as new or updated material safety data sheets become available.</p> <p>Entry into the premises must be strictly controlled.</p>	<p>Inventory of emergency equipment and material safety data sheets to be maintained.</p> <p>A bi-annual report should be compiled of all incidents reported. The report should contain dates when training were conducted and when safety equipment and structures were inspected and maintained.</p>	Proponent
<b>Noise</b>	<p>Tanker trucks delivering LPG. Noise as a result of trucks and vehicles frequenting the area to load or unload cylinders. The use of audible warning systems on forklifts or other heavy machinery.</p>	<p>Follow the City of Windhoek Council Resolution Guidelines 215/09/2006 with regards to noise emissions.</p> <p>Personnel working in noisy environments must be issued with hearing protectors.</p>	<p>Any complaints received regarding excessive noise should be recorded with notes on action taken.</p> <p>All complaints and corrective action to be compiled in a bi-annual report.</p>	Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Waste Production</b>	Any waste, including hazardous waste, such as hydrocarbons, domestic waste, biological waste or any untreated effluent.	All waste produced on site must be removed and disposed of at a recognised disposal facility. Items that can be recycled must be kept separate and sent to approved recyclers.	A register of hazardous waste disposal should be kept. This should include type of waste, volume as well as disposal method/facility. Any complaints received regarding waste should be recorded with notes on action taken. All data to be compiled in a bi-annual report.	Proponent
<b>Groundwater, Surface Water and Soil Contamination</b>	Leakages from vehicles and accidental fuel, oil or hydraulic fluid spills can result in groundwater, surface water and soil contamination in the area.	All vehicles must be serviced and maintained regularly. All hydrocarbon based fluids must be removed from site and disposed of at a recognised hazardous waste disposal facility. Any polluted soil or water to be treated as a hazardous waste.	A bi-annual report should be compiled of all spills or leakages reported. The report should contain the following information: <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> </ul>	Proponent
<b>Ecological Impact</b>	The effect of operational activities on the ecosystem functioning and biodiversity.	Minimal impact on surrounding biodiversity will be experienced as the site has already been in use for approximately 13 years and is situated within developed townlands. Nesting of birds on infrastructure should be discouraged.	A record should be kept of any extraordinary fauna sightings or encounters on site. All data to be compiled in a bi-annual report.	Proponent
<b>Visual Impact</b>	This is an impact that affects the aesthetic appearance.	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. It is also important to ensure the frequent removal of waste.	A bi-annual report should be compiled of all complaints reported.	Proponent

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<p><b>Cumulative Impact</b></p>	<p>These are impacts on the environment, which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of who undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. In relation to an activity, it means the impact of an activity that in itself may not be significant, may become significant when added to the existing and potential impacts resulting from similar or diverse activities or undertakings in the area.</p> <p>Possible cumulative impacts associated with the operational phase include increase in traffic frequenting the site and along the sections of roads near the facility. An increase in emissions from these vehicles will decrease the air quality around the facility. 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.</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>	<p>Bi-annual reports based on all other impacts must be created to give an overall assessment of the impact of the operational phase.</p>	<p>Proponent</p>

Table 4-4. Decommissioning phase

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Waste Production</b>	<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 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 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
<b>Ecological Impact</b>	<p>Operations spanning many years may create new habitat for fauna and flora.</p> <p>Upon decommissioning these habitats will be destroyed.</p>	<p>Triple J Energies would have to ensure that no new habitat is created for flora and fauna on the GasIt site. Before decommissioning the environmental officer 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, Triple J Energies must contact MEFT or other appropriate organizations to establish the conservation status of it and ensure no harm is inflicted.</p> <p>The possibility of relocating the fauna or flora must be investigated and executed. Should the species be listed as vulnerable or worse, a meeting should be held with MEFT in order to determine the appropriate handling of the situation.</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>	Proponent; Contractor



<b>Criteria</b>	<b>Nature</b>	<b>Mitigation</b>	<b>Monitoring</b>	<b>Responsible Body</b>
<b>Employment</b>	Decommissioning of the facility may lead to retrenchments or re-location of staff.	Plan in advance for meeting the Labour Acts requirements for retrenching of staff if required. Where possible staff can be relocated to another facility or town where business continues in the same way.	During normal operations, planning should include measures for handling of employees, should the facility be decommissioned. The report should include budgeting for retrenchments and possible alternative positions elsewhere.	Proponent
<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.	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
<b>Noise</b>	Noise pollution will exist due to heavy vehicles accessing the site to collect rubble from demolished building materials. Cranes may be erected for removing the storage tanks. Hammers, diggers and drills will be used.	Follow the City of Windhoek Council Resolution Guidelines 215/09/2006 with regards to noise emissions. During decommissioning noise levels might be higher than prescribed levels. This will however be short lived. 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.	Notice of the start of the decommissioning should be made and 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; Contractor.
<b>Visual Impact</b>	This is an impact that affects the aesthetic appearance	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.	Proponent; Contractor

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Groundwater, Surface Water and Soil Contamination</b>	Porous surface substrate can allow unwanted 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 appropriately classified waste disposal site approved by the City of Windhoek.</p> <p>Regulations on sewerage discharge and the chemicals that may and may not be put into the sewerage system must be followed.</p>	Report form for all spills or leaks is to be completed by Contractor and submitted to the responsible HSE Officer / Coordinator.	Proponent; Contractor

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<b>Health, Safety and Security</b>	During the Decommissioning Phase similar risks to human beings as with the previous phase will be present. Once the tanks and pipelines have been emptied completely of their contents residual amounts of gas might exist. All other risks associated with demolitions must be considered.	<p>The decommissioning of a facility can cause serious health and safety risks to workers on site. Occupational exposures are normally related to dermal contact with gas and inhalation of gas vapours during handling of such products. For this reason adequate measures must be brought in place to ensure safety of staff on site, and includes:</p> <p>(Provide forms for all end users who monitor)</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> <li>● Protective clothing, footwear, gloves and belts; safety goggles and shields;</li> <li>● 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.</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.	Proponent; Contractor

Criteria	Nature	Mitigation	Monitoring	Responsible Body
<p><b>Fire and Explosion Hazard</b></p>	<p>LPG are extremely flammable and a fire or BLEVE risk exists when decommissioning takes place.</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 rubbish, dry vegetation, and hydrocarbon-soaked soil. Regular inspections and tests should still be carried out on firefighting equipment and pollution control materials at the facility. All fire precautions and fire control at the 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.</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>
<p><b>Site Closure and Rehabilitation</b></p>	<p>Un-rehabilitated sites could potentially impact the environment and inhibit future land use capabilities.</p>	<p>All infrastructure that will not be reused needs to be removed. All pipelines, tanks and hazardous material need to be removed from the site and properly disposed of. Polluted soils needs to be remediated / removed from sited and disposed of as hazardous waste, to prevent health risk and the spread of pollution. Post closure, the site needs to be in a condition that enables future land use to continue.</p>	<p>A pollution survey needs to be conducted on the site to ensure that the site has been properly rehabilitated and no pollution remains. A closure report should be compiled to report on the conditions of the site, and recommend any further rehabilitation initiatives if necessary.</p>	<p>Proponent, Contactor, Independent Specialist.</p>

## **5 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. Auditing should take place in order to determine compliance with the EMP for the 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.