

**PROPOSED NEW BULK STORAGE FACILITY  
FOR LIQUEFIED PETROLEUM GAS AT WALVIS BAY -NAMIBIA**

**ENVIRONMENTAL MANAGEMENT PLAN**



**PROPONENT:**

**ERONGO LIQUID PETROLEUM GAS (LPG) Terminal (Pty) Ltd**



# **ENVIRONMENTAL MANAGEMENT PLAN:**

**Erongo Liquid Petroleum Gas Terminal (Pty) Ltd**



**PROPOSED: STORAGE PLANT OF LIQUID PETROLEUM GAS**

**TERMINAL at Portion Remainder farm 39, Walvis Bay-Namibia.**



**EAP: Consultant:**

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## PROJECT DETAILS

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**TITLE: Proposed Storage Plant of Liquid Petroleum Gas Terminal at Portion Remainder farm 39, Walvis Bay- District, Erongo Region, Namibia.**

**EAP:**

Mr Siyambango Mulife (Centre for Geosciences Research cc)

**Prponent:**

Erongo Liquid Petroleum Gas Terminal (Pty) Ltd

P O Box 4018, Windhoek, Namibia

|                           |   |
|---------------------------|---|
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| RESPONSIBILITY            | Director of Centre for Geosciences Research cc  |
| QUALIFICATIONS            | B. Sc. in analytical, inorganic and physical chemistry, M. Sc. in Industrial Rocks and Minerals, MBA in Banking, Accounting and Strategic Management.   |
| PROFESSIONAL REGISTRATION | Pr.Sci.Nat  |
| EXPERIENCE                | Mr Siyambango is the director and founder of Centre for Geosciences Research cc Mr Siyambango is a qualified geologist, and specialist in industrial minerals and rocks. Obtained an <b>MSc in Industrial Rocks and Minerals</b> with majors in Mineral Resource Assessment & Estimation; Mineral Extraction & Management Marketing of Industrial Rocks and Minerals, Geology and Technology of Industrial Rocks and Minerals. <b>Mr Siyambango</b> is a fully trained and qualified Chemist with a <b>BSc in analytical, inorganic and physical chemistry</b> . Extensively trained and experienced in analytical instruments that are essential for mineral exploration and mineral processing. Academically and experienced trained Manager, with an <b>MBA in Banking, Accounting and Strategic Management</b> . The qualification supplements the economic assessment of commerciality of mineral resources for assessment of the bankability. |

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## LIST OF ABBREVIATIONS

|                  |  |         |         |
|------------------|--|---------|---------|
| <b>API</b>       | American Petroleum Institute                                       |         |         |
| <b>BLEVE</b>     | Boiling Liquid Expanding Vapour Explosion                          |         |         |
| <b>CBD</b>       | Central Business District  |         |         |
| <b>ELPT</b>      | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL Pty Ltd                 |         |         |
| <b>EIA</b>       | Environmental Impact Assessment                                    |         |         |
| <b>EMP</b>       | Management Plan  |         |         |
| <b>EMS</b>       | Environmental Management System                                    |         |         |
| <b>ENOC</b>      | Emirates National Oil Company                                      |         |         |
| <b>ENV</b>       | Environmental Officer  |         |         |
| <b>ERP</b>       | Emergency Response Plan  |         |         |
| <b>GDP</b>       | Gross Domestic Product   |         |         |
| <b>GEGEOR</b>    | Centre for Geosciences Research                                    |         |         |
| <b>HS</b>        | Health & Safety Officer  |         |         |
| <b>HSE</b>       | Health, Safety & Environment                                       |         |         |
| <b>HSEQ</b>      | Health, Safety & Environment Quality System or Program             |         |         |
| <b>I&amp;APs</b> | Interested and Affected Parties                                    |         |         |
| <b>IFC</b>       | International Finance Corporation                                  |         |         |
| <b>IMDG</b>      | International Maritime Dangerous Goods                             |         |         |
| <b>IMO</b>       | International Maritime Organisation                                |         |         |
| <b>ISGOTT</b>    | International Safety Guide for Oil Tankers & Terminals             |         |         |
| <b>ISO</b>       | International Standards Organisation                               |         |         |
| <b>LNG</b>       | Liquefied Natural Gas  |         |         |
| <b>LPG</b>       | Liquefied Petroleum Gas  |         |         |
| <b>MET</b>       | Ministry of Environment and Tourism                                |         |         |
| <b>MFMR</b>      | Ministry of Fisheries and Marine Resources                         |         |         |
| <b>MME</b>       | Ministry of Mines and Energy                                       |         |         |
| <b>MSDS</b>      | Material Safety Data Sheet   |         |         |
| <b>MT</b>        | Metric tonne   |         |         |
| <b>NFPA</b>      | National Fire Protection Association                               |         |         |
| <b>NIDS</b>      | Namibia Inter Censal Demographic Survey                            |         |         |
| <b>OCIMF</b>     | Oil Companies International Marine Forum's                         |         |         |
| <b>OSHAS</b>     | Occupational health and safety information, guidance and resources |         |         |
| <b>PC</b>        | Project Coordinator  |         |         |
| <b>PPPPs</b>     | Projects, Plans, Programmes and Policies                           |         |         |
| <b>psig</b>      | pound-force per square inch gauge                                  |         |         |
| <b>SADC</b>      | Southern African Development Community                             |         |         |
| <b>SANS</b>      | South African National Standards                                   |         |         |
| <b>SIGTTO</b>    | Liquefied Gas Handling Principles on Ships and in Terminals        |         |         |
| <b>SIRE</b>      | Ship Inspection Report Programme                                   |         |         |
| <b>SM</b>        | Site Manager   |         |         |
| <b>SOLAS</b>     | Safety of Life at Sea  |         |         |
| <b>UAE</b>       | United Arab Emirate  |         |         |
| <b>USA</b>       | United States of America   |         |         |
| <b>VOC</b>       | Volatile Organic Compound  |         |         |
| <b>VTS</b>       | Vessel   | Traffic | Service |

# **1. BACKGROUND, INTRODUCTION AND JUSTIFICATION**

## **1.1 Background to the Development**

An Environmental Management Plan (EMP) has been commissioned by Erongo Liquid Petroleum Gas Terminal (Pty) Ltd for the construction and operation of a Liquid Petroleum Gas (LPG) and Terminal in Walvis Bay. Erongo Liquid Petroleum Gas Terminal (Pty) Ltd was motivated to fill the gap that has existed in the Liquid Petroleum Industry in Namibia. The COVID19 pandemic has illustrated just how fragile the local LPG industry is due to all imports coming from South Africa. The problem faced by Namibia, and neighbouring land locked countries is that all are 100% dependent on supply from South Africa. Unfortunately, the refineries in South Africa are too old and usually go on unscheduled shut downs leaving all immediate neighboring countries struggling with the supply of the LPG to end users. The only option for the entire country and other importers such as Namibia was to utilize the Port Elizabeth Terminal at higher costs but, which also ran out of gas occasionally then we were left without no other alternative but to go as far as Mozambique to pick LPG GAS. However Mozambique currently is at country is unsafe due to war. Another threat is unpredictable of the uprising and strikes of South African truck drivers towards foreign truck drivers and trucks. This cause significant backlog of various goods and endangers our personnel and company assets. The only solution we have at our disposal is to construct an importing Bulk LPG terminal at Walvis Bay and bring in the LPG product via maritime route into Namibia and truck product to the other land locked countries. The COVID19 pandemic has just exacerbated and compounded the shortage of LPG in the region and there is a need to expedite the construction of the terminal, so that we can supply LPG into the Namibian market and that of our neighboring countries

The main business activity will involve providing bulk LPG to Namibia and the Southern African Development Community (SADC) market for domestic and industrial usage. These activities will be extended to create LPG distribution points throughout Southern Africa. Erongo Liquid Petroleum Gas Terminal (Pty) Ltd with its technical partner wishes to establish the importing terminal at the Walvis Bay Port. The construction, operational and decommissioning phases entail;

## **1. Construction Phase:**

- Site preparation as required by geotechnical survey;
- Civil works required for storage tanks and pump rooms;
- New buildings required for administration offices and security guard houses at gates;
- Construction of parking bays and driveways;
- Installation of associated electrical, water and sewerage utilities;

## **2. Operational Phase:**

- Receiving fuel from a proposed fuel mooring facility (import);
- Storage and handling of products in on-site tanks;
- Loading of products to transportation vehicles and other links, such as pipelines,

rail tankers, trucks and ships, for distribution to customers.

### **3. *Decommissioning Phase:***

- Removal of all infrastructure not reused during future use of land; and
- Rehabilitation of property.

A proactive approach has been considered this time around and the EMP that is here presented has been adapted from the previous one compiled by various petroleum industry in Walvisbay.

### **4. *OBJECTIVES OF THE EMP***

The Environmental Management Plan (EMP) provides management options to ensure impacts of the proposed development 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 the proposed LPG storage facility. All contractors and sub-contractors taking part in the construction of the facility should be made aware of the contents of the EMP, so as to plan the relevant activities accordingly in an environmentally sound manner. Overall, the EMP forms the basis for the Environmental Contract which will be signed and agreed upon by ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD and the Government of the Republic of Namibia, hereby represented by MET and the Directorate of Environmental Affairs.

The objectives of the EMP are:

- to include all components of the development;
- to prescribe the best practicable control methods to lessen the environmental impacts associated with the construction of the development;
- to provide the management actions, covering the roles and responsibilities required
- for implementation of the EMP;



to give commitment both financially and with respect to all human resource provision for the effective management of all possible liabilities during the operational stage of the proposed development;

to monitor and audit the performance of construction personnel in applying such controls; and to ensure that appropriate environmental training is provided to responsible construction personnel.

Once the facility has been constructed, it is highly recommended that ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD implement an ISO 14001(or other) Environmental Management System (EMS). An EMS is an internationally recognized and certified management system that will ensure on-going incorporation of environmental constraints. At the heart of an ISO 14001 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.

## 5. *THE EMP*

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The following general guidance for the EMP is based on the findings of the EIA & Risk Assessment carried out by Centre for Geosciences Research cc.

### 5.1 **Land Use, Planning, Design and Construction – Identified Impacts**

The following is the summary of the identified impacts:

The proposed site for the LPG terminal does not breach any of the requirements in the Namibian laws nor any of the International Codes regulating the use of hazardous material, including oil and LPG;

The current port zoning within the Port Master Plan Interim Report designates the area as suitable for the development of the LPG terminal;

The envisaged development is in line with the future long term for Walvisbay;

The surrounding areas constitute residential and light industry leaving only a narrow high risk buffer zone;

The risk of an accident/incident causing BLEVE (Boiling Liquid Expanding Vapour Explosion) is considered to be high. The technical partners, ENOC, assure ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD of the terminal's safety. Human factors have been considered and the best engineering has gone in to the creation of a very safe terminal. If a BLEVE was to occur and the necessary engineered structures were not in place there would be a significant impact on the adjoining Central Business district, which includes residential properties.

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

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

To prevent product loss where rupture of pipeline or hose might occur during the unloading operation, all nozzles on the road tankers, ships and storage tanks are fitted with excess flow check valves. These are designed to allow only specific flow rates and the moment it exceeds this, the process is stopped. Small quantities lying in the hose are dispersed into the atmosphere at well below the threshold percentage for an explosion.

BLEVE events are eliminated since mounded storage tanks have been proposed.

The planned fire fighting facility is more than adequate to meet with possible emergencies.

The pipeline will always remain empty of LPG except during the unloading operations. It is proposed that after every unloading operation the whole product lying in the pipeline be flushed back to the storage tanks avoiding any product loss if for instance the pipeline was damaged during non-operational times.

ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD proposes the use of 2,000MT ships for its operations. This complies with international standards.

There is no venting of LPG during transfer.

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 operations or at any other

time, except during emergencies where there is a build-up of pressure, exceeding a set threshold.

### **5.3 *Operations and General Handling of LPG – Identified Impacts***

The following is a summary of the identified impacts:

Proposed LPG facility too close to a residential area;

Lack of appropriate and adequate fire fighting equipment;

Lack of appropriate and adequate emergency preparedness;

Lack of appropriate and adequate LPG terminal manuals;

### **5.4 *Operations and General Handling of LPG – Mitigating Measures***

The following is a summary of the mitigating procedures and facilities:

Strict operational procedures and emergency measures will be implemented and enforced by NAMPORT and ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD to manage potential risks;

The LPG safe handling manual has been prepared by ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD; The Manual for the LPG terminal and the Contingency manual for operations will be prepared jointly by NAMPORT & ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD;

The emergency preparedness will be upgraded to make sure that NAMPORT & ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD are able to handle an LPG incident;

Training for all persons involved will be presented every 6 months. This will be for all handling LPG whether they work for NAMPORT & ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD or Contractors.

## **5.5 *Impacts on the Environment***

The proposed LPG terminal will not cause any substantial ecological threat to the marine environment in the vicinity of Walvisbay. None of the constituent gases of LPG pose a risk to marine life or the marine environment. Each of the constituent gases is however classified as “dangerous goods”. They are heavier than air and are flammable hydrocarbons.

## 6 THE IMPLEMENTATION OF THE EMP

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Tables 1 to 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

Contents of these tables could be incorporated into the HSEQ Management System that was highly recommended. The following abbreviations are used to indicate who would be responsible for each task. The following abbreviations are used to indicate who should be responsible for the implementation. The monitoring of each risk is outlined.

|   |          |
|---|----------|
| Site Manager  | (SM)     |
| Project Coordinator   | (PC)     |
| Environmental Consultant (Centre for Geosciences Research cc) | (GEGEOR) |
| Environmental Officer   | (ENV)    |
| Health & safety Officer                                       | (HS)     |

**Table 1.**

**Planning Phase**

| Project phase and activities | Environmental objectives  | Auditable management actions to be taken to meet the environmental management programme report objectives   | Responsibility   | Control measures                 | Timing  | Requirement for close out report     |
|------------------------------|---|---|--|----------------------------------|---|--------------------------------------|
| Preconstruction planning     | Liaison with Ministry of Mines & Energy, Ministry of Fisheries and Marine Resources, NAMPORT Walvis bay Town Council and other relevant PORT users, such as fishing, mining, petroleum and other industries to get specialist advice so that minimal disruption to services is created. | Finalise negotiations and resolve any outstanding issues if any over the allocation of user rights to the commencement of the construction of the depot.<br><br>Make provisions to have an Environmental Coordinator to oversee occupational health and safety as well as general environmental related compliances at the site.  |  | Specialist input, correspondence | Prior to commencement of the Construction Phase |                                      |
| Preparation for emergencies  | Preparation for any emergency that could result in an environmental impact.   | Have the following emergency plans, equipment and personnel in place to deal with all emergencies:<br><br>Risk Management / Mitigation / Environmental Management Plan/ Emergency Response Plan & HSE Manuals<br><br>Adequate protection and indemnity insurance cover for incidents; and that there is a record with specifications of all materials supplied, delivered, loaded, offloaded on site;<br><br>Comply with the provisions of all relevant safety standards. | Developer<br>ERONGO<br>LIQUID<br>PETROLEUM<br>GAS (LPG)<br>TERMINAL<br>Pty Ltd and<br>Contractor |                                  |   | Consultant<br>(CEGEOR)<br><br>Report |

| Project phase and activities | Environmental objectives   | Auditable management actions to be taken to meet the   | Responsibility  | Control measures | Timing | Requirement for close out report   |
|------------------------------|--|--|---|------------------|--------|--|
| Environmental clearance      | Comply with legislative requirements including the Namibian Environmental Assessment Policy, Petroleum and Fisheries, Guidelines as well as NAMPORT and Walvisbay Town Council operational practices, procedures and guidelines. | Ensure that the Environmental Clearances has been approved by the Ministry of Environment and Tourism for the whole proposed project development from construction to operation and possible rehabilitation if ever required;<br><br>Communicate the issued Environmental Clearance to the relevant stakeholders such as the Ministry of Mines and Energy, Ministry of Fisheries and Marine Resources, NAMPORT and Walvisbay Town Council. | Developer<br>ERONGO<br>LIQUID<br>PETROLEUM<br>GAS (LPG)<br>TERMINAL<br>PTY LTD<br>&<br>Environmental<br>Consultant<br>(Centre for<br>Geosciences<br>Research cc ) |                  |        | Environmental<br>Consultant<br>(Centre for Geosciences<br>Research cc<br>) |



**Table 2. The Construction Phase**

| <b>Criteria</b>             | <b>Nature</b>  | <b>Mitigation</b>   | <b>Monitoring</b>  | <b>Responsible Body</b>  |
|-----------------------------|--|---|--|--|
| Traffic                     | The site is located within the Harbour & Industrial area. Construction related activities are expected to have some impact on the movement of traffic into the construction area and where the pipeline is being laid  | Diversion of traffic or closure of the B2 road may not be required, although heavy construction vehicles are to frequent the site when offloading construction materials or the storage tanks. The responsible contractor must liaise with the relevant traffic department to ensure that traffic flow along the affected route is not disrupted. Speed reduction along B2 road. Road must be enforced, especially near access point to premises along the road. A narrow entrance to the building site exists. Barricading of roadways, paths and open areas that are normally used by vehicles and pedestrians might be needed on a temporary basis when the pipeline is being laid, particularly when it must pass under the road towards the storage facility site. | Receive weekly planning sheet from Contractor to know when traffic / harbour authorities need to be informed of possible obstructions.   | Contractor, CORRIDOR GAS HS & SM                                 |
| Health, Safety and Security | During construction, earthmoving equipment will be used on site and where the pipeline will be laid. This increases the possibility of injuries and the responsible contractor must ensure that all staff members are briefed about the potential risks of injuries on site. | The contractor must be advised to ensure that adequate emergency facilities, including first aid kits, are available on site. All Health and Safety standards specified in the Labour Act should be complied with. Should a construction camp be necessary, it should be located in such a way that it does not pose a risk to the public. For safety and security reasons it is recommended that the entire site be fenced-off and security personnel be employed to safeguard the premises and avert criminal activities. The Contractor should be obliged to adhere to the following:  | Induction training for all who enter the construction site must be required.   | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM; GPT  |
|                             |  | 1. Adhere to Health and Safety Regulations pertaining to personal protective clothing, first aid kits being available on site, warning signs, etc.; A Health & Safety officer must be appointed for the duration of the construction phase.   | Daily Check lists for HS officer; Ensure Take 5 booklets have been issued (plan the job, spot the hazards, assess the risk, make changes and do the job safely); Ensure job hazard analyses are done. Conduct daily safety talks during daily planning meetings. | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM, GPT. |

| Criteria         | Nature  | Mitigation   | Monitoring   | Responsible Body  |
|------------------|---|--|--|---|
|                  |   | <p>2. In consultation with the Walvisbay Traffic Department devise and submit a traffic management programme for sections of the roads to be closed or traffic diverted if necessary during the construction of the</p> <p>3. Employ security personnel to prevent the unauthorised entry of the construction site; and</p> <p>4. Equipment that will be locked away on site (camp) must be placed in a way that does not encourage criminal activities.</p> <p><b>Refer to Emergency Response Guidebook 2008 and associated SANS document, EIA Appendix A, C &amp; D and the official ERONGO LIQUID PETROLEUM GAS (LPG)</b></p> | <p>Ensure Traffic Management plan is submitted to the Walvisbay Town Council</p> <p>Receive weekly reports on all responsible areas.</p> <p>Inventory of all stock to be reported on a weekly basis</p>  | <p>ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD SM</p> <p>ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD</p> <p>ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD SM</p> |
| Dust             | Dust will be generated during the construction phase and might be aggravated during periods of strong winds. This occurs regularly in Walvisbay   | It is recommended that regular dust suppression be included in the construction phase, when dust becomes an issue.   | <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,</p>   | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD ENV & SM, Contractor.  |
| Noise            | Noise pollution will exist due to heavy vehicles accessing the site with building materials. Cranes may be erected for placing the huge storage tanks into place. Cement mixing, drilling and a little excavating will be some additional activities. | It is recommended that the construction and traffic be limited to normal working hours (08h00 to 17h00) and that weekends should rather be avoided. On site construction during these office hours; Pipeline might need to be laid during non-office times if it disturbs office time activities of third parties.   | <p>Survey the residents and businesses on three occasions during the construction phase and note any irregularities. Notice of the start of construction should be made and invitation to give feedback at any time with regards the noise impact of the development</p> | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD ENV & SM, Contractor.  |
| Waste Production | The ability of products and building rubble to act as a waste which must be cleaned up or removed off-site  | The facility will produce waste during construction in the form of building rubble or any other waste as a result of spillage or leak from cleaning and painting materials. Due to the nature of some hazardous materials they should be disposed of in an appropriate way at the Town Councils  | Removal of waste should be at regular (weekly) intervals to maintain visual orderliness but more so to not give time for liquid waste to enter the soil substrate. Dry waste is  | Contractor, ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS, ENV & SM   |

| Criteria                                  | Nature   | Mitigation  | Monitoring   | Responsible Body  |
|---|--|---|--|---|
|   |  | appropriate waste site. See the Material Safety Data Sheets available through the internet if the user is not sure how to dispose of the substance.   | increasing the dust / litter impact so should be removed timeously. Liaise with Town Council regarding waste and appropriate handling of hazardous waste.  |   |
| Groundwater / Surface Water Contamination | Porous surface substrate can allow unwanted hazardous and ecologically detrimental substances to seep down to the water table, which in this case is seawater. The surface substrate is a topping of mixed sand and small stones. Bedrock close to the sea level appears to have been artificially covered by ground fill.           | The close proximity to the marine ecosystem dictates that all precautions are to be taken to prevent contamination of the soil as this could enter the ecosystem. Leakages from construction 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 (i.e. the sea) 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. | Report Form for all spills or leaks is to be completed by Contractor for ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD and submitted to the Environmental Officer of NAMPORT. A baseline study must be carried out before any construction begins. This is to assess the current condition of soil substrate and any Groundwater present. A comparison with this data is to be made at the end of the construction phase. | NAMPORT Environmental Officer, Contractor, ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD ENV & SM, |
| Heritage Impact                           | Buildings and other sites of significance for historical purposes must be reviewed for their age and uniqueness so that the construction of the proposed facility has no impact on such heritage sites.  | A building of unknown age is located at the entrance of the site might be the only building of concern. The narrow passage on to the site might pose a problem for the storage tanks that might be delivered by road to the site. Care must be taken not to damage the building.  | Inspect Old Building adjacent to site for any vehicular or other potential damage. Report any damages to NAMPORT.  | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD ENV & SM   |
| Ecological Impact                         | The site was previously developed, thus no conservation worthy vegetation is situated at the proposed facility location. Limited impact on the flora can be expected, as no vegetation will be removed for the construction of the facilities. A few sea birds can be expected along the rocky coastline along the western boundary. | A security boundary fence, which is planned for the whole site will on the western boundary reduce the impact that the construction activities and workers will have on the tidal zone along the site's boundary. Oystercatchers were observed on the coastal rocks during the site visit.  | Report Form for Environmental officer to fill in regarding the recordable Fauna visiting the shoreline. Submit forms to MET & MFMR   | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD SM & ENV, GPT.                                       |

|               |                                    |  |                          |  |
|---------------|------------------------------------|--|--------------------------|--|
| Visual Impact | This is an impact that affects the | Visual impact could pose one of the most significant | Survey the residents and | Contractor, ERONGO<br>LIQUID PETROLEUM GAS<br>(LPG) TERMINAL PTY LTD |
|---------------|------------------------------------|--|--------------------------|--|

| Criteria  | Nature   | Mitigation   | Monitoring  | Responsible Body   |
|---|--|--|---|--|
|   | aesthetic appearance.  | impacts. Visual impacts could be limited through keeping all construction areas clean and orderly at all times. Good housekeeping also reduces the risk of injuries.   | businesses on three occasions during the construction phase and note any irregularities. Notice of the start of construction and invitation to give feedback at any time with regards the visual impact of the development on tourism and commerce related activities. Develop forms for surveys. | GAS HS & SM  |
| Cumulative Impact   | 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. | Possible cumulative impacts associated with the construction phase include increase in traffic frequenting the site and along the B2 road . Therefore an increase in emissions from these vehicles will be experienced, decreasing the air quality around the proposed establishment and along the B2 road Wear and tear on the B2 road , coupled with increased risk of road traffic incidences. These impacts will however be short lived. | Summary report based on all other impacts must be created to give an overall assessment of the impact of this Construction phase. A monthly summary compiled by SM for review by Environmental Consultants (Centre for Geosciences Research cc - GPT)   | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS, ENV & SM, GPT                       |
| Enhanced skills transfer and technology transfer to Namibia and subsequent promotion of | People need skills to perform their jobs. The technology to do something is often not found in Namibia. Development of people and technology are key to economic development   |  | Report on the actual training and the enhancement of skills and transfer of technology should be done as a matter of transparency with regards to the running of ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD. Report can be published in the company                                       | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD, Directors & Public Relations personnel |

| Criteria   | Nature   | Mitigation  | Monitoring  | Responsible Body   |
|--|--|---|---|--|
| economic development   |  |   | magazine as part of the on-going marketing reflecting the corporate responsibility. Economic development indices can be published to show any trends since the operations of the facility started.  |  |
| Increased spread of HIV/ AIDS; Increased influx to Walvisbay; increased informal settlement and associated problems; Reduced property values | New Developments attract people to the town who seek work. This in turn can increase the extent of informal settlements and its associated problems. The increased trucking and distribution of goods from Walvisbay could contribute to the spread of HIV / AIDS. Property prices in the area can be impacted positively or negatively. | The implementation of an educational program on HIV / AIDS for all the staff of ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD, in particular the truck drivers is imperative. Restricted employment for Walvisbay dwellers only should be practiced strictly, where possible. Deviations from this practice should be justified appropriately. Training of local people should be considered from the start. These measures will reduce the influx of newcomers to the town and thereby reduce growth in the informal settlement and maintain property prices. | Report on the actual challenges facing Walvisbay with regards to HIV/AIDS, informal settlements, property prices and demography. This will reflect the corporate responsibility that ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD takes seriously. Reports can be published in the company magazine, which could publicise the programs that ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD has implemented to address some of these issues. Publications should be distributed to the community. The magazine is a formal accountability measure for the company as it portrays the realities of life in Walvisbay | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD, Directors & Public Relations personnel |
| Employment & Secure Fuel Supply  | The proposed development hopes to secure the supply of LPG gas to Namibia and beyond to its SADC neighbours. The proposed development promises employment to inhabitants of Walvisbay.   |   | Profiling of employees on their job responsibilities and achievements and reporting on these will portray the company as a people centred organisation. The magazine is an ideal vehicle for reaching this goal.  | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD, Directors & Public Relations personnel |

**Table 3. The Operational Phase**

| Criteria | Nature  | Mitigation  | Monitoring   | Responsible Body   |
|----------|---|---|--|--|
| Traffic  | The site is located within the Industrial area. Assessment of traffic to and from the site is assessed. | At maximum envisaged distribution of LPG an average of 6 trucks per day will pass through the town twice in a day. Once on the way in and once on the way out. Trucks park on site (4 parking bays and 2 filling bays are planned). No truck stop exists in Lüderitz and citizens are concerned about associated hygiene problems that persist as a result from truckers using side streets for parking and overnight stays before offloading or leaving town. ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD could address the issue pertaining to their trucks and drivers by offering amenities for truckers off site before and after loading of the LPG especially in the event of them having to overnight in Walvisbay. ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD would like to use rail for distributing the product from Walvisbay and only a few trucks would be needed to serve the regional needs. | A register of trucks arriving and leaving the premises and length of stay will be kept. Longer stays in the town should be reported assumedly if the truck arrives late in the day must wait outside the depot overnight. Coordination of their arrival from the nearest town (i.e. Swakopmund) should be actively monitored to ensure the earliest possible arrival at Walvisbay in the morning and departure back to Swakopmund where a truck stop exists. Overnight stops should be made in these outlying towns as far as is possible. | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD SM & sister companies controlling distribution by truck |
| Security | Access to site by unauthorised persons with the intent to steal product or equipment.                   | Strict security that prevents unauthorised entry. Patrolling perimeter fence. 24 hour surveillance will be required. Security personnel must be trained to their greatest potential with regards emergency response procedures.<br><br><b>Refer to Emergency Response Guidebook 2008 and associated SANS document, EIA Appendix A, C &amp; D and the official ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD operational manuals.</b>   | Daily reporting of all inconsistencies in procedures and equipment. Fitness for work certificates for every security officer to be issued on a monthly basis. Daily internal inspections for assessing personnel's fitness for work should be carried out by an authorised person.   | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD SM & Security Supervisor.                               |

| Criteria                  | Nature   | Mitigation  | Monitoring  | Responsible Body  |
|---------------------------|--|---|---|---|
| Fire and Explosion Hazard | Hydrocarbons are volatile under certain conditions and their vapours in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise. Propane in particular is explosive. BLEVE events are the most feared outcomes in connection with LPG. | <p>Various international occupational health and safety performances should be consulted for specific regulations. These have already been referred to in the Assessment Report. It is very important to take public safety into account when locating LPG storage facilities, as the public can be at risk from potential spills, vapour emissions and fires. Risks from these can be minimized through implementation of buffer zones. Different types of developments may be located within specified distance from these facilities, as well as different industries having different quantities of workers working in them. This is not a legal requirement in Namibia and ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD would have no control on the future placement of facilities around their proposed bulk LPG storage facility. All fuel storage and handling facilities in Namibia must however comply with strict safety distances as prescribed by API Standards and/or SANS. SANS is adopted by the Ministry of Mines and Energy as the national standard. The ERONGO</p> <p>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 ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD would have no control on the future placement of facilities around the proposed facility. Although Namibian legislation only requires that the SANS standards with regard to barrier distances be implemented, the standards for LPG storage of the National Fire Protection Association of America (NFPA) will be consulted for the project. It must further be assured that sufficient water is available for fire fighting purposes.</p> |   |   |
|                           |  |   | Full Report on Site Layout and laws abided by such a layout is to be filed in each HSEQ manual. The Emergency Response and Training Manuals must have this document included. The regulations of the NFPA which will be the overriding regulations for fire safety must be included in each of the above mentioned manuals. | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD Directors & SM |



| Criteria | Nature | Mitigation  | Monitoring  | Responsible Body  |
|----------|--------|---|---|---|
|          |        | <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 LPG storage facility. Regular inspections should be carried out to inspect and test fire fighting equipment and pollution control materials at the LPG storage facility. All fire precautions and fire control at the LPG storage facility must be in accordance with SANS, or better. A holistic fire protection and prevention plan is needed. The role that NAMPORT must play with regards to this must be enforced.</p> | <p>Training to be given every 6 months on procedures for Emergency Procedures. A program for emergency drills is to be drawn up by SM, which includes all relevant stakeholders. NAMPORT Local Fire Brigade &amp; Traffic Department. ENOC, the technical partners are to source the manuals for the training and procedures for Emergencies. Attendance lists for training must be kept and reported on to ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD Directors.</p> | <p>ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD<br/>HS, ENV<br/>&amp; SM, GPT</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 "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>   | <p>Regular testing of automated fire and leak response systems. Record any irregularities and refer to Manuals provided by ENOC for the monitoring of Bulk LPG Tanks. Send report to Directors.</p>   | <p>ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD<br/>HS, ENV<br/>&amp; SM, GPT</p> |

| Criteria        | Nature   | Mitigation   | Monitoring   | Responsible Body   |
|-----------------|--|--|--|--|
|                 |  | The storage tanks are mounded with reinforced concrete and the necessary pressure release valves function to regulate pressure. Temperature of the tank and its content is regulated and by virtue of it being buried in concrete prevents the conditions that results in BLEVE events. <b>Refer to Emergency Response Guidebook 2008 and associated SANS document, EIA Appendix A, C &amp; D and the official ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD operational manuals.</b> | Regular testing of valves and tank temperature and pressures. Record all data and produce weekly report. Follow emergency response procedure if irregularities are picked up. Refer to Manuals provided by ENOC for the monitoring of Bulk LPG Tanks. Send reports to Directors. | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS, ENV & SM, GPT |
| Health & Safety | During operational times all procedures for offloading, storage and uploading are subject to risks to human beings. These risks are assessed in terms of the predicted impact if realised. | The operations of a LPG 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. For this reason adequate measures must be brought in place to ensure safety of staff on site, and includes: (See Appendix A & D) (Provide forms for all end users who monitor)  | Annual Summary Reports from each Officer must be compiled and sent to independent HSE Auditors and ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD Directors. Provide forms for each section of Health, Safety & Environment (HSE) responsibility.                            | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM, GPT      |
|                 |  | 1. Proper training of operators;   | Induction training for all who enter the site must be required. Training of trainers to be done by recognised international institution (providers of NEBOSH certification)  | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM, GPT      |
|                 |  | 2. First aid treatment;  | All Supervisors need to be trained in First Aid and anyone else who wishes to be trained.  | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM           |
|                 |  | 3. Medical assistance;   | Access to quick and efficient medical services must be provided either directly on site or at the local clinics or doctors surgeries.  | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM           |
|                 |  | 4. Emergency treatment;  | Inventory of all stock to be reported on a weekly basis  | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM           |
|                 |  | 5. Prevention of inhalation of fumes (LPG);  | Emergency Response Training must include this aspect of personal health and safety.  | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM           |

| Criteria    | Nature   | Mitigation   | Monitoring  | Responsible Body   |
|-------------|--|--|---|--|
|             |  | 6. Protective clothing, footwear, gloves and belts; safety goggles and shields;  | Daily Check lists for HS officer; Ensure Take 5 booklets have been issued (plan the job, spot the hazards, assess the risk, make changes and do the job safely); Ensure job hazard analyses are done. Conduct daily safety talks during daily planning meetings.  | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM, GPT              |
|             |  | 7. Manuals and training regarding the correct handling of materials and packages should be in place and updated as new or updated material safety data sheets become available;  | Review Training and Inductions to be updated when necessary. Access to manuals by all personnel must be in place. An independent survey by NAMPORT at random unannounced times should be carried out. A report based on the reviewers findings must be sent to the Directors of ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD . A copy of the report to be given to Walvisbay Town Council & CEGEOR.   | NAMPORT ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS, ENV & SM, GPT |
|             |  | <b>Refer to Emergency Response Guidebook 2008 and associated SANS document, EIA Appendix A, C &amp; D and the official ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD operational manuals.</b>   | .   | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD SM, ENV & HS              |
| Air Quality | Gases, which are detrimental to living organisms, are assessed under this section. | In terms of air quality, hydrocarbon vapours will not normally be released during delivery due to complete containment of LPG and no venting of the sea vessel's stowage compartments. Only from pressure relief valves could LPG be released but these are connected to sensors, which cut off flow if the pressure drops. See EMP & ERP. Vapours can also be released during the filling of road and rail tankers. The same applies to these valves. Vapour emissions of the kind mentioned above are minimal and are due only to residual amounts that may remain in the pipes after exchanges or during pressures adjustments at valves. | Provision of Air Quality Samplers for Environmental Officer. Sample air before, during and after all offloading and uploading events. Regular testing of air at various points around the storage tanks, pipelines, immediate vicinity of the property and selected distances further away from outside of the property. Forms to be provided for reporting all data. Independent review of data collected. Monthly reporting by independent body (GPT) | CORRIDOR GAS ENV & SM, Contractor, GPT.                                      |

| Criteria                  | Nature   | Mitigation   | Monitoring   | Responsible Body  |
|---------------------------|--|--|--|---|
|                           |  | expected to be site specific and may pose a limited threat to personnel on site. All venting systems and procedures have to be designed according to SANS standards. Residual LPG in the pipe system is pumped back into the bulk storage tanks. Emissions disperse quickly downwind and the gas is heavier than air (See MSDS Appendix E (EIA Report). for facts about LPG). The smell experienced has been added as a safety measure so that one is aware of the flammable gas in the air. |  |   |
| Noise                     | Noise will exist due to heavy vehicles accessing the site to have their tanks filled with LPG.   | It is recommended that the operation and traffic be limited to normal working hours (08h00 to 17h00) and that weekends should rather be avoided.   | A record of complaints must be kept on site and acted on where appropriate.  | CEGEOR ENV & SM, Contractor, GPT.   |
| Waste Production          | The ability of product to act as a waste which must be cleaned up  | The facility will not produce waste directly as a result of spillage or leak due to the nature of the material. See the Material Safety Data Sheet.  | Removal of waste should be at regular (weekly) intervals to maintain visual orderliness but more so to not give time for liquid waste to enter the soil substrate. Dry waste is at risk of increasing the dust / litter impact so should be removed timeously. Liaise with Town Council regarding waste and handling of hazardous waste. Reports to be written on standard incident forms. | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS, ENV & SM, GPT                            |
| Groundwater Contamination | Porous surface substrate can allow unwanted hazardous and ecologically detrimental substances to seep down to the water table, which in this case is seawater. The surface substrate is a topping of mixed sand and small stones. Bedrock close to the sea level appears to have been artificially covered by ground fill. | Oil spillages from road tanker engines during unloading of LPG should be mitigated by ensuring that surfaces are sealed. All operational surfaces within the LPG storage facility must be installed with spill containment areas as per the relevant SANS standards, where appropriate.  | Report Form for all spills or leaks is to be completed by Contractor for ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD and submitted to the Environmental Officer of NAMPORT. Comparisons with the baseline data are to be made and reported on using standard procedures and forms.  | NAMPORT Environmental Officer, ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD ENV & SM, GPT |
| Ecological Impact         | The site was previously developed, thus no conservation  | There is also no defined bird flight path in the vicinity of the proposed LPG storage facility.  | Daily report Form for Environmental officer to fill in regarding the   | CEGEOR SM & ENV, GPT  |

| Criteria          | Nature  | Mitigation   | Monitoring   | Responsible Body  |
|-------------------|---|--|--|---|
|                   | worthy vegetation is situated at the proposed facility location. Limited impact on the flora can be expected, as no vegetation will be removed for the construction of the facilities. A few sea birds can be expected along the rocky coastline along the western boundary.  | The shoreline will be fenced off and birds using the tidal zone will continue to have access to this area. In fact less access by humans and other probable predators (i.e. cats and dogs) from the landside will take place due to the erection of fencing. The fencing is a security and safety measure.   | recordable Fauna visiting the shoreline. Submit an annual report of the findings to MET & MFMR. This will show a proactive approach and assist ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL Pty Ltd with follow-up applications for Clearance Certificate Renewals. Same applies to all impacts recorded and reported on.  |   |
| Cumulative Impact | These are impacts on the environment, which result from the incremental impact of an 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. | Possible cumulative impacts associated with the operational phase include increase in traffic frequenting the site and along the section of road near the fuel depots. Therefore increase in emissions from these vehicles, decreasing the air quality around the proposed establishment. Wear and tear on the road and increased risk of road traffic incidences could increase. Other companies are using the roads to access the town and harbour and a few members of the public are concerned that the additional road tankers that will frequent the town will have a cumulative impact on the town, in particular the road quality, obstructions along main and side streets when parked and health impacts through lack of garbage and ablution amenities. | Annual summary report based on all other impacts must be created to give an overall assessment of the impact of the Operational Phase. The monthly summaries compiled by SM for review by Environmental Consultants (Centre for Geosciences Research cc -) can be summarised for the year and again sent to the Directors and GPT for review and to allow planning to be adjusted if the mitigations are insufficient. | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD<br>HS, SM &<br>ENV, GPT. |

| Criteria  | Nature   | Mitigation  | Monitoring   | Responsible Body   |
|---|--|---|--|--|
| Enhanced skills transfer and technology transfer to Namibia and subsequent promotion of economic development                                | People need skills to perform their jobs. The technology to do something is often not found in Namibia. Development of people and technology are key to economic development   |   | Report on the actual training and the enhancement of skills and transfer of technology should be done as a matter of transparency with regards the running of ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD. Report can be published in the company magazine as part of the ongoing marketing reflecting the corporate responsibility. Economic development indices can be published to show any trends since the operations of the facility started.   | CEGEOR, Directors & Public Relations personnel   |
| Increased spread of HIV/ AIDS; Increased influx to Walvisbay; ncreased informal settlement and associated problems; Reduced property values | New Developments attract people to the town who seek work. This in turn can increase the extent of informal settlements and its associated problems. The increased trucking and distribution of goods from Walvisbay could contribute to the spread of HIV / AIDS. Property prices can be effected positively or negatively. | The implementation of an educational program on HIV / AIDS for all the staff of ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD, in particular the truck drivers is imperative. Restricted employment for Walvisbay dwellers only should be practiced strictly. Deviations from this practice should be justified appropriately. Training of local people should be considered from the start. These measures will reduce the influx of newcomers to the town and thereby reduce growth in the informal settlement and maintain property prices. | Report on the actual challenges facing Walvisbay with regards to HIV/AIDS, informal settlements, property prices and demography. This will reflect the corporate responsibility that ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD takes seriously. Reports can be published in the company magazine, which could publicise the programs that ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD has implemented to address some of these issues. Publications should be distributed to the community. The magazine is a formal accountability measure for the company as it portrays the realities of life in Walvisbay Profiling of employees on their job responsibilities and achievements and reporting on these will portray the company as a people centred organisation. The magazine is an ideal vehicle for reaching this goal. | CEGEOR, Directors & Public Relations personnel<br><br>CEGEOR, Directors & Public Relations personnel |
| Employment & Secure Fuel Supply   | The proposed development Hopes to secure the supply of LPG gas to Namibia and beyond to its SADC neighbours. The proposed development promises employment to inhabitants of Walvisbay.   |   |  |  |

**Table 4. Decommissioning Phase**

| Criteria                        | Nature  | Mitigation  | Monitoring   | Responsible Body   |
|---------------------------------|---|---|--|--|
| Waste Production                | The ability of product to act as a waste which must be cleaned up   | Upon decommissioning the pipelines, pumps, tanks and valves must be removed to another site owned by CEGEOR or scrapped in the appropriate manner. Upon demolition of the buildings and concrete mounding the rubble must be removed from the property and taken to an approved dump site designated by the Walvisbay Town Council. | Comparisons with Baseline data are to be made. Rehabilitations if necessary are to be done using the Environmental Fund that should have been started at the inception of the project. Costs of rehabilitation must be estimated throughout the operational phase to ensure appropriate funds are set-aside in the Fund. | CEGEOR HS, ENV & SM, GPT or ENVIRONMENTAL CONSULTANT                               |
| Ecological Impact               | Operations spanning many years will create habitat for human activities and no flora or fauna will be encouraged to establish habitats  | CEGEOR would have to ensure that no new habitat is created for flora and fauna.   | Upon 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.   | CORRIDOR GAS SM & ENV,   |
| Employment & Secure Fuel Supply | Retrenchments of Staff or relocation of staff to another town where business continues in the same way.   | Alternative jobs can be offered away from Lüderitz.   | Plans for meeting the Labour Acts requirements for retrenching staff if the possibility arose.   | CORRIDOR GAS, Directors & Public Relations personnel or Human Resource Department. |
| Dust                            | Dust will be generated during the Decommissioning Phase and might be aggravated during periods of strong winds. This occurs regularly in Lüderitz   | It is recommended that regular dust suppression be included in the Decommissioning Phase, when dust becomes an issue.   | 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. Accumulation of rubble should not be allowed and within reasonable time must be taken to the dumpsite.                  | CORRIDOR GAS ENV & SM, Contractor.   |
| Noise                           | 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 huge storage tanks. Hammers, diggers | It is recommended that the demolishing and traffic be limited to normal working hours (08h00 to 17h00) and that weekends should rather be avoided. On site demolishing during these office hours; Pipeline dismantling might need to be during non-office times if it disturbs office time  | Notice of the start of the decommissioning should be made and invitation to give feedback at any time with regards the noise impact of the development on tourism and commerce related activities.   | CORRIDOR GAS ENV & SM, Contractor.   |

| Criteria                                  | Nature   | Mitigation   | Monitoring  | Responsible Body  |
|---|--|--|---|---|
|   | and drills will be used.   | activities of third parties.   |   |   |
| Visual Impact                             | 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 as well.  | Notice of the start of decommissioning and invitation to give feedback at any time with regards the visual impact of this on tourism and commerce related activities. Develop forms for surveys.  | Contractor, ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD<br>HS & SM                               |
| Groundwater / Surface Water Contamination | Porous surface substrate can allow unwanted hazardous and ecologically detrimental substances to seep down to the water table, which in this case is seawater. The surface substrate is a topping of mixed sand and small stones. Bedrock close to the sea level appears to have been artificially covered by ground fill. | The close proximity to the marine ecosystem dictates that 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 (i.e. the sea) 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. | Report form for all spills or leaks is to be completed by Contractor for ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD and submitted to the Environmental Officer of NAMPORT. 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 back over to NAMPORT. | NAMPORT Environmental Officer, Contractor, ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD ENV & SM, |
| Health, Safety and Security               | During the Decommissioning Phase similar risks to human beings as with previous phases will be present. Once the tanks and pipelines have been emptied completely of their contents residual amounts of LPG might exist. All other risks associated with demolitions must be considered.                                   | The decommissioning of a LPG 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. For this reason adequate measures must be brought in place to ensure safety of staff on site, and includes: (See Appendix A & D) (Provide forms for all end users who monitor)   | Final Summary Reports from each Officer must be compiled and sent to independent HSE Auditors and ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD Directors. Provide forms for each section of Health, Safety & Environment (HSE) responsibility.  | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD<br>HS & SM,<br>GPT                                   |
|   |  | 1. Proper training of operators;   | Review induction training for all who enter the decommissioning site must be required. Check the validity of trainers to train on safe work practices during the phase.   | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD<br>HS & SM,<br>GPT                                   |
|   |  | 2. First aid treatment;  | All Supervisors need to be trained in First Aid and anyone else who wishes to be trained.   | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD<br>HS & SM   |



| Criteria                  | Nature  | Mitigation   | Monitoring   | Responsible Body  |
|---------------------------|---|--|--|---|
|                           |   | 3. Medical assistance;   | Access to quick and efficient medical services must be provided either directly on site or at the local clinics or doctors surgeries.  | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM                    |
|                           |   | 4. Emergency treatment;  | Inventory of all stock to be reported on a weekly basis.   | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM                    |
|                           |   | 5. Prevention of inhalation of fumes (LPG);  | Emergency Response Training must include this aspect of personal health and safety. Though lower, awareness that risks still exist.  | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM                    |
|                           |   | 6. Protective clothing, footwear, gloves and belts; safety goggles and shields;  | Daily Check lists for HS officer; Ensure Take 5 booklets have been issued (plan the job, spot the hazards, assess the risk, make changes and do the job safely); Ensure job hazard analyses are done. Conduct daily safety talks during daily planning meetings.   | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS & SM, GPT               |
|                           |   | 7. Manuals and training regarding the correct handling of materials and packages 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.          | Review Training and Inductions to be updated when necessary. Access to manuals by all personnel must be in place. A final independent survey by NAMPORT at random unannounced times should be carried out. A final report based on the reviewer's findings must be sent to the Directors of ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD. A copy of the final report to be given to Walvisbay Town Council & Centre for Geosciences Research cc. | NAMPORT ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS, ENV & SM, GPT  |
|                           |   | 8. 24-hour security surveillance in case of opportunistic activities.  | Receive weekly reports on all responsible areas and issue a final report upon handing over of the site.  | ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD SM                         |
| Fire and Explosion Hazard | Residual Hydrocarbons could be present and might pose a risk to the teams dismantling the various structures. BLEVE events are highly unlikely. | 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 | Full and Final Report on all emergency responses and training done. All manuals must return to the head office of ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD.  | NAMPORT, ERONGO LIQUID PETROLEUM GAS (LPG) TERMINAL PTY LTD HS, ENV & SM, GPT |

| Criteria | Nature | Mitigation   | Monitoring | Responsible Body |
|----------|--------|--|------------|------------------|
|          |        | <p>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 LPG storage facility. Regular inspections should still be carried out to inspect and test fire fighting equipment and pollution control materials at the LPG storage facility. All fire precautions and fire control at the LPG storage facility must be in accordance with SANS, or better. The holistic fire protection and prevention plan should still be utilised. The role that NAMPORT must play with regards to this must be enforced. 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> |            |                  |

## **7. CONCLUSIONS**

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

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