ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STUDY REPORT

FOR

THE PROPOSED INSTALLATION AND OPERATION OF LIQUEFIED PETROLEUM GAS (LPG) BULLET STORAGE TANKS ON PLOT L.R. NO. MN/VI/3070, CHANGAMWE AREA, MOMBASA COUNTY

GPS CO-ORDINATES

4°01'29.3"S, 39°38'01.8"E

(-4.024818, 39.633821)

PROPONENT

LIONSGATE GAS & OIL LIMITED

P.O. BOX 4006 - 00506

NAIROBI

JUNE, 2020

EIA PROJECT IMPLEMENTATION TEAM

Name	Qualification	Affiliate
Edgar Ambaza (1916)	**Lead Auditor/Trainer ISO, Lead Expert (1916)– Natural Resource Management**	**Global EHS Consulting**
Edgar Eredi Muyesu (1921)	**Lead Auditor/Trainer ISO, Lead Expert(1921) – Natural Resource Management**	**Mikaye Systems Limited**
Evans Totona Kiboni	**Health and Safety Advisor.** **Lead Expert (8049)**	**CEMEA Limited**
Ezekiel Olukohe (8379)	**Associate Expert (8379), Bsc Environmental Health, Msc Occupational Health and Safety**	**Global EHS Consulting**
Venlensa Odhiambo	**Associate Expert (9899), Bsc Environmental Planning and Management**	**Global EHS Consulting**
Hastings Sifuma	**Environmental/Social Awareness Expert**	**Zebah Company Limited**

CERTIFICATION

Certification by EIA Expert

I certify that this Environmental Impact Assessment Study Report has been done under my supervision and that all due diligence has been taken in assessment criteria, methodology and report writing and that it conforms to the requirements of the Environmental Management and Coordination Act, 1999 and Legal Notice No. 101 of June 2003 (Environmental Impact Assessment and Audit Regulations).

NAME: ___Edgar Ambaza (1916) __ **Signature:** _____

NAME: ___Ezekiel Olukohe (8379) __ **Signature:** _____

NAME: ___Venlensa Odhiambo (9899) _ **Signature:** _____

DATE: _____

Certification by Proponent

Signed on Behalf of: *LIONSGATE GAS AND OIL LIMITED*

Name:_____

Position:_____**Signature:** _____

Date: _____

EXECUTIVE SUMMARY

Lionsgate Gas and Oil Limited herein referred to as the proponent, is a legally registered Kenyan company. The proponent proposes to construct and install three LPG bullet storage tanks on ***Plot L.R. No. MN/VI/3070*** in Changamwe area, Mombasa County. The parcel of land has been lying undeveloped for so many years. The facility will be operated by Lionsgate Gas and Oil Limited with the main purpose of distributing LPG within the Country and the neighboring countries as per the area demands.

Oil marketing companies have projected an increase in demand of Liquefied Petroleum Gas (LPG) in future due to increase in its domestic use. The demand is likely to increase substantially over the years to come. Even in the present scenario, it is very difficult to meet the market demand. Due to this, different Oil companies are required to augment / construct new facilities to meet the growing demand of Gas hence the motivation of constructing and installing the LPG bullet tanks by the proponent.

The E.I.A for the project is being coordinated by Global EHS Consulting. The firm has been contracted by the proponent to carry out the EIA study report in accordance with Legal Notice 101: Environment (Impact Assessment and Audit) Regulations 2003 promulgated under the Environment Management and Coordination Act, 1999. The proposed project is also expected to comply with the Energy Act, 2006 and its subsidiary legislation- The Energy (Liquefied Petroleum Gas) Regulations, 2009.

The proposed development activities will mainly involve civil, mechanical and electrical works associated with the installation of the LPG bullet tanks and thereafter operations of the facilities. The main activities to be carried out in the development of the proposed project include excavations or earth works, installation of the tanks and pipe works, construction of a boundary wall, entry gates, fire pump house, weighing bridge and administration office. The proposed project is expected to start immediately this EIA Study Report is approved and EIA License is issued by NEMA to the Proponent.

It is estimated that the project will cost approximately Seven Hundred million Kenyan Shillings (**Kshs 700,000,000**.) to complete.

The project site is located in an area characterized for industrial use. The neighborhood is characterized by light industries such as Simba apparel EPZ, Ashton Apparel EPZ, Consolbase Parking Yard, Total Service Station, Kenol Petrol station, Petrocity station,

Kensalt Limited, Polypropene Bags Ltd and other various transport yard. The project area is served by one main road; Mombasa-Nairobi Road (A109) and the Refinery road.

Objective

The proposed project aims at increasing the availability of LPG within the country and its neighboring countries in a bid to support Government efforts to promote the use of clean fuels and meeting the demand for LPG.

Technical Description;

The proposed project includes the:

- Installation of Gates and construction of a guard house
- Weigh bridge
- LPG pump & compressor shed
- Installation of Fire water storage tanks
- Construction of an Office Building
- Air compressor and panel room
- Fire water pump house
- Loading and unloading bay
- Renovation of the existing Perimeter wall
- Construction and Installation of Mounded Type LPG bullet tanks (3 bullet tanks with the capacity of 2500MT)
- Marking of Emergency Exit Gate
- Pipe and paint works

Safety design, engineering and operation

The proposed project will be designed, constructed, and operated in conformance with applicable national and international EHS guidelines and standards. Regarding safety at the facility the proponent will put in place all mechanisms, processes and procedures to eliminate mitigate or control identified risks and promotes continuous improvement. Further to this the proponent will apply HSEQ considerations in all planning, decision making, processes and practices. Various measures will be put in place to prevent leakages which include an electronic check scale and manual leak detector. An emergency shutdown system will also be installed to improve the safety situation at the facility. A hazardous operability study (HAZOP) will be carried out during the design phase of the facility to incorporate health, safety and environmental considerations.

An environmental management plan has been prepared which describes the environmental protection strategies that will be employed at the site. The EMP contains the management programmes and plans for handling the adverse environmental impacts.

Construction Phase

Most raw materials and fittings required for the LPG facility will be sourced locally. Heavy duty machinery including cranes, bulldozers, excavators, front-end loaders and electric welding machines will be used during construction. Construction activities are expected to generate noise levels to a limit of 85decibels and other safety hazards.

Operational Phase

A fire protection system will be provided. It will be by means of four 9Kg Dry powder extinguishers and a water sprinkler system. The sprinkler system will comprise of 1 1/2" main water line to tank and filling station, 1" and 3/4" cooling rings to storage tank complete with thermo spray sprinkler nozzles.

The facility will be hooked to the existing electricity supply line of KPLC while Sewerage and waste will be managed in accordance with the existing waste management procedures and Environmental Management and Coordination (Waste Management) Regulations of 2006.

Job opportunities will be generated through the operation of the LPG station. Skilled and unskilled labor will be required in technical fields as in operations and management. Local people will be employed wherever possible.

Noise levels will be kept to a minimum by designing the facility according to the requirements of Kenyan legislation - The Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009 **and** ISO: 15664:2001. Noise impacts shall not exceed the standards [Threshold Limit Values (**TLV**)] adopted by International Labor Organization (ILO), World Health Organization (WHO) and American Conference of Industrial Hygienist (ACGIH) 1989-guideline document.

Pollution from waste

During construction phase, waste will be generated from construction activities, domestic waste from construction team, sewage, polythene and plastics packing material and lubricants containers, used construction materials and wastewater from hydrostatic testing.

During operation phase, waste to be generated include domestic waste generated by the operation staff, components/parts of the facility's infrastructure been removed during replacement; and redundant electronic equipment.

Whereas during decommissioning phase, the main waste generated will be demolished parts of the facility which include; concrete boulders, scrap metals, plastics and rubber among others. The contractor should develop an integrated solid waste management system for the site.

Impacts on ambient noise quality

During the construction phase the proposed project will utilize machineries such as hydraulic excavator, mobile service crane, dump trucks and tipper Lorries which are likely to generate noise. The contractor at site will be expected to provide proper protective equipment and well planned programs for equipment usage.

During operation phase noise generation will be from the generator, compressor and the pumps. The amount of noise will depend on the size and the model of the pump to be used.

As will be the case with the construction phase, the sources of noise during decommissioning phase, will be mainly machinery and vehicles used in demolition of the facility and removing the materials from the site. The construction activities will be limited to daytime and the workers will be provided with personal protective equipment.

Health and safety impacts

The potential health and safety impacts of the proposed project include the occupational health and safety risks related to the project activities; risks to the public as a result of events of major disasters such as fire outbreaks and explosions.

A number of activities undertaken during development of the proposed project have potential risks to health and safety of the workers. During the construction phase, the potential Health & Safety risks the workers are likely to be exposed to include: Injuries resulting from falling from LPG tanks installation; Injuries resulting from operation of machinery, equipment, tools and construction vehicle, Exposure to diseases, including, typhoid etc. and road accidents.

The potential occupational health and safety impacts during operation phase include injuries to workers from, routine monitoring and maintenance and deaths and injuries from major disasters e.g. explosions and fire outbreaks. During the operation phase, the workers may come in contact with liquid LPG and suffer from severe cold burns whereas during

decommissioning, the potential Health & Safety risks include injuries occasioned by dismantling of the facility. The proposed project could be of great public concern especially in the event of a major disaster such as explosions and fire outbreaks. Liquefied Petroleum Gas is a highly flammable product and can be detrimental to the public safety if measures are not put in place. The impact significance related to public safety is likely to be high during operation phase of the project.

Environmental Management and Impact Mitigation

This report presents an environmental management plan which covers the measures for mitigating the adverse potential environmental impacts of the proposed project. The EMP includes programmes and plans for addressing the adverse environmental impacts. The proposed management programmes includes:

- Air quality management programme
- Noise management programme

The plans also include:

- Construction management plan;
- Construction control plan;
- Workplace health and safety plan;
- Community health and safety plan; and
- Emergency management and response plan

The proposed programs and plans will be subjected to monitoring. Monitoring will have two elements: routine monitoring against standards or performance criteria; and periodic review or evaluation. Monitoring will often focus on the effectiveness and impact of the programme or plan as a whole.

Analysis of alternatives

Several alternatives for the proposed project were evaluated. The alternatives considered include: Location, process/activity/operation, layout, input, and no-go option. On the basis of these considerations, the proposed project satisfies the overall economic, technical, environmental and safety criteria used.

Public Consultation

Public stakeholder consultation was undertaken in order to obtain the views and concerns of the stakeholders regarding the proposed project. The stakeholders perceived that the project

will not generate adverse environmental impacts. Some of the pertinent issues which were raised have been addressed in the environmental management plan.

Conclusion

The proposed project, including the construction and operation of the LPG bullet tanks station is anticipated to provide sufficient stock of LPG for the prevailing market use around Mombasa at the Country at large. The potential adverse impacts associated with the proposed project are possible to mitigate successfully. The impacts before implementation of mitigation measures are assessed as very low to medium low and the ratings are expected to improve further with the implementation of the proposed mitigation measures. In particular, the LPG facility will be designed, constructed and operated according to the latest industry norms and standards. Programs and plans developed and implemented through the EMP will be monitored and audited to ensure compliance.

Recommendation

The mitigation measures proposed in this report should be included in the tender contract and tender documents so that the contractor who will be selected for the project be bound to implement them fully thus ensuring Environmental Sustainability.

TABLE OF CONTENTS

DEFINITION OF TERMS

The definitions used in the impact assessment are given below:

An ***activity*** is a distinct process or task undertaken by an organization for which a responsibility can be assigned. Activities also include facilities or components of infrastructure that are owned by an organization.

An ***environmental aspect*** is an 'element of an organization's activities, products and services which can interact with the environment. The interaction of an aspect with the environment may result in an impact.

Environmental impacts are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality.

Receptors can comprise, but are not limited to, people or human-made structures or systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as aquifers, flora and paleontology. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.

Resources include components of the biophysical environment.

Frequency of activity refers to how often the proposed activity will take place.

Frequency of impact refers to the frequency with which a stressor (aspect) will impact on the receptor.

Severity refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.

Spatial scope refers to the geographical scale of the impact.

Duration refers to the length of time over which the stressor will cause a change in the resource or receptor.

ACRONYMS

Acronym	Description
API	American Petroleum Institute
BS	British Standard
dB(A)	Decibels on the A-Scale
DHP	Designated Health Practitioner
EA	Environment Audit
EHS	Environment, Health & Safety
EIA	Environment Impact Assessment
EMCA	Environmental Management and Coordination Act
ESM	Environmentally Sound Management
HAZOP	Hazardous Operability Study
HSEQ	Health Safety Environment and Quality
KPLC	Kenya Power and Lighting Company
LPG	Liquefied Petroleum Gas
MSDS	Material Safety Data Sheet
NEMA	National Environment Management Authority
NFPA	National Fire Protection Association – USA
OSHA	Occupational Health and Safety Act
TOR	Terms of Reference

CHAPTER ONE

1. BACKGROUND INFORMATION

1.1.Introduction

Lionsgate Gas and Oil Limited herein referred to as the proponent, is a legally registered Kenyan company which was Incorporated on 12th June 2019. The proponent proposes to construct and install three LPG bullet storage tanks on ***Plot L.R. No. MN/VI/3070*** in Changamwe area, Mombasa County. The parcel of land has been lying undeveloped for so many years. The facility will be operated by Lionsgate Gas and Oil Limited with the main purpose of distributing LPG within the country and the neighboring countries as per the area demands.

The E.I.A for the project is being coordinated by Global EHS Consulting. The firm has been contracted by the proponent to carry out the EIA study report in accordance with Legal Notice 101: Environment (Impact Assessment and Audit) Regulations 2003 promulgated under the Environment Management and Coordination Act, 1999. The proposed project is also expected to comply with the Energy Act, 2006 and its subsidiary legislation- The Energy (Liquefied Petroleum Gas) Regulations, 2009.

The proposed project falls under category 2-Medium Risk Projects (8) Hydrocarbons, projects(c) LPG Filling Plant. It is for this reason as required by The Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019.

1.2.Objective of the proposed project

The proposed project aims at increasing the availability of LPG within the country and its neighboring countries in a bid to support Government efforts to promote the use of clean fuels and meeting the demand for LPG.

1.3.EIA Study objectives

The EIA Study mainly aim at developing systems that shall be environmentally friendly, economically viable, socially acceptable and sustainable for the proposed project. The specific objectives of the EIA study include:-

a) To consider all possible positive and adverse impacts to the project area and its environs.
b) Design and prepare mitigation measures and plans to address all the possible environmental impacts.
c) Develop a comprehensive Environmental Management and Monitoring Plan for the

proposed installation of LPG bullet tanks

1.4.Project Justification

Oil marketing companies have projected an increase in demand of Liquefied Petroleum Gas (LPG) in future due to increase in its domestic use. The demand is likely to increase substantially over the years to come. Even in the present scenario, it is very difficult to meet the market demand. Due to this, different Oil companies are required to augment / construct new facilities to meet the growing demand of Gas hence the mainspring towards constructing and installing the LPG bullet tanks by the proponent.

1.5.Scope of the EIA study

The scope of Environmental Impact Assessment includes the following:

a. Identification of significant adverse impacts on the environment,
b. Mitigation measures to adverse impacts.
c. An Environmental Management Plan for the proposed project.
d. The baseline conditions of the proposed project area,
e. Relevant legislative, policy and administrative frameworks,
f. Seek the Views/opinions of the public through structured questionnaires

1.6.Terms of Reference (ToR)

Pursuant to section 58 of the Environmental Management and Coordination Act, (EMCA) 1999, the National Environment Management Authority (NEMA) requires project proponents to carry out Environmental Impact Assessments (EIA) and prepare related reports for developments that have the potential of resulting to negative social and environmental impacts.

Due to this the proponent (Lionsgate Gas and Oil ltd managment) contracted EIA/EA experts to conduct an Environmental Impact Assessment study for the proposed Installation of LPG bullet tanks on Plot no. L.R. No. MN/VI/3070 in Changamwe area, Jomvu Sub County , Mombasa County.

Terms of Reference was prepared and submitted to NEMA and was approved. The ToR which defined the duties of expert was as follows;

- The proposed location of the project in regards to road description, neighborhood and GPS Coordinates
- The objectives of the proposed project both environmental and economical.
- A concise description of the national environmental legislative and regulatory
- Framework, baseline information and any other relevant information related to the project

- The technology, procedures, and processes to be used, in the implementation of the project
- A description of the potentially affected environment
- The environmental effects of the project including the social and cultural effects and the

  direct, indirect, cumulative, irreversible, short term and long term effects anticipated
- Alternative technologies and processes available and reasons for preferring the chosen technology and processes
- Analysis of alternatives including project site, design and technologies and the reasons for preferring the proposed site design and technologies
- An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, time frame and responsibility to implement the measures
- Provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the course of carrying out activities or major industrial and other development projects
- The measures to prevent health hazards and to ensure security in the working environment for the employees and the management of emergencies.
- An identification of gaps in knowledge and uncertainties which were encountered in compiling the information.
- An economic and social analysis of the proposed project.
- An indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures.

1.7.Methodology

i. Environmental Screening

The environmental screening was carried out to determine whether an EIA study is necessary for this project and at what level of evaluation. This took into consideration the requirements of the Environmental Management and Coordination Act (EMCA), 1999 Amended 2015, and specifically the second schedule of the same act. From the screening process, it was understood that this project would cause significant impacts both positive and negative on the environment and therefore the EIA process was necessary.

ii. Environmental Scoping

In environmental scoping, the focus was on environmental impacts of great concern. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects. Impacts were also classified as immediate and long-term impacts. This will include assessment of the proposed project in respect of but not limited to:

- Project Background: this will give the brief history of the proposed project site, the parties involved and justification of the project.
- The proposed project objectives; both in the short and long run; and how they are linked to the overall objectives.
- Present environmental conditions; description of the project site, ecological zoning as well as the state of the environment and its surroundings. Attempts will state if it is already suffering from degradation.
- Identification of Environmental Impacts; the report will distinguish between significant positive and negative impacts, direct and indirect impacts and immediate and long term impacts which are unavoidable and/or irreversible,
- Analysis of the alternatives to the proposed project; this will involve a description of alternatives and identify alternatives that would achieve the same objectives.
- Community/ Stakeholder Consultations: these will be undertaken to determine how the project will affect the local people / various stakeholders.
- Development of an Environmental Management Plan (EMP); to mitigate negative impacts, recommending feasible and cost effective measures to prevent or reduce significant negative impacts to acceptable levels,
- Development of a Monitoring Plan; this will be used in monitoring the implementation of the mitigation measures and the impacts of the project during construction and operational phases, including an estimate of capital and operational costs, and Make necessary recommendations pertaining to the proposed development.

iii. Desktop Study

The Environmental Impacts Assessment Project Report from the findings were compiled in accordance with the guidelines issued by NEMA for such works and was prepared and submitted for consideration and approval. The Consultant ensured constant briefing of the client during the exercise.

iv. Public Consultation and Site Visit

Field visits were initiated for physical inspections of the project site to gather information on the state of the environment. Several photos of the project site and the immediate neighboring

developments were taken for inclusion in this report. The study also sought public opinion/views of neighbors, interested or affected parties of the proposed project if any through Consultation and Public Participation (CPP) exercise. Questionnaires were administered to the public which is considered an appropriate way of data collection following the measures Gazetted by Ministry of Public Health to Curb Covid-19 transmission and interviews held with neighbors. The questionnaires have been included in this report.

v. Reporting

In the entire exercise, the proponent and EIA experts contacted each other on the progress of the study and signing of various documents. Ten copies of this report alongside a CD will be submitted to the National Environment Management Authority for review and issuance of an EIA license. All the materials and workmanship used in the execution of the work shall be of the best quality and description.

CHAPTER TWO

2. PROJECT DESCRIPTION

2.1.Project Location

The proposed project site is located on Plot L.R No. MN/VI/3070 in Changamwe area, jomvu Sub-County, Mombasa County. It is geo-referenced as Lat -4.024818 Long39.633821.

The project site is located in an area characterized for industrial use. The neighborhood is characterized by light industries such as Simba apparel EPZ, Ashton Apparel EPZ, Consolbase Parking Yard, Total Service Station, Kenol Petrol station, Petrocity station, Kensalt Limited, Polypropene Bags Ltd and other various transport yard.

The project area is served by main road; Mombasa-Nairobi Road (A109) and the Refinery road.

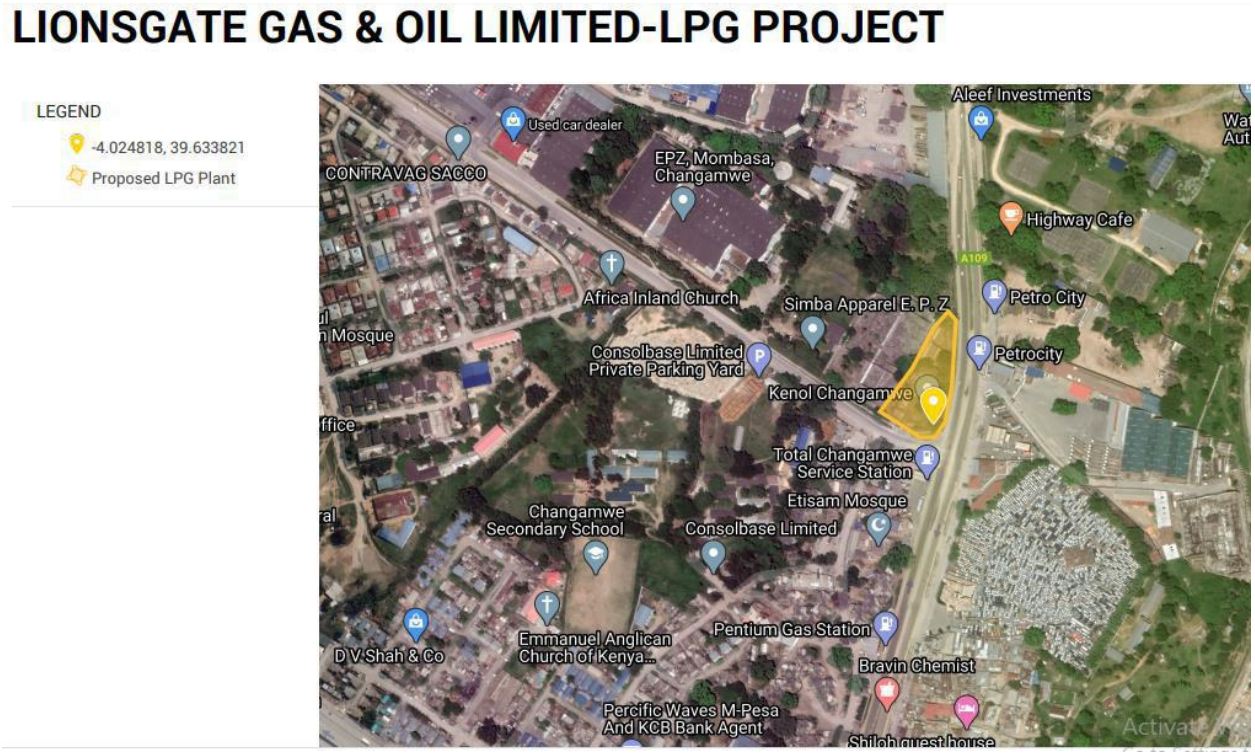

Figure 1: Proposed Project site location

2.2.Proposed Project

The proposed project is to be located on plot no. MN/VI/3070, Changamwe area, Mombasa County and the parcel of land is approximately 1.231Ha. The proposed project will have features such as mounted type 2,500 metric tons 3LPG bullet tanks, and, office block, sentry house, loading and off-loading area, LPG pump compressor and shed, fire water pump house, weigh bridge, perimeter wall will be constructed and two gates installed (Entry/Exit gate and Emergency exit gate).

The task will involve

- Excavation through soil to a depth not exceeding 0.8m to hard rock and cart away debris
- Construction of a tank foundation (4m long by 2m wide by 0.5m deep)
- Fabrication of loading and offloading area (1.2m by 1.2m by 2m high).
- Casting a reinforced concrete slab for LPG pump (0.6m by 0.6m by 100mm thick)
- LPG piping work
- Painting work
- Purge air from tank and pipelines and commission
- Construction of a three storey building (ground, 1st and 2nd floor where ground floor will be used as fire water pump house, 1st floor as air compressor and panel room while 3rd floor will be used as an office).
- Construction of sentry house by the entrance/exit gate
- Construction of weigh bridge
- Perimeter wall construction and installation of steel gates

(Copies of the site layout and drawings showing the respective features of the proposed project are appended herein).

2.2.1. Technology

The primary technologies used for the design, construction and operation of the LPG storage facility include various international code of practice, Standards, Government Acts and Local Authority Regulations. In Kenya there are a limited number of regulations covering the technology to be used in the design, construction and operation of LPG station. Subsequently the country relies on international codes of practice, standards and guidelines for the design, construction and operation of such facilities.

The proposed project will be designed and constructed in alignment with the standards quoted in table below:-

Table 1: Standards to be used for the Proposed LPG facility

Mechanical Works	
Kenya Standards KS 1938-3:2006	The handling, storage and distribution of liquefied petroleum gas in Domestic, commercial and industrial installations-code of practice. Part 1: Liquefied petroleum gas installations involving gas storage containers of individual capacity not exceeding 500L and a combined water capacity not exceeding 3000L per installation. Part 2: Transportation of LPG in bulk by road. Part 3: Liquefied petroleum gas installations involving storage vessels of individual water capacity exceeding 500L Part 4: Storage and filling sites for refillable liquefied petroleum gas(LPG) containers not exceeding 15 kg
BS 1414	Steel Wedge Gate Valves for the Petroleum, Petrochemical and Allied Industries
BS 1868	Steel Check Valves (Flanged and Butt-Welding Ends) for the Petroleum, Petrochemical and allied Industries
BS *5352*	Steel Wedge Gate, Globe and Check Valves 50mm and smaller for the Petroleum, Petrochemical and Allied Industries.
ASME B 16.9	Factory Made Wrought Steel Butt Welding Fittings
1P part 2	Marketing Safety Code (for all works)
Electrical Works	
BS 5467	Specification for XLPE Insulated Cables
BS 5486	Low Voltage Switchgear and Control Gear Assemblies
BS 5501	Electrical Apparatus for Potentially Explosive Atmospheres
BS 7430	Code of Practice for Earthing
BS 7671	Requirements for electrical Installations
IP Part 1	Electrical Safety Code
IEC 502	Specification for XLPE insulated Power Cables

Instrumentation and Control	
BS 381 C	Colors for Identification, Coding and special Purposes
BS 1363	1 3A plugs, socket-outlets and adapters
BS 4196	Sound Power Levels of Noise Sources
BS 5308	Instrument Cables
BS 6739	Code of Practice for Instrumentation in process Control Code of Practice for Earthing
BS 6739	Code of Practice for the Instrumentation of in Process Control Systems: socket outlets and couplers for industrial purposes
P Part 15	Area Classification code for Petroleum Installations
Civil and Structural Standards	
BS 8110	Structural use of concrete
BS 8004	Code of practice for foundations
BS 5328	Specification for concrete
BS 6032	Code of practice for earth works
BS 1881	Testing concrete
BS 812	Testing aggregates

2.2.2. Project Cost

The cost of the proposed installation of 3 LPG bullets of 2,500MT capacity each and construction of the auxiliary facilities is approximately **Kshs 700,000,000 (Seven Hundred Million Kenya Shillings Only)**.

2.2.3. LPG Storage Tank

The 3 LPG bullet storage tanks with the capacity of 2,500MT will be sourced from oversea and installed at the proposed project site (Plot No. MN/VI/3070, Changamwe area, Mombasa County). The tanks will be put on a Tank foundation. The design is as per BS 8110 Standard. During construction, the contractor will adhere to international and local standards including NFPA 13,14,16,20,24,58&70 API 25, API 2410 and KS 1938.

The facility will be installed with appropriate fire-fighting appliances *(well supplied with fire hydrants, water reservoir to be used in case of fire emergencies).* This shall be done with the help of a Fire Safety advisor and fire audits will be done annually.

2.2.4. Loading and Offloading bay Station

These facilities will be configured as specified by code of standard or based on management of the facilities specifications.

- Design of loading and rail car positioning systems
- Degree of automation (electrical/instrumentation)
- PC systems (loading computer, visualization computer, tank management systems)
- Data logging systems weighing scale/meter (mass, volume)
- Safety equipment (firefighting, emergency and signaling systems)
- Storage capacities (tanks, tank equipment)
- Ancillary systems (pumps, recovery systems VRU)
- Construction services (for turn-key plants)

The concept of facilities handling liquid hydrocarbons and mixtures thereof meets the highest requirements in terms of fire protection and operational safety and user-friendliness of the complete automated plant.

For the design of Truck loading systems, a variety of ancillary equipment will be relevant to be considered during a complex planning.

- Operations building (control room)
- Foundation and catchment areas
- Road construction and road systems
- Pump stations
- Pressure- and Control air systems
- Steel constructions for roofing and pipe routes
- Additiv systems and Slop systems
- Drainage- and separation systems
- Measurement control systems
- Firefighting system
- Control- and automation systems
- Visualisation
- Loading computer systems
- Power supply
- Transformer and Power systems
- Corrosion protection
- Earthing- and lightning protection

2.2.5. Perimeter Fencing

The proposed parcel of land will be fenced using Chain links which will be bound on the iron bars and a steel gate will be fabricated and installed.

2.2.6. Fire protection

The facility will have a comprehensive firefighting system covering all hazardous areas and the other areas of the facility. This will ensure that any fire within the depot/facility is quickly surpassed and extinguished. This will include fire water sprinkler systems for the LPG tank, and also fire hydrants that will be mounted strategically within the facility.

2.3.Construction Phase

2.3.1. Site preparation

The site preparation work will consist of the following; site, excavation followed by leveling and compaction. The waste generated from site clearing will be transported and dumped by the waste handlers. The Contractor will be in charge for the transport of raw materials to site during construction process. Some of the materials to be delivered to the site include aggregates, masonry stones, cement, iron sheets and other construction materials.

Environmental protection during the construction phase will address management of hazardous materials, dust, erosion and sedimentation control. The site will be maintained in accordance with relevant erosion and sedimentation control standards for construction sites. Curbs will be incorporated in parking and process areas to allow storm water from these areas to be drained to a collection area equipped with a sump where runoff can be checked prior to release and connected to properly designed oil water separators.

2.3.2. Materials

The exact quantities of materials required for the construction of the proposed project are not known at this stage of the project. The Proponent will utilize several materials in the construction of the project. Some of the materials will be sourced locally whereas others have been obtained from sources outside Mombasa County. The materials to be used in the construction of the projects consist of the following:

a) Concrete
b) Sandstone
c) Sand
d) Steel rods
e) PVC pipes

f) Water
g) Paint
h) Corrugated preprinted roofing
i) Energy – Diesel and electricity

2.3.3. Product

The final product after construction phase is LPG storage facility which will comprise of mounded 3LPG bullet storage tanks with a capacity of 2,500 metric tons each and associated Pipe work, a Gas filling area, an office, air/water pump house block, weigh bridge and sentry houses.

2.3.4. By-products

The Proposed project will generate several byproducts during both construction and operation phases.

During the construction phase of the project it is envisaged that the by-products might include:

- Metal cuttings generated from the construction activities
- Any excess construction materials brought to the project site by the contractor which can be reused later
- Excavated material

2.3.5. Waste

During construction the proposed project is anticipated to generate different waste which shall include:

a. Domestic Waste from the Construction Area

The workers will not be supplied with any forms of foodstuffs. They are expected to buy or carry their own food. Plastic bags and containers which the workers will use to carry their food are expected to increase within the site and in the immediate vicinity. Other forms of waste include sanitary waste and therefore the provision of sanitary facilities will need to be considered both for the site construction workers and the visiting population.

b. Site Construction Waste

The project will generate waste from the site construction activities which includes:

- Excavated soils and vegetation;
- Construction equipment and maintenance wastes;

- Dust and fumes;
- Scrap metals;
- Packaging materials, etc.

The wastes will be segregated in accordance with Legal Notice 121: Waste Regulation, 2006 with recyclable material collected and transported to a recycling facility. An effort will be made to minimize the amount of waste generated by application of 4-R principles (reduce, reuse, recycle, recover) to the extent practical. Non-recyclable wastes should be transported offsite to a permitted landfill by a NEMA Licensed Waste Handler. A Waste Management Plan (WMP) will be developed for all phases of the Project. The objective of this plan is to minimize waste discharges and emissions and identify appropriate waste reduction and other mitigation measures.

Additionally, a Construction Environment Management Plan (CEMP), including plans for erosion and sediment control measures will be developed prior to commencement of construction activities and implemented to minimize impacts to water quality from construction activities. Other measures that will be implemented include:

- Programming site activities to minimize the disturbance of the project surface area
- Avoid maintaining open excavations for prolonged periods and compact loose materials
- Compacting soils as soon as excavations, filling, or leveling activities are complete
- Implementing measures to control against sedimentation and erosion, and to ensure that construction personnel are familiar with these practices and conduct them properly
- Control of runoff during the construction phase.

2.3.6. Air Emissions

Air quality impacts associated with construction activities are generally related to the generation of dust especially during dry weather conditions and exhaust emissions from the operation of construction equipment. Control measures, such as use of dust suppression techniques, will be used in construction zones as required to minimize the impacts from fugitive dust.

The air emissions from the construction equipment will be localized and temporary, lasting the duration of construction activities. Routine inspection and maintenance of construction equipment will minimize exhaust fumes.

2.3.7. Noise Emissions

The target noise levels during construction are set at 75dB (A) (BS 5228, 1997) during the day and 70 during the night.

2.3.8. Commissioning

The final stage of construction is the start-up and commissioning of the facility. During the commissioning stage, air will be purged from the tank and pipelines.

2.4.Operation Phase

Once commissioned, the tank will be filled with LPG. The gas will be brought in by ERC licensed trucks. The proposed LPG will be distributed Country wide to LPG refilling plants.

2.4.1. Products

The primary product of the proposed project during the operational phase will be Liquid Petroleum Gas.

2.4.2. By-products

During the operational phase of the project it is not expected that there will be any by-products generated.

2.4.3. Waste

a. Effluent Waste

The following wastewater will be generated during Project operations:

- Storm water run-off.
- Contaminated waste water from the truck parking area from potential spills which together with the storm water will be directed through an oil water separator prior to discharge.

The above effluent water will be discharged offsite through the county drainage system.

b. Domestic Waste

Some of the domestic waste to be generated at the facility will include office waste such as paper, empty cans among others.

c. Sewage Waste

The employees of the Proponent who will be based within the project area are expected to generate sewage waste which will be channeled to the septic tank.

2.4.4. Air Emissions

The proposed facilities will be designed to international standards. Subsequently emissions from trucks and lifting machinery are expected to be low.

The only emission sources of significance for the project emission inventory during normal operations include:

- Intermittent emissions from routine testing of diesel engine driven emergency generator for backup power;
- Emissions from trucks offloading the LPG gas
- Emissions from trucks and other vehicles to be loaded with filled.

2.5.Decommissioning Phase

Upon decommissioning of the proposed LPG tank, rehabilitation of the project site will be carried out to restore the site to its original status or a better status than it was originally. This will include replacement of top soil and re-vegetation which will lead to improved visual quality of the area.

2.5.1. Products and By-products

During the decommissioning phase it is expected that there will be no product. However, the by-products during decommissioning phase will include:

- Metal generated from the decommissioning of Pipe work infrastructure
- Foundation materials which can be donated to individuals for reuse

2.5.2. Waste

During the Decommissioning phase of the proposed project, several waste products are expected to be generated. These shall include:

- Metals from Pipe work infrastructure
- Demolition wastes from the office block
- Dusts and fumes;
- Scrap metals.

2.5.3. Air Emissions

The demolition activities that will occur particularly during the demolition process will generate a considerable amount of dust and other particulates that will be released into the atmosphere.

The demolition machinery, equipment and trucks brought in by the Contractor are expected to generate smoke emissions. The concentration of emissions will depend on the maintenance levels of the equipment, machinery and trucks used by the Contractor.

2.6.Health and Safety System

The potential health and safety impacts of the proposed project include the occupational health safety risks related to the project activities; risks to the public as a result of events of major disasters such as fire outbreaks and explosions.

The potential occupational health and safety impacts during construction phase will include injuries through the construction activities whilst during the operation phase they will include injuries to workers from, routine monitoring and maintenance and deaths and injuries from major disasters e.g. explosions and fire outbreaks. Whereas during decommissioning; the potential H&S risks include injuries occasioned by dismantling of the facility.

2.7.Employment

The proposed project is expected to create employment in both the construction and operation phases of the project.

CHAPTER THREE

3. BASELINE INFORMATION

3.1.Introduction

Mombasa County is located in the South Eastern part of the Coastal region of Kenya. The County lies between latitudes 3° 80' and 4° 10' S and longitudes 39° 60' and 39° 80' E, with a total land mass of 229.9 km^2 and inshore waters covering 65 km^2. The County also enjoys proximity to an expansive water mass as it borders the Exclusive Ecological Zone of the Indian Ocean to the East. Administratively, the County is divided into four sub-counties namely; Mvita, Changamwe, Kisauni, and Likoni and thirty County assembly wards. These are further sub-divided into twenty locations and thirty-five sub-locations.

Mombasa Island is a 5 by 3 km (3.1 by 1.9 mi) coral outcrop located on Kenya's coast on the Indian Ocean, which is connected to the mainland by a causeway. The city of Mombasa is located on the island. It is linked to the mainland by the Makupa Causeway to the northwest, by the Nyali Bridge to the east and by the Likoni Ferry to the south. A road and rail bridge also serve the mainland container port near Port Reitz. *The proposed project site is located on mainland along Mombasa-Nairobi Road (A109), Changamwe area, Mombasa County.*

3.2.Population dynamics

The total population of the county in 2009 was 939,370 persons of which 484,204 and 455,166 were male and female respectively. It was projected to be 1,041,928 in 2012 and will rise to 1,238,348 persons by 2017. Population distribution and settlement patterns in the County are influenced by proximity to vital social and physical infrastructure networks such as roads, housing, water and electricity. Other factors that influence settlement patterns include accessibility to employment opportunities, and security.

3.3.Demographic Characteristics

Foreigners have toured this region with many settling here while others leave after staying for many years. These people have come both from up country Kenya and other parts of Africa while others from other parts of the world. Mombasa district located at the centre of Coast region has experienced many demographic changes including development of many races, practices of many religious faiths, predominantly Christianity, Islam and Hinduism. The project site is located in an area with mostly commercial/industrial entities with a cosmopolitan population.

3.4.Housing Structures

Generally, the coastal people especially the Mijikenda build their houses with earthen soil and roof/thatch with Coconut branches (leaves). This is however being overtaken by new housing structures that have sprouted in the recent decades. Most of the houses in Mombasa County are

of the local, Swahili type especially in Old Town although larger buildings are found in other areas of the County.

3.5. Landscape and Topography

Mombasa County lies within the coastal lowland which rises gradually from the sea level in the east to about 132 m above sea level in the mainland. The terrain is characterized by three distinct physiographic features, which includes the coastal plain, which is found along the shoreline, covering parts of the South Coast, the Island, parts of Changamwe and the North Coast. The plain consists of an expansive flat land with raised beach terraces covered mainly by Coral limestone and back reef sand deposits that not only provide firm foundation for construction but also provide building materials.

The second category is the hilly areas mainly found within the western part of the County that is underlain by shells and rises gently from 45m to 132m above sea level. This is characterized by poorly drained clay soils which restrict settlement and infrastructural development.

The third category is the Indian Ocean and the shoreline covered with geologically sedimentary rocks of Jurassic to recent age. The topography has evolved as a result of the lowering of the sea level over time leading to severe erosion by the storm water draining into the sea. In addition, the Subsequent rise in sea level led to the submergence of the valleys and the creation of Mombasa Island surrounded by deep natural creeks, ports and harbours such as Kilindini, Tudor, Makupa, and old port creeks. Other notable physiographic features includes, the fringing coral reefs, cliffs and tidal flats, sandy beaches, the coastal plain and a hilly severely dissected and eroded terrain. These features have greatly influenced the economic development of the County in a number of ways. For instance, the sea supports maritime trade while the fringing coral reefs, creeks and tidal flats with extensive mangrove forests are breeding grounds for fish. The fringing coral reefs in North Coast are an important marine conservation area hosting the Mombasa Marine National Park and Reserve.

3.6.Climate

The County lies within the coastal strip in the hot tropical region where the climate is influenced by monsoon winds.

3.6.1. Rainfall

The rainfall pattern is characterized by two distinct long and short seasons corresponding to changes in the monsoon winds. The long rains occur in April - June with an average of average 1,040 mm and correspond to the South Eastern Monsoon winds. The short rains start towards the end of October lasting until December and correspond to the comparatively dry North

Eastern Monsoons, averaging 240mm. The annual average rainfall for the county is 640mm.

3.6.2. Temperature

The annual mean temperature in the county is 27.9^0C with a minimum of 22.7^0C and a maximum of 33.1^0C. The hottest month is February with a maximum average of 33.1^0C while the lowest temperature is in July with a minimum average of 22.7^0C. Average humidity at noon is about 65 per cent.

3.7.Geomorphology

Kenya has a coastline of over 600 km, but the Kenyan coastal region is generally low-lying and characterized by the extensive coral reef, which lies a few meters above present sea level. The principal soil type in the region is a narrow strip of coastal sands.

3.7.1. Soils

The exploratory Soil Map of Kenya (Sombroek et al, 1982), describes, the soil distribution pattern and soil characteristic of Mombasa area and its environs. The soils here range from very deep well drained to very shallow extremely rocky, sandy clay, with top soil of loam to sandy loam. These soils are known to contain low relative fertility.

3.8. Physical Infrastructure

It's considered vital because the standard of living of the people in the County and the performance of the major sectors are greatly influenced by the existence, access, distribution and utilization of the physical infrastructure. Adequate and efficient physical infrastructure has a direct bearing on the production of goods and services in the County. It facilitates and promotes investment, thus creating more jobs, raises income for the people and through taxation increase the County government of Mombasa.

3.8.1. Roads

There is a total of 127 km classified roads and 221.46 km unclassified roads. The County is well served with electricity with virtually all economic and high potential areas having access to power network. *The proposed project site is located along the Mombasa-Nairobi Road (A109) and can also be accessed through the Refinery Road.*

3.8.2. Communication Network

The County has a well-developed communication network with a total network of 31,481 telephone lines and six telephone exchanges; the County is connected to the rest of the country and the outside world. In general, there is a General Post Office (GPO) located within the County Island with branches in other sub county.

3.9.Socio-economic Infrastructure

3.9.1. Employment level

Mombasa County like many other Counties in the coast region has been hit by the problem of unemployment. This has been exacerbated by the rising population growth. Employment is generally generated in manufacturing, building and construction, trade restaurants and hotels, transport and communication finance, insurance, real estate and business services, and community, social and personal services of these major activities account for over 40% of the total labour force engaged in wage employment. However, there is still potential of growth in the manufacturing, transport and communication sectors in the district, though more employment opportunities will be generated in the informal sector.

CHAPTER FOUR

4. RELEVANT LEGAL AND INSTITUTIONAL FRAMEWORK

4.1.Policy

There is a growing concern in Kenya and at global level that many forms of development activities cause damage to the environment. Development activities have the potential to damage the natural resources upon which the economies are based. Environmental Impact Assessment is a useful tool for protection of the environment from the negative effects of developmental activities. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound.

According to Sections 58 and 138 of the Environmental Management and Coordination Act (EMCA) No. 8 of 1999 and Section 3 of the Environmental (Impact Assessment and Audit) Regulations 2003 (Legal No. 101), boreholes require an Environmental Impact Assessment project/study report prepared and submitted to the National Environment Management Authority (NEMA) for review and eventual Licensing before the development commences. This was necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

4.2. Policy Framework

4.2.1. National Environment Policy

Kenya is in the process of developing a National Environment Policy. During this study Draft No. 5 of the National Policy was reviewed. The Policy will provide for a holistic framework to guide the management of the environment and natural resources in Kenya. It will also ensures that the linkage between the environment and poverty reduction is integrated in all government processes and institutions in order to facilitate and realize sustainable development at all levels in the context of green economy enhancing social inclusion, improving human welfare and creating opportunities for employment and maintaining the healthy functioning of ecosystem.

The proposed project will create employment opportunities (both directly and in-directly) throughout the project life cycle thus improving the living standard of local within Changamwe area and Mombasa County at large.

4.2.2. The Constitution

Kenya promulgated a new constitution in 2010. The new constitution is hailed as a green constitution as it embodies elaborate provisions with considerable implications for sustainable

development. The provisions range from environmental principles and implications of multilateral environmental agreements (MEAs) to the right to clean and healthy environment enshrined in the Bill of Rights. Chapter V covers on land and environment. It also embodies a host of social and economic rights of an environmental character, such as the right to water, food and shelter – among others.

Article 69 on obligations in respect of the environment requires the Proponent to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

4.2.3. Kenya Vision 2030

Kenya Vision 2030 is a comprehensive national development plan for period 2008 to 2030. The plan was developed following successful implementation of the Economic Recovery Strategy for Wealth and Employment Creation which ensured the country's economy was back on the path for realization of rapid economic growth since 2002. The county's GDP growth rose from 0.6% to 7% in 2007, but declined to 1.7% and 1.8% in 2008 and 2009, respectively.

The objective of the Vision 2030 is to transform Kenya into a middle income country with a consistent annual economic growth of 10 % by the year 2030. The 2030 goal for urban areas is to achieve "a well-housed population living in an environmentally-secure urban environment." This goal is expected to be achieved by developing basic infrastructure services such as roads, street lights, water and sanitation facilities, storm water drains, footpaths, and others while ensuring that the country has a clean, secure and sustainable environment by 2030 through reduction of pollution and improvement of waste management. The plan also requires that the current land use practices in the country be reviewed due to the fact that they are incongruent with the ecological zones.

The proposed project will contribute to the realization of the goals of Vision 2030 through provision of employment opportunities, and provision of clean energy for cooking, among others.

4.3. LEGAL FRAMEWORK

The execution of the proposed project will be done in accordance with all applicable legislation, regulations, approvals and relevant guidelines. **The table below** provides legislations that are applicable to the proposed project and the proponent should fully comply with all the legislation.

Legislation	Institution	Main Purpose	Relevance to the Proposed Project
The EMCA, 1999	NEMA	-A framework legislation that addresses major issues concerning the environment. -The purpose of the Act is to provide for sustainable management of the environment.	Requires the Proponent to: – Submit EIA Report to NEMA before commencing any new project. – Engage NEMA approved expert/firm of experts in conducting EIA studies
EMCA (Environment Impact Assessment /Environmental Audit) Regulations, 2003	NEMA	Provides for the framework for carrying out environmental impact assessment in Kenya	Requires the Proponent to: - Prepare EIA Project report in accordance with the format specified in Regulations and pay attention to issues specified in the second schedule of the Regulations - Carry out annual environmental audits to check on efficacy of EMP developed in EIA report - Carry out corrective measures in the improvement order from NEMA - Allow a NEMA inspector to enter the facility for the monitoring the effects of its activities on the environment - Mitigate trans-boundary impacts taking into account regional and international treaties.
L.N. 121: Environmental Management and	NEMA	Formulated for managing various kinds of waste in Kenya	The Regulations requires the Proponent to:

Coordination (Waste Management) Regulations, 2006			- Acquire valid EIA license from NEMA prior to engaging in an activity that can generate hazardous substance - Segregates their waste (hazardous and non- hazardous) by type and then disposes the wastes in an Environmentally acceptable manner. - Contract a NEMA licensed waste handler to collect and disposed-off. - Ensure waste is in a licensed disposal facility. - Label hazardous wastes containers in accordance with the requirements provided in section18 of the Regulation.
L.N. 120: Environmental Management and Coordination (Water Quality) Regulations, 2006	NEMA	Formulated for sustainable management of water used for various purposes in Kenya	The Regulation requires the Proponent to: - Refrain from any activity which might cause water pollution. - Not to discharge any liquid, gaseous or solid into water resource as to cause pollution. - Acquire a valid effluent discharge license to discharge effluent into the environment. - Acquire EIA license prior to abstracting ground water or any activity that is likely to have any adverse impact on the quantity and quality of the water - follow the monitoring guide set out in the Third Schedule to the regulation when discharging effluent into the environment
Legal Notice No.61 of 2009: The Environment	NEMA CGM DOSH	Promulgated for control of Noise and excessive vibration pollution	The regulations: - Prohibits the Proponent from making or causing to be made noise which annoys, disturbs, injures

Management (Noise Pollution and Excessive Vibration)			or endangers the comfort, repose, health or safety or safety of others and the environment. - Prohibits the Proponent from making or causing to be made excessive vibration which annoy, disturb, injure or endanger the comfort, response, health or safety of others and the environment - Requires the Proponent (if wishing) to operate or repair any machinery, motor vehicle, construction equipment or other equipment, pump, fan air –conditioning apparatus or similar mechanical device or engage in any commercial or industrial activity which is likely to emit noise or excessive vibrations to do so within the relevant levels prescribed in the First Schedule of the Regulations. - Prohibits the Proponent from operating a motor vehicle which produces any loud and unusual sound and exceeds 84 dB (A) when accelerating. - Prohibits the Proponent from operating construction equipment or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to the Regulations. Requires the Proponent during EIA studies to: - Identify natural resources, land uses or activities which may be affected by noise or excessive vibrations from construction or demolition; - Determine the measures which are needed in the plans and specifications to minimize or eliminate

			adverse construction or demolition noise or vibration impacts - Incorporate the needed abatement measures in the plans and specifications. - Prohibits the Proponent from carrying out activities relating to demolitions without a valid permit issued by the Authority
Environmental Management and Coordination (Air Quality Standards) Regulations, 2009	NEMA	Formulated to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air	The proposed project has potential to impact on air quality. Dust and fugitive emissions from transport vehicles during construction and decommissioning phases and petroleum fumes during operation phase could impact on air quality. In the light of the above, these Regulations prohibit the Proponent from: - Acting in a way that directly or indirectly cause or may cause air pollution to exceed levels set out in the second Schedule to the Regulations - Allowing particulates emissions into the atmosphere from any source not listed in the six schedule of the Regulations - Causing ambient air quality in controlled areas (listed in Schedule Thirteen) to exceed those stipulated under second Schedule. - Allowing emission of particulate matter above the limits stipulated in second Schedule.

Building Code	Local Government NCA	Formulated to provide rules, guidelines and standards to be observed during construction.	The Proponent is required to adhere to the rules, guidelines and standards stipulated in the Code during development of the proposed project
The Public Health Act Cap 242	Ministry of Public Health	The Act regulates activities detrimental to human and environmental health and safety	The Act prohibits the Proponent from engaging in activities that cause environmental nuisance or those that cause danger, discomfort or annoyance to inhabitants or is hazardous to human and environmental health and safety.
The Local Government Act (Cap. 265)	Ministry of Local Government		The Act requires the Proponent to grant the Officers and servants of Local Authority access to their premises to inspect, maintain, alter or repair sewers, drains, pipes, ventilating shafts or other
The Penal Code (Cap. 63)	Judiciary	Formulated to define the penal system in Kenya. It outlines criminal offences and prescribes penalties to them	The Code Prohibits the Proponent from: - Voluntarily corrupting or fouling water for public springs or reservoirs, rendering it less fit for its ordinary use - Making or vitiating the atmosphere in any place to make it noxious to health of persons/institution in dwellings or business premises in the neighbourhood or those passing along public way.
The Occupier Liability Act (Cap 34)	DOSH NEMA		The Act Requires the Proponent to ensure that visitors to his premises will be reasonably safe in

			using the premises for the purposes for which he is invited or permitted by the Proponent to be there
Occupational Health and Safety Act, 2007	DOSHS	Enacted to provide for the health, safety and welfare of persons employed in workplaces, and for matters incidental thereto and connected therewith.	It requires the Proponent to: - Undertaking S&H risk assessments, provide notification of accidents, injuries and dangerous occurrences, etc. - Provide first aid facilities at the workplace - provide PPEs to the employees
Legal Notice No. 25: Noise Prevention and Control Rules	DOSHS	Promulgated for work related noise exposures	It requires the Proponent to: Comply with the following permissible noise levels : a. *Workplace Noise*- 90 dB (A) over an 8-hour TWA period over 24-hours; and 140 dB (A) peak sound level at any given time. b. Community noise level emanating from a workplace -50 dB(A) during the day; and 45 dB(A) at night. ensure that any equipment brought to a site in Kenya for use shall be designed or have built in noise reduction devices that do not exceed 90 dB(A). -Medically examine those employees that may be exposed to continuous noise levels of 85 dB (A) as indicated in Regulation 16. If found unfit, the Occupational hearing loss to the worker will be compensated as an occupational disease.

			-It is not anticipated that there will be equipment that will generate noise exceeding the threshold levels of noise stipulated under the Rules. However, in case there will, it will be incumbent on the selected contractor to ensure that their equipment complies with the threshold noise values given above. -Alternatively the selected contractor will be required to develop, rollout and implement a written hearing conservation program during the project period
Liquefied Petroleum Gas (LPG) Regulations, 2009	ERC	Promulgated for Management of LPG Business in Kenya. It covers on import, export, transport, storage, wholesale and retail of LPG	The Regulations requires the Proponent to: Apply for/obtain license from ERC prior to operating bulk LPG storage facility. Application for the license should be accompanied by the follow: - EIA License issued in accordance with EMCA, 1999 - Proof of compliance with OSHA 2007 and Public Health Act; - Certificate of compliance issued in accordance with - Physical Planning Act of 1986; - Copy of approved drawing accordance with Local Government Act, with specifications and

			plans in duplicate; A clearance certificate from Chief Fire Officer. - A declaration of the intended use of LPG that is to be stored - A copy of certificate of adherence to the KS 1938(1-5) - Transport LPG by road in accordance with the Act and terms and conditions of a valid license issued by the Commission;
KS 1938:2006	KEBS ERC	Code of practice for handling, storage and distribution of LPG in domestic, commercial and industrial installations Part 3: LPG installation involving storage vessels of individual water storage capacity exceeding 500L	The Standard provides guidelines for: - Design pressure Fire protection - Construction and initial (production) testing of storage vessel - Filling ratio and volumes of storage vessel - Storage vessel location - Installation of LPG storage vessels - Installation of vaporizers - Periodic inspection and retesting; - Electrical equipment and other sources of ignition - Filling point for bulk storage vessel; - Filling of portable containers Container storage areas; - Filling shed for portable containers

4.4.Institutional Framework

4.4.1. Ministry of Environment and natural resource

Kenya's Ministry of Environment and Natural Resource is mandated to monitor, protect, conserve and manage environment and natural resources of the country. The Ministry is to achieve this task through sustainable exploitation of natural resources for socio-economic development geared towards eradication of poverty, improving living standards and maintaining a clean environment for present and future generations.

4.4.2. EMCA 1999 Institutions

The EMCA, 1999, make provisions for creation of environmental administrative structures under MENR. The institutions that have been created under the Act for environmental management in Kenya are:

NEMA - the principal government authority established under MENR to exercise general supervision and coordination over all matters relating to the environment in Kenya.

NEC- The apex body under the Act charged with the responsibility of developing the national environmental policy in Kenya as well as to set annual environmental goals and objectives.

PCC - formed to investigate environmental complaints against any person, submit their findings/recommendations to the NEC and to submit periodic reports of its activities to the NEC.

SERC- established to advise the NEMA on the criteria and procedures for the measurement of environmental quality in Kenya. Environmental quality relates to air quality, wastewater quality, waste quality, noise quality, land use quality, etc. Additionally, the SERC is required to recommend to the NEMA minimum environmental quality standards for all environmental parameters for which subsidiary legislation is or has been promulgated.

4.4.3. Ministry of Energy

The Ministry of Energy is responsible for the provision of clean, secure, sustainable and affordable energy services for social-economic development while protecting the environment. The Minister of Energy is empowered by the Energy Act to make regulations/rules for managing energy sector. Since 2006, when the Energy Act was amended, the Minister has made several regulatory instruments for the energy sector. One of the rules applicable to the proposed development is the Draft Energy (Licensing of Petroleum Retail Business) Regulation 2011 which prohibits against construction or modification of petroleum dispensing site without except in accordance with the Act.

4.4.4. Energy Regulatory Commission (ERC)

The ERC was established under Energy Act to regulate energy sector in Kenya. The ERC's functions include the protection of consumer, investors and other stakeholder interests as well as monitoring the energy sector as a whole. Other functions include licensing, enforcement, dispute settlement and approval of power purchase and network service contracts.

CHAPTER FIVE

5. ENVIRONMENTAL IMPACT ASSESSMENT

5.1. Introduction

Several environmental impacts (positive and negative) associated with the proposed project were identified through the use of experts' judgment method. The following section highlights the impacts anticipated throughout the lifecycle of the proposed project. The associated impact assessment tables for each impact will be categorized according to project phases, prior to and post mitigation. Effects of activities are categorized as negative impact and or positive impact.

5.2. Assessment of impacts

Section **one** of this report presents the methodology used in assessing the potential impacts of the proposed project. The key impacts identified for the proposed project are highlighted according to the relevant project phases.

The Team of Experts utilized precautionary principles to establish the significance of impacts and their management and mitigation.

5.3. Potential impacts of the proposed project

The proposed project is anticipated to generate the following impacts, however the significance of the impacts will range between low to moderate before mitigation and will further reduce with mitigation measures:

a) Soil and Geology Impacts
b) Air quality Impacts
c) Noise and vibration Impacts
d) Impacts of waste generation
e) Socio-economic impacts
f) Health and Safety Impacts.

5.3.1. Soil and geology impacts

a. Contamination of soil

The potential sources of soil contamination during construction phase are leaks or spills from machinery used in site preparation and demolition. Depending on the size and source of the spill, liquid and gaseous phase petroleum hydrocarbons may remain mobile for long periods of time, and can potentially pollute groundwater. During operation phase soil contamination is not anticipated because of the presence of the concrete paved surface which will prevent any potential contaminant from reaching the subsurface layers and is thus not assessed. During decommissioning phase, soil contamination could occur especially with the use of machinery in demolition of the facility.

Mitigation Measures

The Contractor shall prepare hazardous materials and waste management plan. The plan shall include, but not limited to, measures to prevent:

a. Contamination of soils
b. Pollution of water
c. Safe siting and storage.

Mitigation Measures during demolition

The Proponent and contractor engaged in the demolition of the facility shall ensure machinery and vehicles used during demolition are adequately serviced to prevent any oil leakages. Additionally, the Proponent shall undertake a further survey to identify any contaminated areas and remediate them accordingly.

b. Soil erosion

During construction phase, site preparation activities such as clearance of vegetation, excavation and demolition will expose the soils at the construction site to agents of erosions mainly wind and rain water. During operation phase, soil erosion is not anticipated at the project site because the concrete surface to be constructed will protect the soil from agents of erosion.

During decommissioning phase, removal of concrete surface will expose the soil to the above erosion agents.

Mitigation Measures for potential soil erosion

The Proponent and Contractor shall implement soil conservation program.

Mitigation Measures during decommission

The Proponent shall ensure that the site is restored as much as possible to original state. This shall be accomplished through surfacing of denuded areas and planting of vegetation.

5.3.2. Air quality Impacts

Decreased air quality due to dust emission

During construction decommissioning phases, potential dust pollution will emanate from site preparation activities such demolition, excavation, stockpiling and preparation of mortar for construction of substructure. During operation phase, dust pollution is not Anticipated as the site will be covered by the proposed project. While during decommissioning phase, dust emission would be generated from debris and soil resulting from demolition process.

Mitigation measures for decreased air quality due to dust emission

The Proponent and Contractor shall implement dust abatement measures which shall include:

- Sprinkling stockpile with water regularly or cover with a membrane to prevent them from being blown away and keep them for the shortest time possible;
- All loads entering or leaving the site should be covered
- Securely cover waste containers and minimize drop height
- Erect solid barriers to site boundary

Air Quality pollution (Decommissioning Phase)

The proposed project will be designed and managed in accordance with the best industry standards and practice. However, during operation phase unplanned or unforeseen fire or explosion incidents may occur as result of acts of vandalism or human error. Such incidents may generate emissions that have several implications on the human health and visibility of the site and its environs.

Mitigation Measures for air pollution from incidents

The Proponent need to develop, implement and monitor environment, health and safety measures and procedures, including an emergency preparedness and response plan.

c. **Exhaust emissions**

During construction phase exhaust emissions from construction and demolition vehicles (used in transporting materials) are the only source of gaseous pollutants from the proposed project.

During operation phase exhaust emission from trucks entering and exiting the site will be source of gaseous pollutants.

Mitigation Measures for impacts of exhaust emission

The Proponent should ensure that:

- Engines and exhaust systems of construction and demolition vehicles and machinery should be regularly serviced according to manufacturer's recommendations and maintained to meet statutory limits/opacity tests;
- No machinery or vehicle is left idling unnecessarily

Mitigation Measures

The Proponent should ensure that:

- Engines and exhaust systems of construction vehicles and machinery should be regularly serviced according to manufacturer's recommendations and maintained to meet statutory limits/opacity tests;
- No truck is left idling unnecessarily at the parking bay

5.3.3. Noise and vibration

Deterioration in ambient noise quality

The construction machinery and vehicles will generate noise of varying magnitude. The proposed project will utilize machineries such as wheel loading shovel; 30 to 40 Ton tracked Excavator, Mobile service crane, Dump Truck and Tipper lorry

From the predictions of the specialist study on ambient noise quality measurements it can be seen that all the above activities are predicted to be largely within the target noise levels, although highest levels are expected when using pneumatic drills to break hard rock for foundation when the noise levels would peak at about 68Db.

As will be the case with the construction phase, the sources of noise during decommissioning phase, will be mainly machinery and vehicles used in demolition of the facility and removing the materials from the site.

5.3.4. Impacts of waste generation

Several wastes are anticipated to be generated throughout the project cycle (***Section 3*** *of this report provides a description of the waste to be generated*). During construction phase, wastes anticipated from demolition and construction activities will: concrete waste Whereas during decommissioning phase, demolition waste generated will be mainly concrete boulders, and scrap metals.

Mitigation Measures

The Contractor in collaboration with the Proponent will prepare and maintain site waste management plan which estimate the quantity of each type of waste expected to be produced and track their recovery and destination throughout the construction phase of the project. Waste streams could be recovered, segregated and either re-used on site (e.g. crushed concrete aggregate) or disposed offsite in line with the Proponent's ***Go Green Initiative***. The Proponent will manage waste in accordance with the existing procedures and relevant legislations. Waste streams could be recovered, segregated and either re-used on site (e.g. crushed concrete aggregate) or disposed offsite in line with the Proponent's Go ***Green Initiative***.

The Contractor selected for undertake demolition work will in collaboration with the Proponent will prepare and maintain site waste management plan which estimate the quantity of each type of waste expected to be produced and track their recovery and destination throughout the decommissioning phase of the project. Waste streams could be recovered, segregated and either re-used on site (e.g. crushed concrete aggregate) or disposed offsite in line with the Proponent's ***Go Green Initiative***.

5.3.5. Health and safety

a. Occupational health and safety

The development of the proposed facilities involves a number of activities that pose potential health and safety risks to the workers. The workers are potentially exposed to risks as a result of working a height, operating tools and equipment and exposure to dust.

During the construction phase, the potential H&S risks include:

- Exposure to silica dust
- Hazards of falling objects;
- Occupational hazards when working at height such as the roofs and walls;

The potential occupational health and safety impacts anticipated for operation phase include: injuries to workers from preventive and corrective maintenance especially of electrical equipment, work at height especially renewing coat of paint on the roofs and walls and handling of medical wastes.

During decommissioning phase, the potential H&S risks include hazards of falling objects; work at height hazards, injuries from operating tools and equipment.

Mitigation Measures

The Proponent is recommended to enforce the existing H&S operation procedures for minimizing potential health and safety impacts. During construction phase, the Proponent is

recommended to ensure that tool box talks are done every day. Toolbox talks address actual and anticipated safety concerns for scheduled project work. The talks provide an opportunity to relate specific safety concerns with the jobs to be performed.

5.3.6. Risk of Large Scale incident

The proposed project could be of great public concern especially in the event of major disaster such as major fire outbreak and explosion caused by third parties. The product to be stored is highly flammable hence incidents fire or explosions can be detrimental to the public.

The impact significance related to public safety is likely to be low during the rehabilitation and closure of the facility.

5.3.7. Socioeconomic

a. Compatibility with existing and proposed land uses

The proposed project site area consists mainly of light industries. The proposed project is therefore compatible to the existing as well as future land-uses. Since the proposed project will not conflict with the existing and perhaps future developments, impacts were therefore not assessed.

b. Creation of employment opportunities

The proposed project will generate job opportunities (skilled and unskilled Labour) throughout the project cycle.

It is anticipated that proposed project will provide opportunities for local employment and service provision, such as the use of local transport companies and sourcing of some construction materials locally. There also likely to be trickledown effect results from the employment opportunities as well as services provided by the facility.

c. Improved Security

The proposed project is expected to improve the security situation in the area in that the project will employ security guards, install security lights and installing alarm systems.

d. General economic growth and increased land value

Due to the proposed project there will be an influx of people searching for jobs. An increase in economic activities will increase the demand for housing, communication transport and financial services will significantly increase and thus present a likelihood of increasing the land values.

e. LPG Provision

In the operational phase, there will be provision of LPG which is a clean energy for cooking hence sustainability will be achieved.

5.3.8. Cumulative impacts

Cumulative impacts are impacts of an activity that in themselves may not become significant but may become significant when added to the existing and potential impacts resulting from similar or diverse activities or undertakings in the area. The concrete paving will affect permeability of storm water into the subsurface and underground water.

The soil once excavated and moved within the site loses its original physical and chemical composition, structure, arrangement of soil horizons and the transition between those horizons. These changes cumulatively alter the biological, physical and chemical properties of the soil and consequently the reaction patterns with pollutants.

5.4.Summary of impacts

The table below shows the summary of the above identified impacts.

Impact	Significance Rating					
	Construction Phase		**Operation phase**		**Decommissioning phase**	
	Without mitigation	With mitigation	Without mitigation	With mitigation	Without mitigation	With mitigation
Air Quality						
Dust generation	low negative impact	Very low negative impact	Not anticipated	Not anticipated	Very low negative impact	Very low negative impact
Fugitive Emission	Very low negative impact	Very low Negative impact	Low Negative impact	Low Negative impact	Very low Negative impact	Very low
Health and Safety						
Occupational Health and Safety	Low medium negative impact	Very low	Very low	Very low	Very low	Very low
Risk of large incident fire explosion and fire outbreak	low medium negative impact	Very low negative impact	low medium negative impact	Low Negative impact	Not anticipated	Not anticipated
	Very low	Very low	Low	Low	Very low	Very low

Impact	Significance Rating					
	Construction Phase		Operation phase		Decommissioning phase	
Socioeconomic						
Employment	low	Medium High	low	Medium High	Very low	High
LPG Provision	-	-	Medium High	Medium High	-	-
General Economic Growth and increased land value	Low Medium	Low Medium	Low Medium	Low Medium	-	-
Improved Security	Low	Medium	Low	Medium	-	-

CHAPTER SIX

6. ANALYSIS OF ALTERNATIVES

The following alternative aspects were considered for the proposed project: No Project Scenario, design and site alternative. Evaluation of the alternatives is governed by a "rule of reason," which requires the evaluation of alternatives "necessary to permit a reasoned choice."

6.1.No Project Scenario

The no Project Scenario is where the proposed project should not be undertaken at all. The site will remain as it is; covered by grass and few ornamental trees and it will imply that anticipated benefits from the project would not be realized and similarly the potential adverse impacts associated with the project will not be experienced. By implementing the project, the Proponent will enable PUBLIC to phase out use of fuel wood and replace them with LPG which are environmentally friendly. The No Project Scenario is therefore not considered as a viable option.

6.2.Location Alternative

The Proponent has only one proposed site for the storage and distribution of Liquefied Petroleum Gas. The site is located at Changamwe area, which is zoned as industrial area.

Additionally, the proposed site is ideal because it is located away from the residential dwelling where the main operations occur and hence would not compromise the safety of the public.

The proposed project will offer job opportunities to the resident, hence boosting both economic value of the residents and government at all through payments of taxes.

6.3.Design Alternatives

6.3.1. Proposed Option (Mounded Bullet)

The Proponent has proposed to install mounded 3LPG bullet tanks each with a capacity of 2,500metric tons.

The cover of the mound protects the vessel from fire engulfment, radiation from a fire in close proximity and acts of sabotage, terrorism or vandalism. The catastrophic failure mode of a cylindrical vessel is also such that it can be directed away from any processing or occupied areas. Mounded bullet type storage is also used where visual impact is important.

The proposed design will largely improve the safety of storage and handling of LPG and will create a steady supply/stock of LPG gas to Mombasa residents and neighboring Counties.

6.3.2. LPG spheres

LPG can also be stored in LPG sphere tank. The sphere offers the maximum volume for the least surface area and the required thickness of a sphere is one-half the thickness of a cylinder of the same diameter. However, they are less safe since its weight is not distributed evenly on a larger area thus increasing chances of collapse as compared to LPG tanks described in the previous sections, especially in areas prone to earth quakes.

6.4.Input alternatives

The proposed facility will handle Liquefied Petroleum Gas. The amount of LPG stored will be dependent with the decision of the proponent. The input alternatives are thus dictated by the market demand. The design does not allow storage of other products other than Liquefied Petroleum Gas.

6.5.Conclusion

On the basis of the above considerations, the Experts conclude that the proposed project satisfies the overall economic, technical, environmental considerations. The proponent will have adequate stock of LPG for the market; will reduce fuel wood utilization leading to Ozone depletion thus achieving environmental sustainability.

Finally, the Team of Experts believes that the 'No project scenario' does not compete with the benefits of proceeding with the project.

CHAPTER SEVEN

7. STAKEHOLDER/PUBLIC CONSULTATION

7.1.Introduction

Public participation is an essential and legislative requirement for environmental authorization. The Team of Experts undertook the public stakeholder consultation (PSC) for the proposed project in accordance with the requirements for an EIA report stipulated in the EMCA, 1999 and EIA/EA Regulations 2003.

7.2. Objective of Public Stakeholder Consultation

The objectives of public participation in an EIA are to provide sufficient and accessible information to Interested and Affected Parties (I&APs) in an objective manner to assist them to identify issues of concern, and provide suggestions for enhanced benefits and alternatives.

7.3.Approach used in carrying out the PSC

The Team of Experts consulted the neighbors of the Proponent. The responses from the stakeholders were captured using the public stakeholder checklist while others were recorded in the field note book.

Copies of completed checklists are appended at the end of this report

7.4.Comments and Responses from the Stakeholders

Generally, all the stakeholders consulted at the project site have no objection to the establishment of proposed project. They observed that the proposed project will not generate any adverse environmental impacts. The responses for concerns raised by the respondents are provided.

The responses were categorized into the following:

Socio-economic issues

The respondents reported that there will be:

- Availability of more LPG stocks for the market
- Enhanced fire safety measures put in place at the project will benefit the neighbors;
- Enhanced security at site will also benefit the neighbors.
- Creation of job opportunities
- Reduction of environmental degradation due to over reliance to fuel wood

Environmental impacts

All the respondents were of the opinion that the project will have minimal or rather no impacts on air, noise levels, flora and fauna, water and soil.

Health and Safety Issues analysis

The respondents were of the opinion that during the construction phase workers will be at risk of the following;

- Working at heights
- Falling objects;
- Exposure to dust and fuel fumes;
- Fire risks
- Noise
- Ergonomic issues
- Air pollution in the event of leakage of LPG

Proposed Mitigation Measures

Members interviewed were asked to propose mitigations measures for the mentioned EHS Issues. They proposed the following to be undertaken during the construction and operation phases:

- Continuous risk assessments;
- Inducting employees on safety and environment before commencing work;
- Use of permit to work systems;
- Use of appropriate and inspected tools,
- Barricading the area and use of warning signs;
- Control of access of the project site;
- Operations to be conducted by approved operators;
- Have a preventive maintenance programme of the LPG Tank

CHAPTER EIGHT

8. ENVIRONMENTAL MANAGEMENT PLAN

8.1. Introduction

This section presents the environmental management plan (EMP) for the proposed project. The EMP specifies the mitigation and management measures which the Proponent will undertake and shows how the Project will mobilize organizational capacity and resources to implement these measures.

The EMP covers information on the management and/or mitigation measures that will be taken into consideration to address impacts in respect of the following project phases: design, construction, operation and decommissioning.

8.2.Approach to environmental impact management

The proposed EMP will be the responsibility of the HSE department of the Lionsgate Gas & Oil Limited. However, it will have links with other departments such as operation and maintenance. The table below presents the range of approaches that will be used to manage potential impacts of the proposed project.

Approach	Description
Avoidance	Avoiding activities that could result in adverse impacts and/ or resources or areas considered sensitive
Prevention	Preventing the occurrence of negative environmental impacts and/ or preventing such an occurrence having negative impacts.
Minimization	Limiting or reducing the degree, extent, magnitude or duration of adverse impacts through scaling down, relocating, redesigning and or realigning elements of the project
Mitigation	Measures taken to minimize adverse impacts on the environment
Enhancement	Magnifying and/ or improving the positive effects or benefits of a project
Rehabilitation	Repairing affected resources
Restoration	Restoring affected resources to an earlier (possibly more stable and productive) state, typically “background or ‘pristine’ condition.

The environment, health and safety management cycle has five broad components:

- Planning and design
- Project implementation (covering the construction and operation phases);
- Checking and corrective action; and
- Management review

8.3.Responsibility and Accountability

8.3.1. Environmental Management Structure

The Proponent (Lionsgate Gas & Oil Limited) will utilize the existing arrangements in the implementation of the EMP during planning and design, construction, operation and decommissioning/closure. The Proponent is accountable for ensuring that resources are made available to effectively implement the EMP and necessary environmental management measures arising from the project. The Project Manager will take responsibility of the day to day running of the project and will oversee the detail of implementation of the EMP during construction phase while during operational and decommissioning phases, will be managed by the Manager. The managers will collaborate with the QEHS Manager of and HSE Manager of Lionsgate Gas &Oil Limited in implementation of the EMP.

The Table below provides details on the functions of each staff member. The environmental, health and safety management of the project will be the responsibility of the Health, Safety and Environment (HSE) Manager.

Environmental monitoring will be undertaken by the EHS Executive, and independent audits of environmental performance will be conducted from time to time by independent NEMA approved environmental expert.

Table: Functions of Staff in implementation of EMP

Position	Responsibility
Engineering	- Performing technical and organizational role of construction works overseeing Implementation of EMP
Project Manager	- Supervising construction works - Schedule preparation and resource forecasting for engineering and other technical activities relating to the project.

Contractor(s)	- Undertake development of LPG facility in accordance with contract signed with the Proponent; - Adhere to Proponent HSE policies, procedures and other requirements while undertaking the Project Implement aspects of EMP assigned to them
Construction Manager	- Effective implementation of the EMP - Regular performance reviews - Corrective and/or remedial action where this may be required.
BAT HSE Manager	- Overseeing annual environmental, health and safety and fire audits
HSE Executive	- Preparation of environmental monitoring reporting and any permit applications (if any) - Running of day-to-day requirements for EMP implementation - Overseeing of construction process and ensuring the implementation of avoidance and mitigation measures - Conducting monitoring and review of EMP implementation by contractors - Inspect the constructed facilities after completion
NEMA Approved EIA/EA Expert	- Periodically commissioned to undertake statutory environmental audit - Guide the Proponent during implementation of the Environmental Management Plan
DOSHS Approved H&S Advisor	- Carry out statutory health and safety audit of the LPG facility
DOSHS Approved Fire	- Carry out statutory Fire safety audit of the LPG facility

8.3.2. Management of Contractors

The Contractors will be responsible for implementation of some of the EMP commitments. However, the Proponent fully recognizes that it is not absolved from those management responsibilities. Ultimate responsibility for meeting all commitments lies with the Proponent.

The Proponent will commit contractors to meeting the relevant responsibilities by means of specific conditions in the contracts of appointment. Where there is concern over the capacity of contractors to undertake specific activities according to the system stated here, the Proponent will provide additional training to improve the capacity of the contractors.

Activities of contractors will be overseen by the Project Manager and staff as appropriate.

The Proponent will put in place the following construction phase contractor arrangements to support EMP implementation:

Contractors will have certain key environmental line functions included in their job descriptions and performance criteria critical among these is the Construction Manager.

8.3.3. Training, Awareness and Capacity Building

The Proponent will ensure that all contractors' staff are inducted on health and safety, environmental and emergency response procedures. The Proponent will use written (newsletter/posters/toolbox talks) and verbal (as part of routine briefings) communication methods to raise awareness on a range of health, safety and environmental issues. This will be done in both Kiswahili and English languages (as appropriate) to ensure that all members of the workforce are made aware.

8.3.4. Monitoring and Compliance Assessment

During the construction phase, the Proponent will monitor and inspect contractors' written records to demonstrate compliance with the EMP. This compliance monitoring will verify that the responsible parties are implementing the specifications contained in the EMP. Compliance will mean that the contractor is fulfilling contractual obligations.

To determine the effectiveness of the EMP, the Proponent will use a series of internal and external inspections and audits.

Internal environmental, health and safety inspections will be carried out once every week by EHS Executive.

Minor non-conformances will be discussed during the inspection and recorded as a finding in the inspection report. Major non-conformances will be formally reported as an incident

8.3.5. Incident handling and Reporting

An incident can arise from the following:

- Significant non-conformance with the EMP identified during an internal inspection
- Any non-conformance identified by either the authorities or an external audit
- Accidents or spills resulting in potential or actual environmental harm

- Accidents or near misses that did or could result in injury to staff, visitors to site or the surrounding communities
- Significant complaints received from any source.
- All incidents will be formally recorded and noted in the General Register in accordance with requirements of OSHA 2007.

8.3.6. Checking and corrective action

Checking and if necessary implementing corrective action, to ensure that required EMP management activities are being implemented and desired outcomes are achieved. As such this component includes four key activities namely:

- Monitoring selected environmental quality variables as defined in the objectives and target,
- Ongoing inspections of the operational controls and general state of the operations.
- Internal audits to assess the robustness of the EMP or to focus on a particular performance issue.
- External audits to provide independent verification of the efficacy of the EMP.

8.3.7. Corrective Action

There are several mechanisms for implementing corrective action, both during the construction and operational phases. The main mechanisms to address transgressions include verbal instruction ***(In the event of minor transgressions from established procedure, usually following a site inspection);*** written instruction ***(identifying source(s) of problems, usually following an audit)*** and contract notice ***(following possible breach of contract).***

8.3.8. Reporting

The findings of all of the above will be structured into instructive reporting that provides information to all required parties on EHS performance, together with clearly defined corrective action where this is seen to be required. Both the monitoring and inspections are to be reported continuously.

8.3.9. Management review

The Proponent will organize for formal management review at defined intervals both during the construction and operational phases. The purpose of the management review is for senior project management to review the environmental management performance during the preceding period and to propose measures for improving that performance in the spirit of continuous improvement.

8.3.10. Liaison

Throughout the project cycle, the Proponent will liaise with authorities especially NEMA to ensure ongoing feedback on the environment performance of the project.

8.4.Overview of the Proposed Project

The EMP addresses the planning and design, pre-construction and construction, operational and closure phases of the proposed project.

8.4.1. Planning and design

Planning and design is necessary to ensure that mitigation and impact management can be effectively implemented in the context of the HSE approach. Planning involves the following activities:

- Identifying and defining the various environmental aspects and related potential positive and negative impacts that can result from the company's activities.
- Establishing a procedure to identify legal and other requirements to which the organization is subject.
- Identifying and defining appropriate mitigation and management measures, including those reinforcing positive impacts.
- Establishing and maintaining documented, scheduled environmental objectives and targets at each relevant function and level within the organization.

In the case of the proposed Project the environmental aspects and potential impacts will mainly emanate from the site preparation and construction activities.

8.4.2. Construction Phase

The EMP contains measures to avoid and mitigate impacts and optimize benefits arising from activities during the pre-construction (e.g. clearing of the construction site) and construction phase (e.g. construction of required infrastructure) of the Project. The principal focus of Project management for construction will include: personnel and contractor management and training; conduct and site management; maintenance of complaints register; emergency preparedness; and management and mitigation of impacts such as surface runoff, noise, dust, safety and pollution.

Assignment of responsibility and contractor management is especially important during the construction phase. Contractors will be held to the highest HSE performance requirements to ensure they meet Proponent's, national and international standards.

8.5.Impact mitigation and management

This study identified potential impacts of the proposed project. The subsequent sections provide description of the management plans and programmes within which management and mitigation measures will be implemented. The actions and activities for decommissioning phase are dealt with in the rehabilitation and closure plan which also addresses the mitigation measures that will be ongoing once operations have ceased.

8.5.1. Impacts and mitigation/ management measures

The table below presents the EMP for the proposed project. It covers on the proposed management and mitigation measures for the identified impacts. The information presented addresses the dual objective of the EMP, namely to fully disclose the commitments to be undertaken by the Proponent, and to provide the Proponent's as well as Contractor(s) staff with a clear framework for EMP implementation.

In addition, the EMP provide a schedule for the implementation of management/mitigation activities, sub-divided by project phase. The schedule shows at a glance, the timing of the many actions required under the EMP. It is particularly useful where management/mitigation measures extend across phases.

8.5.2. Management of impacts during construction phase

The EMP will put in place measures to avoid and mitigate impacts and optimize benefits arising from activities during construction phase of the project. The principal focus of project management for construction phase will include:

- Personnel and contractor management
- Conduct and site management
- Landowner relations
- Maintenance of complaints register
- Emergency preparedness; and
- Management and mitigation of impacts such as noise, dust, safety and pollution.

Assignment of responsibility and contractor management is important during the construction phase and operation phase the contractor is used to carry out maintenance work. The contractor will be held to the highest EHS performance requirements to ensure they meet national and international standards.

8.5.3. Management of impacts during operation phase

The operation phase of the proposed project will be mainly receipt, storage and delivery of LPG to the customers.

For the purpose of the EMP there are three principal mechanisms for the implementation of management and mitigation measures:

- Facilities – these can be either specific facilities that have a dedicated HSE management functions or additions to facilities that are central to the proposed project activity.
- Procedures- in a similar vein, procedures can be stand-alone procedures with a dedicated HSE function (such as a waste management procedure) or can be a modification to an existing activity process to affect the HSE management.
- Assignment of responsibility and contractor management – this is important when the contractor will be used on an ongoing basis for a range of maintenance and other functions. The contractor will be held to the same HSE performance requirements that govern Lionsgate Gas & Oil ltd.

8.5.4. Checking and corrective action

Checking and if necessary implementing corrective action, form the fourth component of the EMP management cycle. They ensure that:

- The required EMP management activities are being implemented; and
- The desired outcomes are being achieved.
- As such this component includes four key activities. These are:
    a. Monitoring selected environmental quality variables as defined in the objectives and targets.
    b. Ongoing inspections of the operational controls and general state of the operations.
    c. Internal audits to assess the robustness of the EMP or to focus on a particular performance issue.
    d. External audits to provide independent verification of the efficacy of the EMP.

8.5.5. Inspections (construction phase)

An ongoing but pragmatic inspections regime will be developed that allows for potential HSE transgressions to be identified proactively, so that mitigation can be quickly and effectively implemented.

8.5.6. Monitoring

The environmental variables that are to be monitored are described in the description of the baseline environment. Monitoring results must be structured and presented for review on an ongoing basis so that if objectives and targets are not met, corrective action can be taken.

8.5.7. Internal and external audits

Where the monitoring data and the inspection reports highlights problems, an internal audit can be used to ascertain the source of the problem and to define action to prevent its recurrence. The three key areas for audit are facilities *(are they operating properly?),* project procedures *(are they properly designed and implemented?)* and finally, and perhaps most importantly Contractor's HSE performance.

8.5.8. Corrective Action

There are several mechanisms for implementing corrective action, both during the construction and operational phases. The main mechanisms to address transgressions include verbal instruction (in the event of minor transgressions from established procedure, usually following a site inspection); written instruction (identifying source/s of problems, usually following an audit) and contract notice (following possible breach of contract).

8.5.9. Reporting

The findings of all of the above will be structured into instructive reporting that provides information to all required parties on HSE performance, together with clearly defined corrective action where this seen to be required. Both the monitoring and inspections are reported on continuously. Within the reporting structure it is necessary to create a review function that continuously assesses the reporting and prescribes any necessary corrective action. Reporting will include the provision of information on the HSE performance to external stakeholders and surrounding communities.

8.5.10. Management review

The final component of the EMP management cycle is a formal management review that takes place at defined intervals both during the construction and operational phases. The purpose of the management review is for senior project management to review the environmental management performance during the preceding period and to propose measures for improving that performance in the spirit of continuous improvement.

8.5.11. Liaison

Throughout the project, ongoing liaison will be maintained with authorities and communities alike to ensure the following: Advance warning of any project activities that may have some adverse impact on surrounding communities, e.g. clearing of construction site, installation of storage tanks; and Ongoing feedback on the environment performance of the project.

CONSTRUCTION PHASE				
Expected –Ve Impacts	**Recommended mitigation measures**	**Responsible party**	**Time Frame**	**Cost(Kshs.)**
1. **Minimize extraction site impacts and ensure efficient use of raw materials in construction**				
High demand of raw material	- Source building materials from local suppliers who use environmentally friendly processes in their operations. - Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered. - Ensure that damage or loss of materials at the construction site is kept minimal through proper storage. - Use at least 5%-10% recycled, refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills	Proponent Contractor Engineer	Throughout construction period	2,000,000
2. **Reduce storm-water, run-off and soil erosion**				
Increased storm water, run-off and soil erosion	- Surface runoff and roof water shall be harvested and stored for reuse. - A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed.	Engineer Proponent QHSE NEMA expert contractor	4 months	100,000
3. **Minimize solid waste generation and ensure efficient solid waste management during construction**				
Increased solid waste generation	-Use of an integrated solid waste management system i.e. through a hierarchy of options: 1.	Engineer Proponent	Throughout the project	50,000

	Source reduction 2. Recycling 3.Composting and reuse 4. Combustion 5. Sanitary land filling. -Through accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed, rather than cutting them to size, or having large quantities of residual materials -Donate recyclable/reusable or residual materials to local community groups, institutions -Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time -Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements -Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste -Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of. -Ensure that damaged or wasted construction materials including pipes, doors, plumbing and lighting fixtures, marbles will be recovered for refurbishing and use in other projects	construction manager project manager		
4. **Reduced Dust Emission**				

Dust Emission	-Ensure strict enforcement of on-site speed limit regulations -Avoid excavation works in extremely dry weathers -Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles -Personal Protective equipment to be worn -construction materials on site to be covered to prevent to be blown off by wind	Proponent Contractor Engineer construction manager QHSE	Throughout construction period	50,000
5. **Minimization of Exhaust emission**				
Exhaust Emission	-Vehicle idling time shall be minimized -Alternatively fueled construction equipment shall be used where feasible equipment shall be properly tuned and maintained -Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off or keep vehicle engines at these points	Proponent Contractor Engineer construction manager QHSE/	Throughout the construction period	Nil
6. **Minimization of Noise and Vibration**				
Noise and Vibration	-Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used. - Sensitize construction drivers to avoid gunning of vehicle engines or unnecessary hooting especially when passing through sensitive areas such as churches, mosques, residential areas and schools -Ensure that construction machinery are kept in good condition to reduce noise generation	Proponent Contractor Engineer construction manager QHSE All site foremen	Throughout the construction period	100,000

	-Ensure that all generators and heavy duty equipment are insulated or placed in enclosures to minimize ambient noise levels. -The noisy construction works will entirely be planned to be during day time when most of the neighbours will be at work.			
7. **Minimization of energy consumption**				
Increased energy consumption	-Ensure electrical equipment, appliances and lights are switched off when not being used -Install energy saving fluorescent tubes at all lighting points instead of bulbs which consume higher electric energy	Proponent Contractor	Throughout the construction period	100,000
8. **Minimize water consumption and ensure more efficient and safe water use**				
Increased Water demand	-Promptly detect and repair of water pipe and tank leaks -Ensure Taps are nor running when not in use -Install a discharge meter at water outlets to determine and monitor total water usage -Proper recycling of water from other uses for sprinkling dusty pavements	Proponent Contractor Construction manager	Throughout the construction period	100,000
9. **Minimize occupational health and safety risks**				
OSH	-Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the facility -Construction of a perimeter wall around the project area	Proponent QHSE manager	Continuous	100,000
Personal Protective Gears	-Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear muffs should	Contractor Engineer Construction Manager	On Commencement	100,000

	be made available and construction personnel must be trained on how to use the equipment			
Health and Safety Impacts	-Implement all necessary measures to ensure health and safety of workers and the general public during the project life cycle as stipulated in OSHA, 2007	Proponent QHSE manager Contractor	Continuous	-
First Aid	-Well stocked first aid box which is easily available and accessible should be provided within the site -Provision must be made for persons to be trained in first aid with a certificate issued by a recognized body	Proponent Contractor	Continuous	50,000
Fire protection	-Regular inspection and servicing of the equipment must be undertaken by a reputable service provider and records of such inspections maintained -Fire escape routes and assembly point to be marked -signs such as "NO SMOKING" must be prominently displayed within the premises especially in parts where flammable materials are stored	Proponent Contractor QHSE Fire and Safety Expert	Continuous	100,000
OPERATIONAL PHASE				
Expected –Ve Impacts	**Recommended mitigation measures**	**Responsible party**	**Time Frame**	**Cost(Kshs.)**
1. Minimization of solid waste generation and ensuring more efficient solid waste management				

Solid Waste generation	-Provide solid waste handling facilities such as waste bins and skips -Ensure that solid waste generated at the offices and LPG plant is regularly disposed to by a NEMA licensed waste handler -Ensure that staff at the facility manage their waste efficiently through recycling, reuse and proper disposal procedures	Proponent Manager	Continuous	50,000
2. Minimize risk of sewerage release into the environment				
Sewage disposal	-Connect the premise to sewer line -Conduct regular inspection for drainage pipe blockages or damages and fix appropriately - Ensure regular monitoring of the sewage discharged from the project to ensure that the stipulated sewage/effluent discharge rules and standards are not violated	Proponent Facility Manager QHSE manager	Continuous	100,000
3. Minimize Energy Consumption				
Increased Energy consumption	-Switch off electrical equipment, appliances and lights when not in use -Install occupation sensing lighting at various locations such ad storage areas which are not in use at all times -Install energy saving bulbs within the facility -Consider installation of solar panels for use in lighting -Sensitize staff on how to use energy efficiently	Proponent	Continuous	1,000,000 for solar panel installation
4. Minimize water Consumption				
Increased Water Consumption	-Promptly detect and repair water pipes and tank leaks	Proponent/Management	Continuous	50,000

	-Sensitize staff on water conservation e,g, by use posters and signages -Ensure are taps are not running when not in uses -Install water conserving taps that turn off automatically -Install a discharge meter at water outlets to determine and monitor total water usage			
5. Minimization of Health, Safety and Fire risks				
	-Implement all necessary measures to ensure health and safety of the workers and the general public during operation of the project as stipulated in OSHA, 2007 -train all workers of the facility on fire safety procedures -Install ESD at strategic points within the facility -Ensure all fire safety equipment are inspected regularly -Conduct Occupational Health and Safety, Fire and risk assessment audits annually -Register the facility as a workplace by DOSH	Proponent Facility management Fire & Safety Auditor	Continuous	200,000
6. Gas leakages and oil spillage risks				
	-Ensure regular monitoring of LPG tanks, install leakages detectors, get services regularly of oil waste handlers, ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises	Proponent Facility Management	Continuous	100,000

DECOMMISSIONING PHASE				
1. Minimize solid waste generation and ensure efficient management				
Solid waste generation	-Used building materials and other waste from decommissioning must be transported and disposed off by a NEMA licensed handler	Proponent Contractor	Throughout decommissioning	100,000
2. Reduced dust emission				
Dust emission	-Ensure strict enforcement of on-site speed limit regulations -Avoid demolitions in extremely dry weather -Sprinkle water on graded access routes when necessary to reduce dust generation by machines -Personal protective equipment to be worn -Demolished materials on site to be covered to prevent blown off by wind	Engineer QHSE	Throughout decommissioning phase	50,000
3. Minimization of exhaust emission				
Exhaust Emission	-Vehicle idling time shall be minimized -Alternatives fueled construction equipment shall be used where feasible equipment shall be properly tuned and maintained -Sensitize truck drivers to avoid unnecessary racing of vehicles engines at loading and off-loading points and parking areas, and to switch off or keep vehicle engines at these points	QHSE Engineer Construction	Throughout decommissioning phase	-
4. Minimization of Noise and Vibration				
Noise and Vibration	-Sensitize machinery drivers and machinery operators to switch off engines of vehicles or machinery not being used.	Contractor	Decommissioning phase	-
5. Rehabilitation of the project site				

	-Implement an appropriate revegetation programme to restore the site to its original state -Consider use of indigenous plant species in revegetation -trees should be planted at suitable locations so as to interrupt slight lines (screen planting) between the adjacent area and the facility	Contractor	One off	-

CHAPTER NINE

9. INCIDENT PREVENTION AND HAZARD COMMUNICATION ACTION PLAN

The construction and operation activities of the proposed project might generate incidents and hazards to the health and safety of the employees. It is therefore imperative that the project is constructed and operated in a safe and incident free manner particularly in compliance with Kenyan legislation on safety (e.g. Legal Notice No. 40 titled "Building Operations and Works of Engineering Construction Rules", 1984) and the Proponent's HSE management system requirements. This section recommends the incident prevention and hazard communication actions that the Proponent should undertake in the construction and operations phase of the project.

9.1.Incident Prevention – Construction Phase

Contractor health and safety is an essential component of incident prevention during the construction phase of the project. It is recommended that contractor health and safety rules be implemented for the project containing the elements described below.

9.1.1. Responsibilities with regard to safety

The responsibilities with regard to safety must be documented by the Proponent for all contractors to follow while working at the project site. The Proponent's responsibility is to issue procedures, safety rules and safety induction training for all contractors working on site. It is the responsibility of all contractors to strictly adhere to the Proponent's HSE standards and to ensure that every person in the contractors' employment observes the requirements of the Proponent's regulations.

The contractor will be required to nominate a contractor supervisor for the project. This person will be responsible for all HSE compliance requirements of subordinates and will issue instructions regarding safety and health which have to be carried out by all contract employees.

9.1.2. Designation of First Aiders

In accordance with the Legal Notice 160 of 1977 (First Aid Rules), the contractor shall ensure that an adequate number of certified first aiders are available at the project site with properly equipped first aid boxes. At least one first aider for every 50 employees is recommended.

9.1.3. Contractor Employee Responsibility with regard to Safety

Any contractor employee who observes or is involved in an accident will immediately report such incident to the contractor supervisor who will record the details in a General Register as stipulated under the Occupational Safety and Health Act, 2007. The Contractor's Supervisor on site shall fill out an Accident Report Form and submit it to the nearest provincial DOHSS office within 24-hours of the accident.

9.1.4. Personal Conduct

It will be the responsibility of the contractor to ensure that their employees do not engage in any of the following practices during the construction phase of the project:

- Smoking
- Personal business
- Misconduct

9.1.5. Personal Protective Equipment (PPE)

Each contractor working at the project site shall ensure that all their employees are provided with appropriate and adequate PPE. The contractor will be required to maintain a register indicating the issuance, control and use of PPE which includes the following:

- Safety shoes
- Safety helmets (hard hats);
- Hand protection (gloves)
- Eye and face protection (safety glasses)
- Hearing protection (ear plugs, ear defenders)
- Clothing (overalls).
- Safety Procedures

The contractor will be required to issue the Proponent with a comprehensive Safety Method Statement for carrying out each phase of the construction works. The contractor will further be required to comply with the safety procedures of the Proponent EHS Management System.

9.1.6. Fire and Emergency Procedures

The contractor and all the employees working for them shall be required to be familiar with the Proponent's fire and emergency procedures. The safety induction training to be provided by the Proponent's Consultant for all contractors working at the project site will include the Proponent's emergency and evacuation procedures.

9.1.7. Security Procedures

The contractor will be required to familiarize themselves with the Proponent's security procedures and shall ensure that all employees comply with those security procedures.

9.1.8. Working Tools and Equipment

The contractor will ensure that no unsafe tools are used at the project site. The contractor will further ensure that all scaffolding and ladders, cranes, welding machines, compressors, etc. are in good serviceable condition at all times during the construction phase of the project and have been certified by DOHSS approved persons.

9.2.Incident Prevention – Operational Phase

9.2.1. Proponent's HSE Management System

The Proponent will develop, rollout and implement a detailed HSE management system for their project. It is expected that relevant parts of such an HSE management system will be rolled out and implemented at the project site during the operational phase of the project.

9.2.2. Emergency Response Plan

In the event of an emergency at the project site the Proponent's Emergency Response Plan will be activated in accordance with the procedures laid out in it. It will therefore be necessary for the Proponent to develop, rollout and implement their documented emergency response plan prior to the construction phase.

CONCLUSION AND RECOMMENDATION

From the findings of this EIA Study, the following conclusions and recommendations are made:

- The proposed installation and operation of LPG storage tanks has the support of the Changamwe residents and stakeholders
- The project will be designed, constructed, and operated according to the acceptable industry norms and standards.
- Though there are a number of potential adverse impacts associated with it, it is possible to mitigate them successfully. Successful implementation of the proposed EMP will help to minimize or reduce the environment impacts to the acceptable levels.
- The proposed project will generate socio-economic benefits which would not be realized if the no development option is considered.
- The proposed project will help in conserving the Natural resources in that it will eliminate over reliance on fuel wood as source of fuel to renewable LPG.
- The proposed project will help meet the increasing demand of LPG in the country.

REFERENCES

1. British Standard (BS) 8233:1999: Sound Insulation and Noise Reduction for Buildings
2. British Standard (BS) 5228 Part 1, 1997: Noise and Vibration Control on Construction and Open Sites
3. British Standard (BS) 5228 Part 4, 1997: Noise Control on Construction and Open Sites: Code of Practice for Noise and Vibration Control applicable to piling operations
4. Control) Rules 2005
5. Government of Kenya: The Environment (Impact Assessment and Audit) Regulations 2003
6. Government of Kenya: Waste Management Regulations, 2006
7. Government of Kenya: Water Quality Regulations, 2006
8. Government of Kenya: Factories and Other Places of Work (Medical Examination) Rules 2005
9. Government of Kenya: Factories and Other Places of Work (Noise Prevention and
10. Government of Kenya: Factories and Other Places of Work (Safety and Health Committee) Rules 2004
11. Government of Kenya: Fire Risk Reduction Rules, 2007
12. Government of Kenya: Hazardous Substances Rules, 2007
13. Government of Kenya: Medical Examination Rules 2005
14. Government of Kenya: Noise Prevention and Control Rules 2005
15. Government of Kenya: Occupational Safety and Health Act,2007
16. Government of Kenya: The Environment Management and Coordination Act 1999
17. Government of Kenya: The Occupational Safety and Health Act, 2007
18. Government of Kenya: The Physical Planning Act 1996
19. Government of Kenya: The Safety and Health Committee Rules 2004