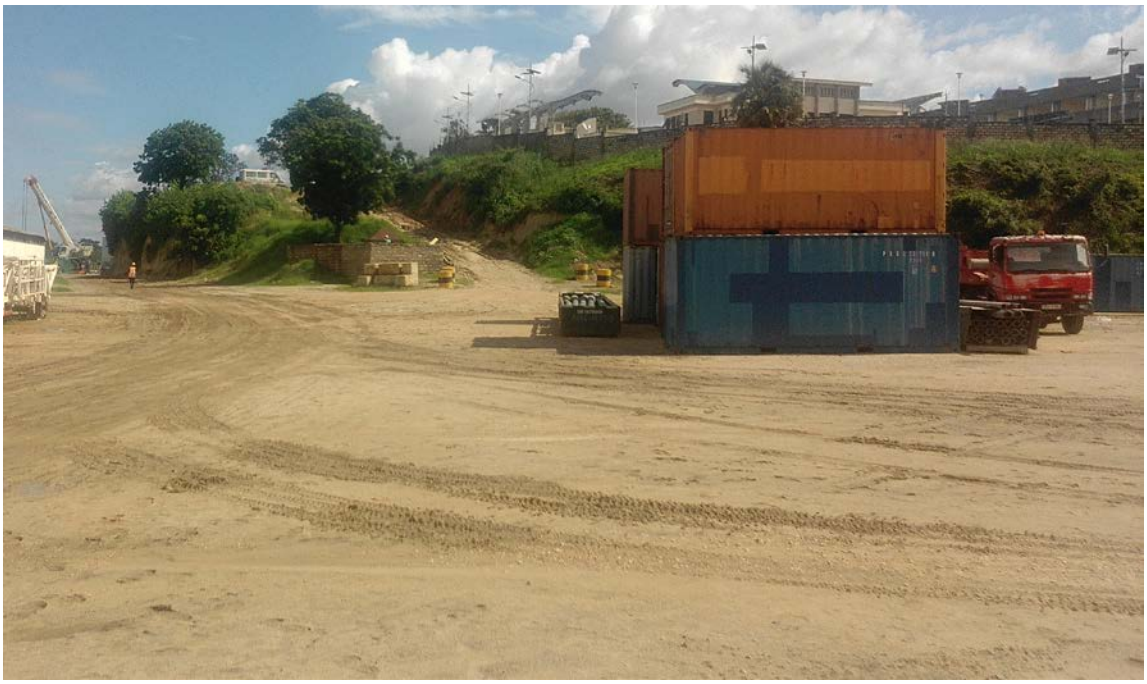
ENVIRONMENTAL IMPACT ASEESSMENT STUDY REPORT FOR THE PROPOSED INSTALLATION OF 1100 CUBIC METRES OF LIQUIDFIED PETROLEUM GAS STORAGE AND FILLING PLANT ON LR MOMBASA/BLOCK XLVII/173, COMARCO SUPPLY BASE, GANJONI MOMBASA COUNTY



Document information

Client	**Dry Docks Logistics Limited** **P.O Box 17592-00500 Nairobi**
Project Title	**Proposed Installation of 1100 metres cubic of LPG storage and Filling Plant**
Project	**LR number Mombasa/Block XLVII/173, Comarco Supply base, Ganjoni Mombasa county**
Document Title	**EIA study report**

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The preparation of this EIA study Report was commissioned by the management of Dry Docks Logistics Limited in fulfillment of requirements of the EIA/EA Regulations 2003 and Environment Management and Coordination Act, cap 387

Proponent: **Dry Docks Logistics Limited**

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Acknowledgement

We extend our special thanks to the management of Dry Docks Logistics Limited (the Proponent) for contracting Caleb Nyagah, Boniface Osoro and carol Muoge (EIA/EA Associates& Lead Expert) to prepare this E.I.A study Report for their proposed installation of Liquefied Petroleum Gas storage and filling plant of 1100 cubic metres on LR number Mombasa/Block XLVII/173, Comarco Supply base, Ganjoni, Mombasa county.

We further register our gratitude to the various stakeholders consulted during public stakeholder consultation for their invaluable contribution, support and cooperation. Their input contributed enormously towards successful completion of this E.I.A study report

Table of Contents

Acronyms

Acronym	**Description**
ARV	Anti Retroviral
BS	British Standard
dB(A)	Decibels on the A-Scale
EA	Environment Audit
EHS	Environment, Health & Safety
API	American Petroleum Institute
EIA	Environment Impact Assessment
EMCA	Environmental Management and Coordination Act
CEMP	Construction Environment Management Plan
ESM	Environmentally Sound Management
LPG	Liquefied Petroleum Gas
MSDS	Material Safety Data Sheet
ESD	Emergency shutdown Device system
NEMA	National Environment Management Authority
NFPA	National Fire Protection Association – USA
FH	Fire hydrant
KPA	Kenya ports Authority
OSHA	Occupational Health and Safety
DHP	Designated Health Practitioner
HSEQ	Health Safety Environment and Quality
TOR	Terms of Reference

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Executive Summary

Dry Docks Logistics LTD (proponent) proposes to install a 1100 metres cubic LPG storage tank and filling plant on plot on LR number Mombasa/Block XLVII/173, Comarco Supply base, Ganjoni, Mombasa county with the main purpose of providing more LPG stock for sale.

The E.I.A for the study report is being done (NEMA licensed and registered experts).The firm has been appointed by the proponent to complete the EIA study in accordance with Legal Notice (L.N.) 101: Environment (Impact Assessment and Audit) Regulations 2003 promulgated under the Environment Management and Coordination CAP 387. The proposed project is also expected to comply with the energy act and its subsidiary legislation.

The proposed development activities will mainly involve civil, mechanical and electrical works associated with the installation of the LPG tank and filling point 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 tank and pump and pipe works.

The proposed project is expected to start immediately this Study Report is approved by NEMA and EIA Licence is issued to the Proponent.

The project site is located in an industrial area set up. The neighbourhood is characterized by shipping companies and warehouses. The project area is served by two main roads; Mikanjuni Road and Taib Bin Nasir road

Project Objective

The proposed project aims to increase the availability of LPG to the coast region in a bid to support Government to promote the use of clean fuels.

Project Cost Estimate

The proponent has undertaken a preliminary estimate of the total project cost using experienced consultants. The estimated total project cost is approximately Kenya shillings fifty five million. (Kshs 55,000,000).

Project Description

Technical Description

The proposed project includes the:

- Installation of 11 tanks of 1100 metres cubic LPG.
- Construction of a cylinder filling station;
- Pipe works LPG jetty
- Paint works
- Weighbridge installation
- Fire hydrant station
- Construction of an office

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 have also been 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

LPG tanks will be installed at the comarco supply base, Ganjoni , Mombasa county. 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 85 decibels and other safety hazards.

Operational Phase

A fire protection system will be provided. It will by means of 12 Fire hydrant strategic points and 4 units of 250 metres cubic each of water storage tanks

The facility will be hooked to the existing electricity supply line of KP&LC while Sewerage and waste will be managed in accordance with the existing waste management procedures of comarco supply base, Mombasa county council and Environmental Management and Coordination (Waste Management) Regulations of 2006.

Long term 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 Labor Organization (ILO), World Health Organization (WHO) and American Conference of Industrial Hygienist (ACGIH) 1989-guideline document.

The ambient noise level at site is typical of the industrial setting. Existing noise data indicates that noise levels range between 51.5 dB (A) and 62.5 dB (A

The ambient air quality is also typical of industrial setting. Available data on air quality of the site indicate that the concentration of particulate matter, sulphur dioxide and nitrogen dioxide in air are generally within guideline limits stipulated under the Draft EMC (Air Quality Standards) Regulations, 2008.

Pollution from waste

During construction phase, waste will be generated from construction activities, domestic waste from construction team, sewage, waste oil, treated timber, polythene and plastics packing material and lubricants, containers of 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 H&S 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 H&S 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 on 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

While the plans 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 and Recommendations

Conclusion

The project, including the construction and operation of the LPG tank and cylinder filling station is anticipated to provide sufficient stock of LPG. 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 will be bound to implement them.

1.0 CHAPTER ONE: BACKGROUND INFORMATION.

1.1 Project Background

Dry Docks Logistics Limited is an upcoming LPG dealer in Kenya, which is hereinafter referred to as Proponent, incorporated under the Companies Act (Cap. 486) (Appendix 1). It is proposing to install 1100 metres cubic of LPG storage and filling plant at comarco supply base, Ganjoni, Mombasa County.

The Legal Notice No. 101 of 2003 (EIA/EA Regulations, 2003) requires the Proponent to prepare EIA Study Report for approval by National Environment Management Authority (NEMA) prior to commencement of a new development. As such, Dry Docks Logistics Limited engaged Caleb Nyagah, Boniface Osoro and carol muoge (EIA/EA Associatse& Lead Expert) to undertake environmental impact assessment for the proposed project. Copies of documents relating to the said piece of land including the Title of lease, Lease Agreement , maps and plans are attached in Appendix 2

1.2 Terms of Reference (TOR) for the EIA Process

The proposed installation of 1100 metres cubic of LPG storage and filling plant at comarco supply base, Ganjoni, Mombasa County by Dry Docks Logistics Limited was done in accordance with the (EIA/EA Regulations, 2003) requires the Proponent to prepare EIA Study Report for approval by National Environment Management Authority (NEMA) prior to commencement of a new development. Assessment in compliance with the Environmental Management and Coordination act chapter 387 .

The main objective of the assignment was to assist the proponent to prepare an EIA study of 1100 metres cubic LPG storage and filling plant and to ensure the proposed development takes into consideration appropriate measures to mitigate any adverse impacts to the environment. The study identified existing and potential environmental impacts and possible concerns that interested and/or affected parties have with the development, as well as the associated prevention and mitigation measures for the negative impacts as stipulated in the Environmental Management Plan (EMP) proposed.

The team of experts on behalf of the proponent conducted the EIA study by incorporating but not limited to the following terms of reference:-

- The proposed location of the project
- A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
- The objectives of the project.
- The technology, procedures and processes to be used, in the implementation of the project.
- The materials to be used in the construction and implementation of the project.
- Project description and layout plan. The location, size of land, leases and project site. Architectural designs for the overall project, piping, LPG storage tanks, filling station, hydrants stations and offices.
- A description of the potentially affected environment. Geological, soils, hydrology, climate, and vegetation types, biological environment and demographic patterns and attitudes towards proposed project. Historical importance of the area.
- 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.
- To recommend a specific environmentally sound and affordable wastewater management system.
- Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes.
- Analysis of alternatives including project site, design and technologies.
- An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.
- Provide an action plan for the prevention and management of the foreseeable accidents and hazardous activities in the cause of carrying out development activities.
- Alternatives for the development
- Time schedule for executing an EIA
- Propose measures to prevent health hazards and to ensure security in the working environment for the employees, residents and for the management in case of emergencies.
- An identification of gaps in knowledge and uncertainties which were encountered in compiling the information.
- An economic and social analysis of the project.
- Such other matters as the Authority may require.

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1.3 Project Objectives

The Proponent is seeking to have met the growing demand of LPG consumers in coast region and its environs. The LPG filling plant will involve cylinders of 6kgs, 13 kgs and 40kgs sizes. The proposed 1100 metres cubic LPG storage will ensure the sufficient availability and accessibility of LPG.

1.4 Data collection

The team of NEMA Experts undertook environmental screening and scoping to avoid unnecessary data. The Experts employed various approaches in collecting data and information for assessing the impacts of the proposed project. The data collection was carried out through questionnaires/standard interview schedules, use of checklists, observations and photography, site visits and desktop environmental studies, where necessary in the manner specified in Part V (section 31-41) of the Environmental (Impact Assessment and Audit) Regulations, 2003.

The following techniques were used:

1.4.1 Review of secondary data

A wide range of environmental and socio-economic data were sought to describe the baseline conditions at the project area. These included socio-economic, physical and environmental data and reports from government departments and on-line sources.

1.4.2 Interviews

Interviews were conducted during public stakeholder consultation in order to obtain the views and concerns of the interested parties as regard to the proposed project. A semi structured interview checklist was used to capture the responses of the stakeholders. The questionnaires feedback is appended on this report.

1.4.3 Public meetings and *barazas*

The experts coneveved meetings with the Ganjoni area local chief, community elders and members of the public and obtained views and concerns of the public in regards to the proposed LPG storage and filling plant. The participants views raised were meant to predict possible positive impacts and possible negative impacts to the natural environment and human environment. The public meetings also highlighted opinions of how negative impacts on the natural and human environment can be

mitigated. The questionnaires, public meetings attendance list and meeting minutes are appended on this report.

1.4.4 Baseline environmental survey

More recently the development spurred on by regulators in Kenya and indeed globally, has recognized the need for change in order to safeguard the environment. In relation to this, Environmental concerns have now been integrated in the planning and implementation processes of any proposed projects (in Kenya). The key objective is to mitigate conflicts with the environment at the vicinity; during implementation, operational and decommissioning phases. In addition, it is now mandatory for the proponents of such projects to carry out environmental impact Assessments (EIAs), to enhance sustainable environmental management (SEM) as well as controlling and revitalizing the much-degraded environment. The environmental management is regulated by the National environmental management environment Authority (NEMA) in Kenya.

Baseline environmental survey was undertaken in order to understand the prevailing conditions and to predict the likely changes once the proposed project is operationalized. The survey reports are appended to this report.

1.5 Assessing significance of Impacts

The first stage of impact assessment is identification of environmental activities, aspects and impacts. The significance of the impacts is then assessed by rating each variable numerically.
The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a value.
The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring. The values for likelihood and consequence of the impact can be represented in values a rating matrix and it is determined whether mitigation is necessary.

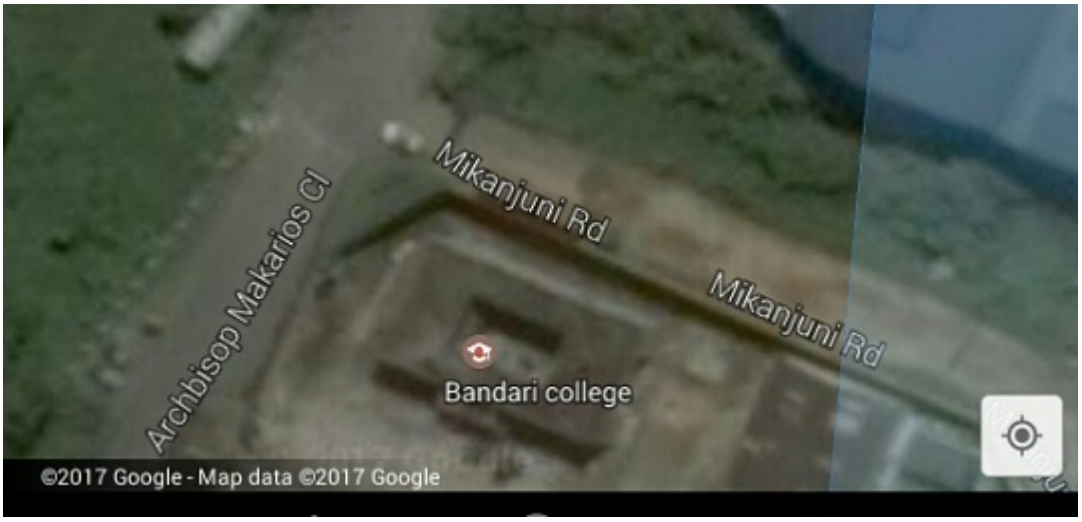
1.6 Purpose of this Report

This report addresses the requirement for preparation of EIA Study Report in accordance with EIA/EA Regulations, 2003 and environmental management and coordination act Cap 387.
The report presents an overview of the proposed project and the environmental regulatory framework from which it operates. It identifies and assesses the significance of the impacts of the project as well as mitigation measures necessary to reduce or prevent impacts from occurring.

CHAPTER 2 PROJECT DESCRIPTION

2.1Proposed project location

The proposed project will be developed on Plot No L.R. No. LR number Mombasa/Block XLVII/173, Comarco Supply base, Ganjoni, Mombasa County. The registered proprietor of the certificate of lease of land is Touchwood Investments LTD .Touchwood Investments Limited has subsequently issued a land lease agreement to Dry Docks logistics management. Touchwood investment limited has a 33 years old lease(as at 1st January 2003) from Kenya Ports Authority. Geographically, the site is located on Longitude 39^0 36 14.65.22'' East and Latitude 4^0 18' 14.65'' South.



Copy of certificate of title of the land is appended at the end of this report (Appendices 1). Figure 1 below is a satellite image showing the location of the project site

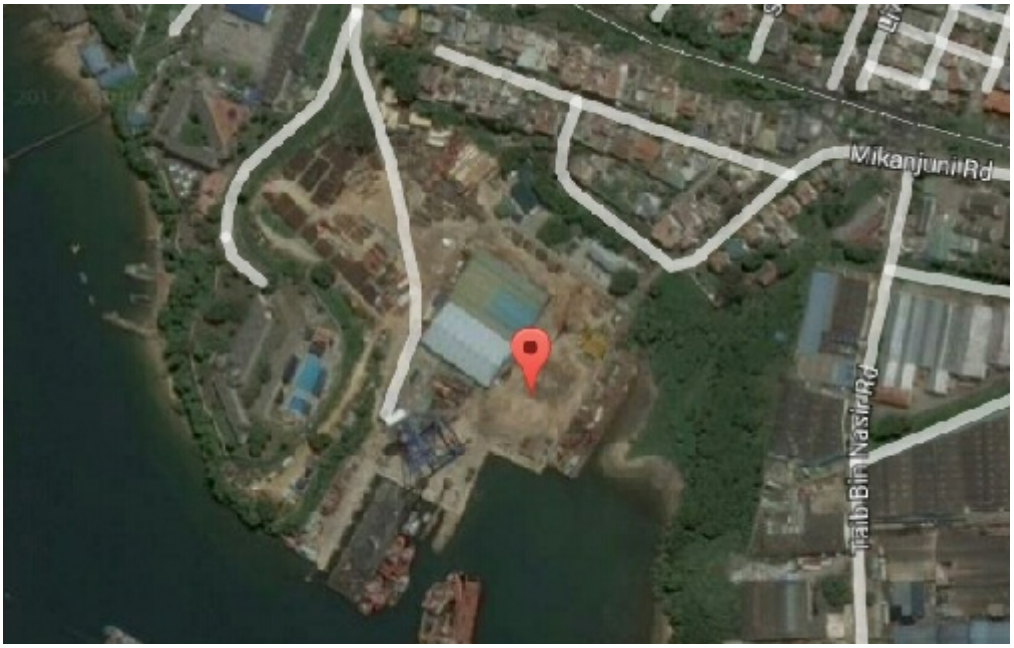


Figure 2: Satellite Image showing the location of the proposed project site Source: Google Earth

2.2Proposed Project Description

The proposed project will have 11 tanks of Liquefied Petroleum Gas of 1100 metres cubic above ground tanks, a filling station and perimeter fencing, Hydrant location, jetty, piping and office. The project will occupy an area of approximately 1.921 hactres.

The task will involve

- Excavation through
- Construction of a LPG tanks foundation storage for 11 tanks of 1100 metres cubic capacity
- Construction of filling station.
- Casting a reinforced concrete slab for LPG pump
- LPG piping work piping systems
- Tankers loading and off loading stations
- Painting work
- Purge air from tank and pipelines and commission
- Perimeter fencing

Copies of the site layout and drawings showing the respective features of the proposed project are appended at the end of this report (Appendices, 2 and 3)

2.2.1 Technology

The primary technologies used for the design, construction and operation of the LPG facility include various international codes 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

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

Mechanical Works	
KS 1938-1:2012 KS 1938-2:2012 KS 1938-3:2012	Kenya standards for 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 150 Land a combined water capacity not exceeding 3000L per installation second edition. Part 2: Transportation of LPG in bulk by road,rail and sea.code of practise second edition. Part 3: LPG handling, storage and distribution in domestic, commercial
KS ISO 16486-3:2012	Plastic piping systems, unplastic polyanide for supply of gaseous,with fusion joining and mechanical joints:fittings
KS ISO 16486-5:2012	Plastic piping systems, unplastic polyanide for supply of gaseous,with fusion joining and mechanical joints:fitness for the purpose of system
KS ISO 16486-6:2012	Plastic piping systems, unplastic polyanide for supply of gaseous,with fusion joining and mechanical joints:handling and installation.

2.2.2 Project Cost

It is approximated that the construction of the proposed project will cost Kenya shillings Fifty Five million (Kshs 55,000,000)

2.2.3 LPG Storage Tanks

11 LPG tanks of 1100 metres cubic will be installed at the proposed project site, Comarco supply base, Ganjoni, 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 filling station will be supplied with fire hydrants, water reservoir to be used in case of fire emergencies.

2..2.4 Cylinder Filling Station

The cylinder filling area will be reinforced with a thick concrete slab for the LPG Pump. The pump will be installed according to Kenya standards on safety. The shed will be a shed, with a cast slab beneath.

The filling process will take place in the cylinder filling area. The Plant's filling stock management system will be fully computerized. This will ensure that every single cylinder will be filled thoroughly and that instances such as over-filling, under-filling, and leakages do not occur.

Before the LPG cylinders are filled, a pre-fill inspection of the cylinders will be undertaken to ensure that the cylinders are safe to fill. The cylinders that are found to be in good condition will be filled, sealed, weighed and taken back to the factory.

2.6 Perimeter Fencing

The project will have a perimeter fence. Chain links will be bound on the iron bars and will be fabricated and installed.

2.7 Fire protection

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

2.8 Construction Phase

2.8.1 Site preparation

The site preparation work will consist of the following; site clearing (relocation of pallets and machinery from site), excavation followed by backfilling 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 for 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.

2.8.2 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 have been sourced locally whereas others have been obtained from sources outside Mombasa City.

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

2.8.3 Product

The final product after construction phase is LPG storage and filling plant which will comprise
of 1100 metres cubic of Aboveground Storage Tanks and associated Pipe work and a Gas filling
area.

2.8.4 By-products

The Proposed project will generate several by-products 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

2.8.5 Waste

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

(i)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.

(ii)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.

(iii) 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. Waste Management Plan (WMP)

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 mitigative 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 levelling 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; and □ Control of runoff during the construction phase.

2.8.6 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.

2.8.7 Noise Emissions

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

2.9 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.

2.10 Operation Phase

Once commissioned, the tank will be filled with LPG. The gas will be brought in by trucks. The proposed LPG will serve the coast region targeting homes, industries and institutions

2.10.1 Products

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

2.10.2 By-products

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

2.10.3 Waste

- Effluent Waste

The following wastewater will be generated during Project operations:

- Storm water runoff.
- 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 comaco supply base disposal systems. Some of the domestic waste to be generated at the facility will include office waste such as paper, empty cans among others.

- **Sewage Waste**

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

2.10.4 Air Emissions

The proposed facilities will be designed to international standards. Subsequently emissions from trucks and customers vehicles etc are expected to be low.

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

(i) Intermittent emissions from routine testing of backup power and trucks offloading LPG.

- Emissions from trucks offloading the LPG gas
- Emissions from trucks and other vehicles to be loaded with cylinders./

2.11 Decommissioning Phase

Upon decommissioning of the proposed LPG storage and filling plant, 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.

2.11.1 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; and Foundation materials which can be donated to individuals for reuse

2.11.2 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.

2.11.3 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.

2.12 Health and Safety System

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.

CHAPTER 3 BASELINE INFORMATION

3.1The Physical profile

3.1.1 Geographic and administrative location

Administratively, the proposed project is located comarco supply base, Mombasa County, off Mikanjuni road. The area lies within Ganjoni location. Mombasa is the city on the coast of Kenya. It is the country second largest city after capital Nairobi with an estimated population of about 1.2 million people in 2016. It is a regional and economic hub, with a large port and international airport and its important regional tourism centre. It is connected to the mainland to the north by Nyali Bridge, to the south by Likoni ferry, west by Makupa causeway, alongside which runs Kenya-Uganda railway.

3.2 Location, Climate and Topography

The location, topography and climate of an area have an important bearing on its development. The project is situated in Mombasa County.

The altitude of the county varies between approximately 5 m above sea level. The major drainage pattern consists of Indian Ocean. The annual precipitation averages 1072.7mm which is equivalent to 1072.7litresm cubic metres. Although the rainfall in the county is above annual average, the amount varies from place to place and also from year to year. There is however no major variation within the year.

The annual mean temperature is 26.3 degrees Celsius. The average monthly temperature varies by 4.3 degrees Celsius. This indicates that the sentimentality type is hyper oceanic subtype.

3.3 Social and Economic Environment

3.3.1 Population

The size and composition of the population are important variables in the development of the process of the economy. It is the country second largest city after capital Nairobi with an estimated population of about 1.2 million people in 2016.

3.4 Land and Soils

The main types of soils along the Kilindini habour ranges from clay loam to silt clay loam. These soils are of moderate to high fertility potential. These are favourable to the establishment of horticulture.

3.5 Fauna and flora

Comarco supply base is an industrial zone there is no much plants and animals on site. However, Oysters thrive on the few shrubs of mangrove prop roots towards the ocean. Despite kilindini habour is a major East African port serving the land locked the East Africa nations. Uganda, Somalia and south Sudan. Despite Considerable shipping activities, our physical inspection did not show any dark smudges or any other evidence of being affected by harbour pollution.

3.6 Ecology

There are no any other activities except industrial use of land near the proposed site.

3.7 Utilities

3.7.1 Water Supply

Mombasa water and Sewerage Company is connected to site and the proponent is connected to the supply and will use the water during construction and operational phases.

3.7.2 Sewer system

The proposed site is connected to the sewer system of Mombasa water and Sewerage Company for waste water treatment and disposal

3.7.3 Waste management

The proponent will contract a licensed solid waste collector licensed by NEMA to collect and dispose all solid waste during the operational phase of the project

3.7.4 Energy

The area is connected by the KPLC distribution grid. Stand by generators will be required to cater for periods where there are interruptions in the power supply.

3.8 Transport and communication

The proposed project site is well served by roads and can be easily accessed by potential customers .Secondly, the area is well connected with road network and communication facilities such as safaricom, airtel and Equitel.

3.9 social economic conditions, national and regional land use policies.

The proposed project land use zoned as an industrial land, there are numerous shipping companies near the proposed site. The architectural plans must be approved by The Mombasa county council and Kenya ports authority.

The national land planning policy in Kenya is to achieve sustainable development and is generally viewed in the context of resource exploitation, poverty eradication, conflict resolutions, public participations, equality and policies to achieve regional balance. LPG storage and filling plant is ideal for this proposed site.

CHAPTER 4: RELEVANT LEGISLATIGVE AND REGULATORY FRAMEWORK

Legal Framework for the study

4.1. Environmental management Tools under EMCA

The EIA study for the construction of 1100 cubic metres LPG storage and filling plant located at comarco supply base, Ganjoni, Mombasa was guided by reigning government policy and legislation on environmental management. Kenya has an umbrella Environmental law; the Environmental Management and Coordination Act (EMCA) cap 387 which enacted with a view to harmonizing environmental legislation previously scattered in 77 national laws. Among other tools for protection of the environment, EMCA allows for application of powerful tools as follows:

4.1.1 EIA as a tool for Environmental Protection in Kenya:

Section 58 of the Environmental Law requires that an Environmental Impact Assessment (EIA) study precede all development activities proposed to be implemented in Kenya. The Act further requires that EIA studies so designed, be executed in accordance with the Guidelines for Conduct of EIAs and Environmental Audits (Kenya Gazette Supplement No. 56 of 13th June 2003) as published by the National Environmental Management Authority (NEMA).

Application of Environmental Audits: In order to mitigate and control environmental damage from on-going projects, Sections 68 and 69 EMCA require that all on-going projects be subjected to annual environmental audits as further expounded in Regulation 35 (1) and (2) of Legal Notice 101 of June 2003. Part V of the Legal Notice 101 defines the focus and scope of Environmental Audit studies including an appraisal of all the project activities, within the perspective of environmental regulatory frameworks, environmental health and safety measures and sustainable use of natural resources.'

4.1.2 The Environmental Management and Coordination, (Water Quality) Regulations 2006:

These are described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006. These Regulations set the standards for diverse waters namely: - water for domestic use, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife and water used for any other purposes. The rules further stipulate the quality standards for water to be disposed either directly into nature or through the sewage network. These Regulations outline: Quality standards for sources of domestic water; Quality monitoring for sources of domestic water; Standards for effluent discharge into the environment; Monitoring guide for discharge into the environment; Standards for effluent discharge into public sewers; Monitoring

for discharge of treated effluent into the environment. LN 120 requires that a Discharge Permit be obtained for all water disposed into the environment from any premises.

4.1.3 The Conservation of Biological Diversity (BD) Regulations 2006:

These regulations are described in Legal Notice No. 160 of the Kenya Gazette Supplement No. 84 of December 2006. These Regulations apply to conservation of biodiversity which includes Conservation of threatened species, inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties.

4.1.4 The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009:

Legal Notice No. 61, effected in November 2009 to regulate noise and vibrations across the spectrum of various activities. The regulations give the noise limits applicable at different times of the day and has provisioned for issuance of licences and permits for noise levels exceeding the stated standards. For regulation of noise at workplaces, these regulations have given reference to the Factories and other places of Work Act regulations on noise at workplaces.

4.1.5 Administration of EIAs under EMCA

EMCA cap 387 allows for formation of the National Environmental Management Authority (NEMA) as the body charged with overall coordination of environmental protection in Kenya. A Director General appointed by the President heads the Authority established in 2001. Several Directors in charge of Enforcement, Education, Policy, who are assisted by Assistant Directors and Senior Officers under them, assist the DG. To facilitate coordination of environmental matters at District level, EMCA cap 387 allows for creation of District Environmental Committees traditionally chaired by respective District Commissioners. To each DEC in the country is attached a District Environmental Officer who oversees environmental coordination among diverse sectors and is also secretary to the DEC. (The District Environmental Committees are now being replaced by County Environmental Committees in line with the current constitutions).

4.1.6 Format and content of Project Reports under EMCA

EMCA is the principle legislation governing conduct of EIA in Kenya. The Second Schedule of EMCA-cap 387 specifies projects that require to be subjected to EIA studies and under this schedule; there is no minimum size threshold below which an EIA is not necessary. Thus, in line with this requirement, the proposed construction of 1100 metres cubic bulk LPG storage and filling

plant was screened and found to raise concerns that required to be addressed through a Project Report, which should hopefully withhold the need for a full cycle EIA.

Towards preparation of a study Report, the NEMA screening procedure as expounded in Legal Notice 101 of June 2003 was adopted. This entails development of a study Report whose focus and scope are defined in Regulation 6, 7 and 8 of Legal Notice 101. Section 6 of part 1 of the LN 101 stipulates that "An application for an Environmental Impact Assessment License shall be in the form of a Project Report in the form set out in the First Schedule to these Regulations, and the applicant shall submit the application together with the prescribed fee to the Authority… Section 7(1) of Part 11 of the Legal Notice 101 specifies the contents (scope) of the project report.

A proponent shall prepare a project report stating: -

a. The nature of the project;

b. The Division of the project including the physical area that may be affected by the project's activities;

c. The activities that shall be undertaken during the project construction, operation and decommissioning phases;

d. The design of the project;

e. The materials to be used, products, by-products, including waste to be generated by the project and the methods of disposal;

f. The potential environmental impacts of the project and the mitigation measures to be taken during and after implementation;

g. An action plan for the prevention and management of possible accidents during the project cycle;

h. A plan to ensure the health and safety of the workers and neighbouring communities;

i. The economic and socio-cultural impacts to the local community and the nation in general;

j. The project budget;

k. Any other information that the Authority may require

Section 10(2) of Part II of Legal Notice 101 allows for approval of proposed projects at the Project Report Stage and has been effectively used by NEMA to grant Environmental Licenses to big and small projects. This is the process and stage at which the EIA process for the installation of 1100 cubic metres of LPG storage and filling plant, comarco supply base, Ganjoni, Mombasa County is expected to end.

4.1.7 Inter-sectoral Coordination of EIAs under EMCA

In recognition that EMCA is an umbrella law coordinating diverse sectoral statutes all of which are still in force, Legal Notice 101 of EMCA requires that the respective sectors be consulted as Lead Agencies in making decisions pertaining to environmental assessment for projects in respective sectors. This is to ensure that NEMA does not approve projects that contradict sector policies and legislation.

In sections below, we highlight sectoral laws and policies likely to be affected by the project as proposed by the proponent.

4.2 The Water Act 2002

In March 2003, the Water Act 2002 came into effect to provide a legal framework for management and conservation of the national water resource base in line with policy changes in the sector. New institutions with separate functions have now been established, and decentralized decision making is reflected in autonomous regional bodies. Henceforth, these are the institutions with which all works touching on water resources have to coordinate with.

They include:

4.2.1 Ministry of Environment, Water and Natural Resources (MEWNR):

The MEWNR (formerly called the Ministry of Water and Irrigation-MWI) is the trustee of all water resources in the country. The present key roles and functions of the MEWNR have been defined in the National Water and Sanitation Services as: water policy formulation; water resources management policy; apportionment of water resources and abstraction licensing; appointment of water undertakers; regulation, setting and approval of standards; approval of water tariffs, levies, rates and charges; development and operation and maintenance of urban and rural water supply systems; wastewater treatment and control; water quality and pollution control; catchment area conservation; water conservation (by National Water Conservation and Pipeline Corporation); irrigation and dam construction schemes; flood control and land reclamation (MWI, 2003).

4.2.2 The Water Resource Management Authority:

This is a body corporate charged (under Section 8(1) of the Water Act 2002) with the overall responsibility of overseeing sustainable development of the national water resource base. The functions of the WRMA as provided in Section 8 of the Water Act 2002 is to manage, protect and conserve the water resources with regional offices at catchment levels for decentralized decision-making, quick response to water resources management problems and for speedy water allocation process. The above institutional set up and interactions will provide a framework to achieve the objectives of setting up an effective, efficient and sustainable organization. The Water Resources Management Authority is a corporate body with perpetual succession and a common seal. It is a government parastatal created under the Water Act 2002 to oversee the management, use and development of water resources in the country. It has a governing Board, a Chief Executive Officer and other officers working under the Chief Executive Officer. Institutionally, it is closely linked to the newly formed Catchment Area Advisory Committees and works closely with Water Resources User Associations.

In order to coordinate activities in Water resource management, WRMA has issued Guidelines for Water Resource Management, Part IX of which specifies code of conduct with regard to activities in riparian areas.

4.2.3 Water Service Boards (WSBs

WSB is responsible for ensuring adequate access to water and sanitation services within their jurisdictions. Where government assets exist they will be owned by the WSBs and operations delegated to water service providers (see below). The WSB is the primary agent for service quality oversight.

4.2.4 Water Services Regulatory Board (WSRB)

WSRB is mandated as the national regulator with responsibility for providing guidelines on tariff setting and quality standards. The WSRB also is responsible for issuing licenses to WSBs and to approve WSPs.

4.2.5 Water Service Providers(WSPs)

to provide water services to consumers, ranging from public urban utilities, small private network operators in rural areas and community managed self-supply through water users' associations.

4.3 Public Health Act Cap 242:

This Act provides the impetus for a healthy environment and outlines regulations on waste management, pollution and human health. Part IX section 115 of the Act provides for any noxious matter or wastewater generated from any premise such as building nuisances including offensive smells, the Act therefore states that no person or institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires that local Authorities take all lawful necessary and reasonable practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to injuries or dangerous to human health. This is important in ensuring that the developments of any kind do not pose danger to the users and general public.

4.4 The Physical Planning Act Cap 286:

Physical Planning Act is a fundamental Act of Parliament that provides for preparation of local-physical development plans giving the local authority power to prohibit or control development activities in their jurisdictions by checking on the content of the plans, process of preparation and ultimate approval. Section 30 states that any person who carries out development without development permission will be required to restore the land to its original condition. It also states that no other licensing authority shall grant license for commercial or industrial use or occupation of any building without a development permission granted by the respective local Authority. In principle, the Planning Act ensures that all developments and other changes to land are vetted and approved as to ensure order, harmony, health and economy of the different uses on any land. The Act also promotes public participation in the preparation of plans and requires that in preparation of plans proper, consideration be given to the potential for economic and social development. The proposed site is in an industrial area.

4.5 Occupational Safety and Health Act, 2007:

This act was enacted to give general and specific guidelines on management of Occupational Health and Safety in work places. Section 23 establishes the office of the Director of Occupational Safety and Health Services. The office of the Director is charged with the responsibility of coordinating the operations of the Occupational Health and Safety Department. In section 27, the Act establishes the National Council for Occupational Safety and Health. The act outlines several measures that need to be in place for the management of the Occupational Health and Safety, these measures are:

The duties of the employers have been defined as

Formulation and implementation of an occupational health and safety policy

- Establishment of the safety and health committees where there are at least 20 employees in an establishment. The Director may direct establishment of a committee at any other workplace.

- Reporting of accidents to the Director of Safety and Occupational Health

- A contractor is bound by the act by virtue of being an employer, and it is imperative that the Act be applied to safeguard the Safety and Health of workers at the construction site. This is especially so in matters related to working with mobile / moving parts equipment and other implements used in the construction sites.

4.6 The Petroleum Act (Cap 116)

In this Act, safety of storage of petroleum products is provided for under Section 14 (1). Section 18 (2)-No license to store petroleum within a Sub County or township shall be granted unless the local authority has approved of the site. Section 19 (i) prohibits any person in or near any storage shed or installation from doing any acts that are likely to cause fire. Part (ii) of this section disallows smoking within a storage shed or possessing matches or other articles of highly inflammable or explosive nature except as permitted by this Act. This excludes smoking in offices and living quarters if so situated to preclude danger from fire. Part (iii) of this section states that; there shall be posted in a conspicuous place at the entrance to every installation a notice in English and Swahili to the effect that smoking and the possession of matches are prohibited. Part (v) indicates that an adequate supply of dry sand or dry earth shall always be kept ready for immediate use in an installation and in or near a storage shed for purposes of extinguishing fire. Part (vi) of the same section requires that an adequate supply of dry sand or dry earth shall always be kept ready for immediate use in an installation and in or near a storage shed for the purpose of extinguishing fire.
Part VI outlaws any petroleum from escaping into any drain, sewer, harbour, and river or water course. Section 20 (6): An efficient fire service shall be provided in every installation and the employees shall be instructed periodically in the use of various fire appliances.

4.7 Energy Regulatory Commission (ERC)

The ERC was established under Energy Act, 2006, 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.

ERC on its part has continued to root out these unscrupulous business operatives and prosecute them. This has been done through joint operations with other government agencies including the Kenya Police (Flying Squad Division), the Kenya Bureau of Standards and the Anti-Counterfeit Authority. To further enhance its enforcement mandate, the Commission procured the services of an independent LPG inspector whose main role is to audit the entire LPG supply chain with the aim of bringing to the fore persons engaging in malpractices for purposes of prosecution by the Commission. In addition, the Commission has also initiated the process of revising legal notice 121 of 2009 with a view to increasing the penalties and fines to be levied on any persons found in breach of the requirements.

The consumer plays a big role in the LPG supply chain in that they provide the necessary market especially for the cooking gas in cylinders. Consumers can thus play a major role in ensuring that illegal operatives are brought to a halt by ensuring that they only purchase LPG from licensed retailers. It is crucial for consumers to note that all licensed LPG dealers should have a license displayed at their location of business every time and that they should always issue an official receipt with the cylinder weight and serial number clearly indicated. For their own safety, consumers are advised to check on the cylinder's neck for the validity of the test dates for the cylinders that they intend to buy. LPG cylinders with test dates exceeding 8years from the last date of test are deemed to be prone to material failure and hence explosions. Several explosions of such cylinders have been reported in the recent past some of which resulted in loss of life. Consumers should also know that in accordance to Legal Notice 121of 2009, the only person authorized to fill an LPG cylinder is the person whose brand appears on the particular cylinder. Companies filling other companies' brands of cylinders are considered to be counter-feting the original brand and are thus culpable under the Anti-Counterfeit law.

Energy act promulgated in 2006 contains EHS provisions for the environmentally sound management of petroleum sector. These highlighted;

1 .Section 91(1) the act requires the proponent to ensure compliance with the requirement of EMCA cap 387

2. Section 98(h) the act requires the proponent to comply with EHS standars set by ERC

3. Section 102(h)(m)(v) empowers the minister responsible for the engey to promulgate requlations for the environmentally sound management of petroleum related facilities nad infrastructure

4.8 Penal Code (Cap 63)

The Chapter on "Offences against Health and Conveniences" contained in the Penal Code strictly prohibits the release of foul air into the environment which affects health of other persons. Any person, who voluntarily violates the atmosphere at any place to make it noxious to human health in general dwellings or business premises in the neighbourhoods or those passing along public way, commits an offence.

CHAPTER 5 PUBLIC PARTICIPATION/STAKEHOLDERS CONSULTATION

Public participation is an essential and legislative requirement for environmental authorization. The firm of experts undertook the public stakeholder consultation (PSC) for the proposed project in accordance with the requirements for an EIA Study stipulated in the EMCA, cap 387 and EIA/EA Regulations 2003.

5.1 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.

5.2 Approach used in carrying out the PSC

The Firm of Expert consulted the neighbors of the Proponent. The responses from the stakeholders were captured using the public stakeholder questionares, public meeting with the local administration, community elders and members of the public. Secondly the experts collected the views from the business community.

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

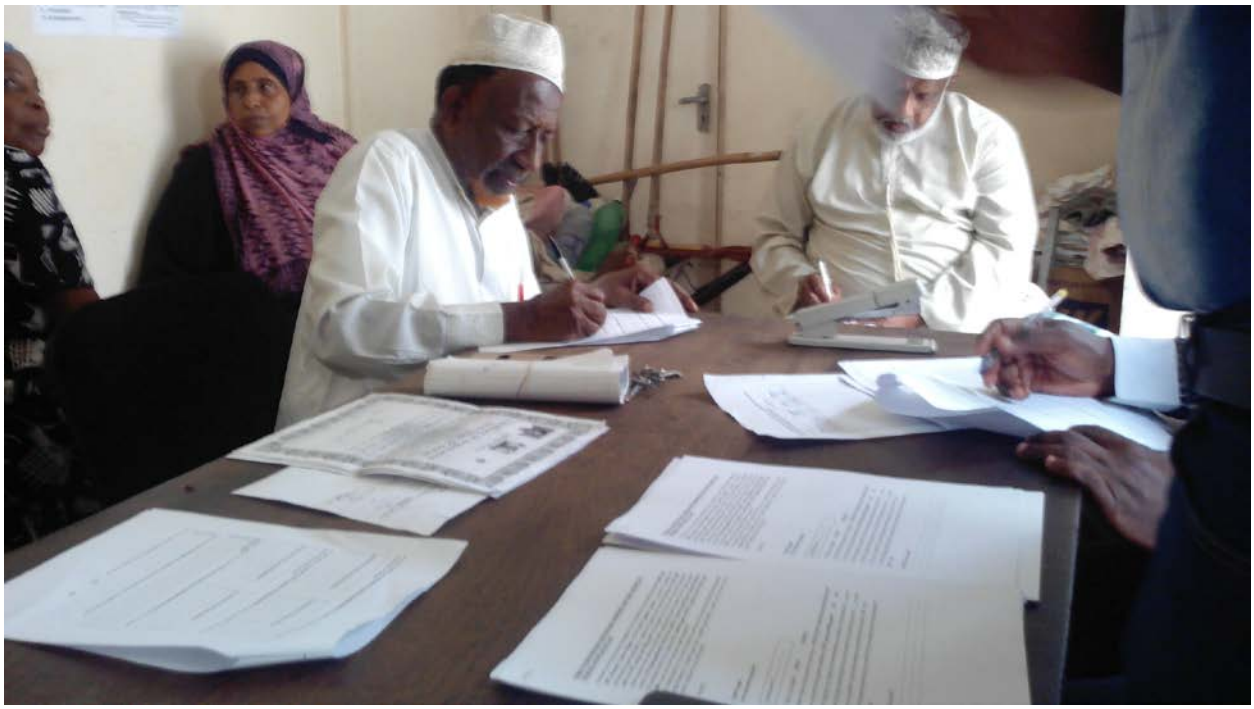
5.3 Comments and Responses from the Stakeholders

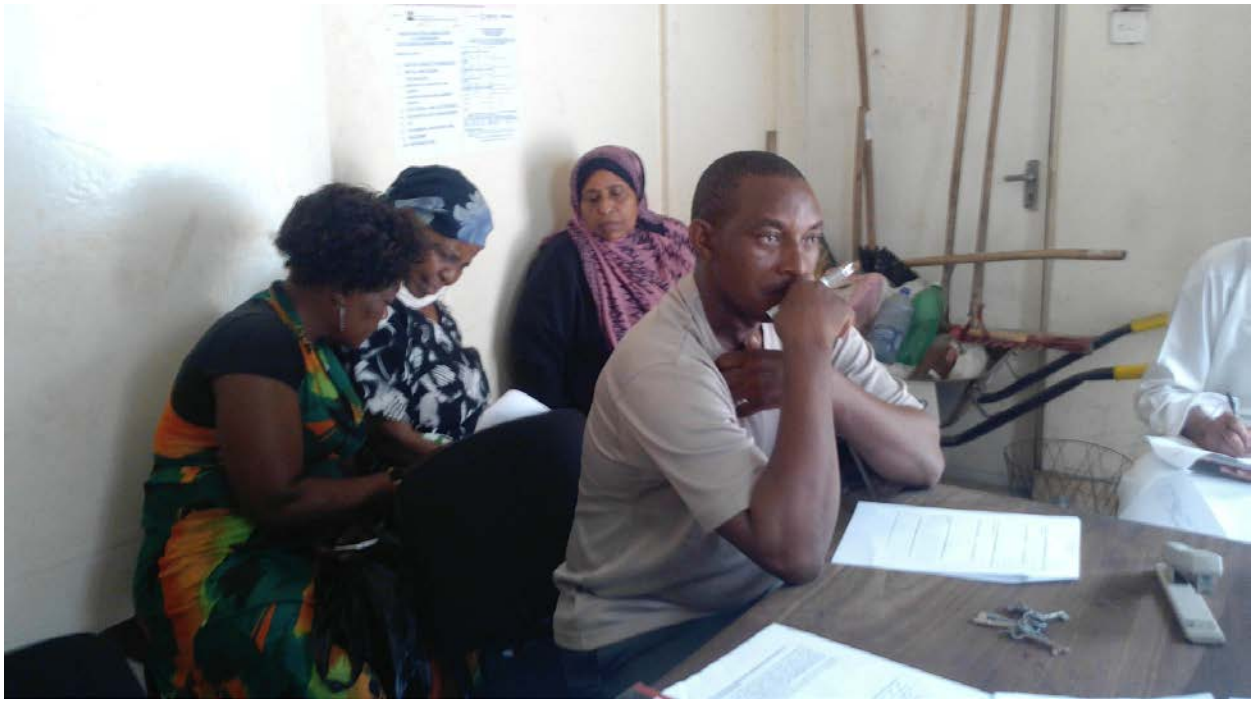
Generally, all the stakeholders consulted at the project site have no objection to the establishment of proposed projects. They observed that the proposed project will not generate any adverse environmental impacts. All approached parties signed the questionnaire and were very enthusiastic in giving their comments. They gave several reasons on why the project should start immediately, including security, creation of more employment opportunities for the youth, and the fact that gas would be available at a close range and affordable.

However, the neighbors had specific concerns such as smell of the gas, accidental leakages, fire break-outs and distance of the project work from residents. Their worries were explained to them and the measures to be taken. Moreover, the EMP provides for such impacts. They were supportive of the project to go on nevertheless, especially to increased infrastructure, more jobs and provision of more LPG gas to the community.

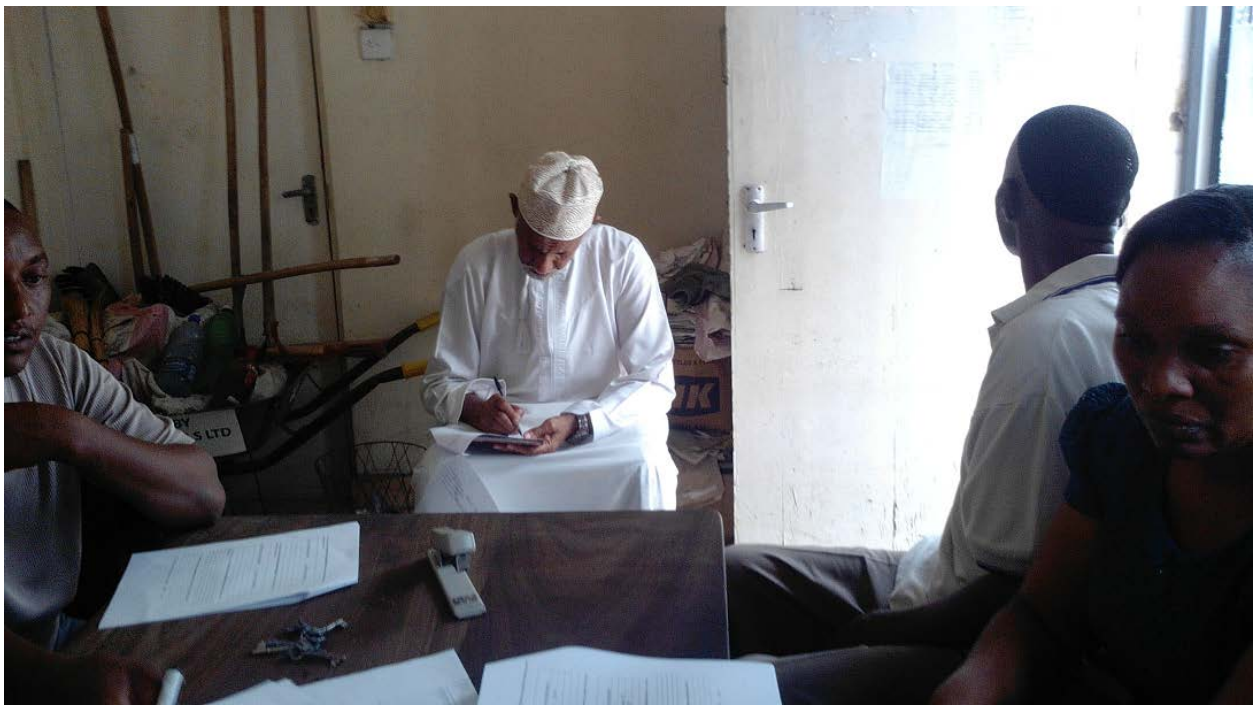
Table 2; Summary of benefits and concerns mentioned by the local community and business community

summary of Benefits of LPG plant mentioned by the local community/business community	**summary of concerns of proposed LPG plant mentioned by local community/ business community**	**Proposed mitigation measures**
Employment	Risk of fire	Inspection and certification of LPG facility by ERC and other government agencies
More LPG to the community	Risk of gas leakage	Quick LPG leak detection mechanism and avoidance
Increased growth of local infrastructure	Risk of respiratory diseases incase of LPG leakage	safety safeguards be put in place/Restricted and secured access to the facility
Increased revenue to the government in taxes		
Increased economic value for the traders and employees(local community)		





Public participation



6.0 POTENTIAL IMPACTS

Introduction

This Section identifies both positive and negative impacts associated with the proposed project. These impacts are hereby identified at three distinct phases of the project i.e. - Construction Phase, Operation Phase and Decommissioning Phase although another study should be carried out during the projects decommissioning phase.

6.1 Construction phase

6.1.1Positive Impacts

6.1.2Employment opportunities

One of the main positive impacts during projects construction phase is the availability of employment opportunities especially to casual workers and several other specialised workers. Employment opportunities are of benefit both economically and in a social sense. In the economic sense it means abundant unskilled labour will be used in construction hence economic production.

Several workers including casual labourers, masons, carpenters, joiners, electricians and plumbers are expected to work on the site from start to the end. Apart from casual labour, semi skilled and unskilled labour and formal employees are also expected to obtain gainful employment during the period of construction.

6.1.3Improving growth of the economy

Through the use of locally available materials during the construction phase of the project including cement, concrete and ceramic tiles, timber, sand, ballast electrical cables etc, the project will contribute towards growth of the economy by contributing to the gross domestic product. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of these raw materials will be payable directly to the producers.

6.1.4 Boosting of the informal sector

There are usually several informal businesses which come up during the construction periods of such projects. These include activities such as food vendors who benefit directly from the construction, staff members who buy food and other commodities from them. This will promote the informal sector in securing some temporary revenue and hence livelihood.

6.1.5Negative Impacts

6.1.6 Disposal of excavation materials

Some of the excavation material will be rendered unusable and thus will have to be disposed of. This also applies to some of the soil/rocks which may not be reusable after excavation processes are complete. All these materials needs to be collected, transported and disposed off appropriately in approved designated areas. It is encouraged that other alternative uses of these materials should be found.

6.1.7 Storm water

Storm water runoff either from the site or from the neighbouring compounds may run into the site thereby causing interference to the construction operation.

6.1.8 Noise pollution

The construction works on site will most likely have noise operation due to the moving machines (mixers, tippers, communicating workers), incoming vehicles to deliver construction materials, workers to site and other normal construction activities. This may prove to be a potential source of disturbance to the surrounding neighbours and a health hazard to the workers themselves. Such noise emissions should be minimised as much as possible from the source point while workers should be provided with appropriate personal protective wear.

6.1.9 Dust emissions

Particulate matter pollution is likely to occur during the site clearance, excavation and loading and transportation of the construction waste. There is a possibility of PM_{10} suspended and settle-able particles affecting the site workers and even neighbours health.

6.1.10 Increased water demand

Both the workers and the construction works will create an increased demand for water in addition to the existing demand. Water will be mostly used in the creation of aggregates for

construction works and for wetting surfaces for softening or hardening after creating the formworks.

6.1.11 Generation of exhaust emissions

Exhaust emissions are likely to be generated during the construction period by the various construction machinery and equipment. Motor vehicles used to mobilise the work force and materials for construction would cause a potentially significant air quality impact by emitting pollutants through gaseous exhaust emissions.

6.1.12 Building materials and energy used

Several building materials will be required for construction of the facility and associated facilities. These will include sand, ballast, hard core, timber, cement, clay tiles, metal sheets, electrical gadgets, steel, plumbing materials, glass and paints among others. Most of these materials will be obtained locally within the surrounding areas.

The main sources of energy that will be required for construction of the project will include mains electricity and fossil fuels (especially diesel). Electricity will be used for welding, metal cutting/grinding and provision of light. Diesel will run material transport vehicles and building equipment/machinery. The proponent should promote efficient use of building materials and energy through proper planning to reduce economic and environmental costs of construction activities.

6.1.13 Waste management

Large amounts of solid waste will be generated during construction of the project. These will include metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, paper bags, empty cartons, empty paint and solvent containers, broken glass among others.

Solid wastes if not well managed have a potential of causing disease outbreaks due to suitable breeding conditions for vectors of cholera and typhoid. Malaria outbreak could also be

exacerbated by the presence of open water ditches for breeding of anopheles mosquitoes. The major vulnerable groups are children who could be exposed to these conditions.

The construction workers will also generate faecal waste during their day-to-day operations. The generated waste needs proper handling to prevent diseases, for example cholera, typhoid and diarrhoea outbreak on the site. Unless this is addressed, it can prove to be an environmental/health disaster. A pit latrine(s) or mobile toilets should be established on site to avoid such health risks.

6.1.14 Increased runoff from new impervious areas

Construction of offices and paved roads could result in additional runoff through creation of impervious areas and compaction of soils. Impervious areas and compacted soils generally have higher runoff coefficients than natural area, and increased flood peaks are a common occurrence in developed areas.

6.1.15 Workers accidents and hazards during construction

During construction of the proposed project, it is expected that construction workers are likely to have accidental injuries and hazards as a result of accidental occurrences, handling hazardous waste, lack or neglect of the use of protective wear etc. All necessary health and safety guidelines should be adhered to so as to avoid such circumstances.

Workers are also likely to be exposed to diseases from contact with potentially harmful building materials. It is therefore recommended that before the construction activities, there is need for the materials to be well inspected and harmonised to the occupational health and safety standards.

6.2 Operation phase

6.2.1 Positive Impacts

6.2.1.1 Increased LPG in the coast region

The proposed LPG storage and bottling plant by the proponent is one of major milestone of development when it begins its operations. The benefits associated with putting up the project will include: Employment creation, individual investments, improved trade between the

developer and entire partners, gains in local and national economy, available and affordable gas among other benefits

6.2.1.2 Employment opportunities

Employment opportunities are one of the long term impacts of the project that will be realised after construction and during the operation and maintenance of the facility. These will involve other sources of employment such as direct service provision to the domestic sector e.g. traders, office operators, engineers, security personnel etc.

6.2.1.3 Improvement infrasturcure

Economic growth of the the sub-county and the county in general.

6.2.1.4 Optimal use of land

Optimal use of the available land by providing an LPG and filling plant at comarco supply base, Ganjoni. Industrial Land is a scarce resource in Kenya and through construction of the proposed project will ensure optimal use of land.

6.2.1.5 Incorporation of collective waste management

The project is designed such that there will be provision of a designated spot for the dumping of garbage which is well protected from rain and animals. This wastes will thus be collected from the site in bulk and as one unit such that the careless disposal and hence proliferation of wastes within the surrounding areas will be curbed

6.2.1.6 Increase in revenue

There will be positive gain for the revenue system arising from the tax being paid by the proponent to the government and other lead agencies.

6.3 Negative Impacts

6.3.2.0 Increased pressure on infrastructure

The project will lead to increased pressure on existing infrastructure such as roads, service lines etc due to the increased number of people who will be using these facilities which will directly translate into increase in volume of the relevant parameter.

6.3.2 .1 Electricity consumption

Upon completion, the project shall consume large amount of electricity due to the number of units being proposed and the activities that will take place once the project is complete. Since electric energy in Kenya is generated mainly through natural resources, namely water and geothermal resources, increased use of electricity have adverse impacts on these natural resources base and their sustainability.

6.3.2.3 LPG storage and filling plant solid waste

A lot of waste such as waste from foodstuffs, empty plastic containers, cartons, papers etc will be generated during the operational phase of the project. Once the proposed project is complete and operational, they are expected to generate a large amount of solid waste on a daily basis whose composition will be dominated by organic waste.

6.3.2.4 Leakage of gas and air pollution

Leakage of LPG can cause serious health risk to humans.

6.3.2.4 Fire risk

Leakage of gas and fire can cause explosions and destruction of property and life

6.3.2.5 Accidents

Accidents can occur due to increased traffic of lorries bringing in LPG and customers buying LPG from the filling plant.

6.4 Decommissioning phase

6.4.1Positive impacts

Rehabilitation

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

Employment Opportunities

For demolition to take place properly and in good time, several people will be involved. As a result several employment opportunities will be created for the demolition staff during the demolition phase of the proposed project.

6.5 Negative Impacts

6.5.1 Noise and Vibration

The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. This will be as a result of the noise and vibration that will be experienced as a result of demolishing the proposed project.

6.5.2 Solid Waste Generation

Demolition of the offices and other related infrastructure will result in large quantities of solid waste. The waste will contain the materials used in construction including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia which may be released as a result of leaching of demolition waste, are known to lead to degradation of groundwater quality.

6.5.3 Dust

Large quantities of dust will be generated during demolition works. This will affect demolition staff as well as the neighbouring residents.

CHAPTER 7: PROPOSED MITIGATION MEASURES

7.0Introduction

This section highlights the necessary mitigation measures for the expected negative impacts of the proposed project. The potential impacts and the possible mitigation measures have herein been analyzed under three categories. These are Construction phase, Operation phase and Decommissioning Phase. References are made as to where decommissioning mitigation measures can be sought.

7.1Construction related impacts

7.1.2Construction waste

It is recommended that construction waste be recycled or reused to ensure that materials that would otherwise be disposed of as waste are diverted for productive uses. In this regard, the proponent is committed to ensuring that construction materials left over at the end of construction will be used in other projects rather than being disposed of. In addition, damaged or wasted construction materials including cabinets, doors, plumbing and lighting fixtures, marbles and glass will be recovered for refurbishing and use in other projects. Such measures will involve the sale or donation of such recyclable/reusable materials to construction companies, local community groups, institutions and individual residents or home owners.

The proponent shall put in place measures to ensure that construction materials requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is kept minimal.

It is further recommended that the proponent should consider the use of recycled or refurbished construction materials. Purchasing and using once-used or recovered construction materials will lead to financial savings and reduction of the amount of construction debris disposed of as waste.

Additional recommendations for minimization of solid waste during construction of the project include:-

i. 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.

ii. Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements.

iii. Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste

iv. Use of construction materials containing recycled content where possible and in accordance with accepted standards.

7.1.3 Hydrology and water quality degradation

Several measures shall be put in place to mitigate the impacts that are likely to lead to surface and groundwater quality degradation. The proponent will prepare a hazardous substance control systems and emergency response plans that will include preparations for quick and safe clean up of accidental spills. It will prescribe hazardous-materials handling procedures to reduce the potential for a spill during construction, and will include an emergency response programme to ensure quick and safe cleanup of accidental spills. The plan will identify areas where refuelling and vehicle maintenance activities and storage of hazardous materials, if any, will be permitted.

7.1.4 Increased runoff

Increased runoff from paved grounds and expansive roofs causing extreme flooding and overflows of drainage systems shall be mitigated. Surface runoff and roof water shall be harvested and stored in underground reservoir for reuse or shall be directly channelled into storm water drains. 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 structures will be designed.

7.1.5 Noise pollution

Significance of noise impacts depends on whether the project would increase noise levels above the existing ambient levels by introducing new sources of noise. Noise impacts would be considered significant if the project would result in the following:-

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The proponents shall put in place several measures that will mitigate noise pollution arising during the construction phase. The following noise-suppression techniques will be employed to minimise the impact of temporary construction noise at the project site.

- Install portable barriers to shield compressors and other small stationary equipment where necessary.
- Use quiet equipment (i.e. equipment designed with noise control elements).
- Co-ordinate with relevant agencies regarding all substation construction activities in the residential areas.
- Install sound barriers for pile driving activity.
- Limit pickup trucks and other small equipment to an idling time of five minutes, observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.

7.1.6 Air quality

Controlling dust during construction is useful in minimizing nuisance conditions and consequently health (respiratory and eye) complications. It is recommended that a standard set of feasible dust control measures be implemented for all construction activities. Emissions of other contaminants (Nitrogen oxides, Carbon dioxide, Sulphur oxides, and diesel related Particulate Matter PM_{10}) that would occur in the exhaust from heavy equipment are also included.

The proponent is committed to implementing measures that shall reduce air quality impacts associated with construction. All personnel working on the project will be trained on methods for minimizing air quality impacts during construction. This means that construction workers will be trained regarding the minimization of emissions during construction. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles. Construction vehicles drivers will be under strict instructions to minimize unnecessary trips, refill petrol fuel tanks in the afternoon, and minimize idling of engines.

Dust emissions will be controlled by the following measures:

- Watering all active construction areas when necessary.
- Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites.

7.1.7 Generation of exhaust emission

In order to control exhaust emissions the following measures shall be implemented during construction

- Vehicle idling time shall be minimized
- Alternatively fuelled construction equipment shall be used where feasible
- Equipment shall be properly tuned and maintained

7.1.8 Worker accidents and hazards when handling hazardous wastes

Necessary health and safety rules shall be enforced by the site foreman to ensure that all staff members adhere to these standards and are thus safe. Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated areas shall be provided. In addition covers for refuse containers and appropriate personal protective equipments to be used by workers shall also be provided by the proponent.

Workers accidents especially in deep trenching operations and from gas accumulation in septic and other confined spaces shall be mitigated by enforcing adherence to safety procedures and preparing contingency plan for accident response in addition safety education and training shall be emphasized.

7.1.9 Populations of disease vectors

Well designed waste management system and storm water drainage systems have to be put in place so as to ensure that breeding grounds of disease carrying vectors such as rats, flies, mosquitoes, cockroaches etc are effectively controlled. Complete waste collection and handling service will be provided by the proponent.

7.1.10 Possible exposure of workers to diseases

Possible exposure of workers to diseases from building materials at construction site shall be mitigated by occupational health and safety standards enforcement which encompasses the inspection of such raw materials to ensure required standards are met.

7.1.11 Controlling oil spills during construction phase

The proponent will control the dangers of oil spills during construction by maintaining the machinery in specific areas designed for this purpose hence might not be a serious impact as a result of the construction.

7.2 Operation Phase Impacts

7.2.1Ensuring efficient solid waste management

The proponent will be responsible for efficient management of solid waste generated by the project during its operation. In this regard, the proponent will provide waste handling facilities such as waste bins and skips for temporarily holding domestic waste generated at the site. In addition, the proponent will ensure that they are disposed of regularly and appropriately. It is recommended that the proponent puts in place measures to ensure that the

workers of the school manage their waste efficiently through recycling, reuse and proper disposal procedures.

7.2.2Ensure efficient energy consumption

The proponent shall plan and install an energy-efficient lighting system at the facility. This will contribute immensely to energy conservation during the operational phase of the project. In addition, pupil teachers and other workers of the school will be sensitised to ensure energy efficiency in their daily operations. To complement these measures, it will be important to monitor energy use during the operation phase.

7.2.3Ensure efficient water use

The proponent will install water-conserving automatic taps and toilets. Moreover, any water leaks through damaged pipes and faulty taps will be fixed promptly by qualified staff/technician.

7.2.4 Personal protection equipment and safety

The proponent will provide all employees PPEs Based on PPE evaluation. In addition, continuous awareness creation for employees by the proponent on health and safety matters.

The proponent will provide PPEs to all employees

7.2.5 Emergency response plan / fire fighting system

1. The proponent will develop and implement a sound emergency response plan. It will commence with a complete fire safety systems adequate enough for the envisaged worst case scenario.
2. The fire fighting system will comprise of a clear design plan and the fire extinguishers will be serviced accordingly and regularly.
3. The emergency shutdown (ESDs) will be installed in strategic locations to enable quick power cut off from the operations in case of an emergency.
4. An adequate stocked first aid kits boxes will be provided for and the employees will be properly trained on how to administer first aid.

7.3 Decommissioning Phase Impacts

Decommissioning refers to the final disposal of the project and associated materials at the expiry of the project life span. Efficient solid waste management will be employed by the proponent in demolishing the site and remediating the soil.

Solid waste resulting from demolition or dismantling works will be managed as described above

7.3.1Reduction of dust concentration and solid waste

High levels of dust concentration resulting from demolition or dismantling works will be minimized as described above. The decommissioning contractor will put in place inefficient and effective waste disposal systems. Excavated soil and debris will be properly disposed of by backfilling or dumping in grounds approved by the Mombasa county council.

7.3.2Minimization of noise and vibration

Significant impacts on the acoustic environment will be mitigated as already described above.

7.3.4 Safety and capacity building of workers

Capacity voiding of the workers and staff involved in the decommissioning exercise will be done to create awareness towards potential risks and recommended incident/accident preventive measures. This will ensure safety process.

7.3.5 Site Restoration

The proponent in consultation with NEMA will remediate the resultant soil and the whole site as a whole to the initial status

Chapter 8; Analysis of Project Alternatives

This section analyses the project alternatives in terms of technology scale and waste management options.

8.1 No Project alternative

The No Project Alternative option in respect to the proposed project implies that things remain unchanged. The environment therefore won't be tampered with. Under the No Project Alternative, the proponent's proposal would not receive the necessary approval from NEMA. The proposed project would not be constructed and there would be no demand for such an LPG storage and filling project. This option will however, involve several losses both to the landowner and the community as a whole. The certificate of lease holder will continue to pay rates on the land while the property remains idle. The No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- The economic status of Kenyans and the local people would remain unchanged.
- The local skills would remain under utilized.
- No employment opportunities will be created for Kenyans who will work in the project area.
- Increased urban poverty and crime in Kenya.
- Discouragement for investors willing to install LPG storage and filling plants
- Development of infrastructural facilities (roads, electrical etc. will not be undertaken).

In addition the anticipated insignificant environmental impacts resulting from construction, and occupation of the school scheme, as proposed, would not occur. From the analysis above, it becomes apparent that the No Project alternative is no alternative to the local people, investors, Kenyans, and the government of Kenya.

8.2 The proposed development alternative

Under the proposed development alternative, the developers of the proposed project would be issued with an EIA License. In issuing the license, NEMA would approve the proponent's proposed development of the LPG storage and Filling Plant, provided all environmental measures are complied with during the construction period and occupation phases. This

alternative consists of the applicant's final proposal with the inclusion of the NEMA regulations and procedures as stipulated in the environmental impacts to the maximum extent practicable.

8.3 Alternative design and technology

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors. The architects, surveyors, engineers and environmental experts involved in the projects have vast experience in the LPG regulations and standards for both local and international and they settled for the best as a way of fostering best practice within the industry.

From the analysis, it becomes apparent that all the available alternatives are not viable hence inappropriate for this project.

Aerial view of the proposed project site

Proposed site

CHAPTER 9 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

This section presents the environmental management plan (EMP) for the proposed LPG storage and filling 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.

9.1 Approach to environmental impact management

The proposed EMP will be the responsibility of the Health Safety Environment department of the Limited; however, it will have links with other departments such as operation and maintenance. Table 9 presents the range of approaches that will be used to manage potential impacts of the proposed project.

Table 3: Approach used to Manage Potential Impacts

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
Rehabilitation	Repairing affected resources
Restoration	Restoring affected resources to an earlier (possibly more stable andproductive) state, typically'background or pristine' condition

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

1. Planning.
2. Design implementation (covering the construction and operation phases)
3. Checking and corrective action
4. Management review

9.2 Responsibility and Accountability

9.2.1 Environmental Management Structure

The Proponent 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 proponent will develop proposed organizational structure for the proposed Project, showing the reporting lines of staff to be involved in environmental management of the project. The Project Manager will take responsibility for 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 plant Manager. The two managers, QEHS Manager, HSE will be responsible in implementation of the EMP.

Functions of The environmental, health and safety management of the project will be the responsibility of the Health, Safety and Environment (HSE) Manager who reports directly to the chief Operations Manager. The HSE Manager will be supported by EHS Executive.
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 4: Functions of Staff in implementation of EMP

Position	Responsibility
Engineering Manager	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.
QHSE Manager	Develop policies and procedures on the environmental, social, health and safety issues oversee implementation of the EMP Review and analysis of monitoring results and preparation of short reports to Project Manager Planning of training programs for personnel in accordance with relevant laws e.g. OSHA 2007

	oversee inspection of the constructed facilities after completion of construction works

Table 5 Proposed organization structure responsibilities

HSE Manager	Overseeing annual environmental, health and safety and fire audits
HSE Executive	Preparation of environmental monitoring reporting and any permit applications 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 Registred&licensed EIA/EA Expert	Periodically commissioned to undertake statutory environmental audits 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 storage and filling plant
DOSHS Approved Fire auditors	Carry out statutory Fire safety audit of the LPG storage and filling plant

9.2.2 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:

1. Contractors will have certain key environmental line functions included in their job descriptions and performance criteria. Critical among these is the Construction Manager.
2. The Construction Manager will be accountable for environmental (including social) management during the construction phase.
3. Specific responsibilities for the Construction Manager will include Regular performance reviews and undertake corrective and/or remedial action where this may be required. Regular (at least monthly) liaison between the Construction Manager, the Project Manager and the HSE Manager and his/her team must be carried out. At the commencement of the construction phase, weekly meetings should occur.
4. Meetings should review implementation of EMP requirements, highlight issues of concern, identify required interventions and prescribe corrective actions and schedule, and allocate budget and appoint responsible parties. The plant Manager should receive minutes of meetings and should be invited to attend meetings at least once in a month.
5. A code of practice for construction teams will be prepared and implemented. This code Will guide the management and behaviour of construction teams. The code will include items relating to health safety and community relations.
6. Information on the implications of construction will be disseminated before construction

Starts. Contracts will be key tools in managing many potential negative impacts such as transport related incidents. They will specify required environmental and social practices.

9.2.3 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.

9.2.4 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:

(1)Internal environmental, health and safety inspections will be carried out once every week by EHS Executive;

(II) 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

(III)EHS Manager, will arrange for initial and subsequent environmental audits and will provide relevant information required by relevant authorities including NEMA. The audit will be carried out in accordance with EMCA, CAP 387 and its subsidiary legislation, EIA/EA Regulations, 2003. Any negative findings arising from the audits will be addressed accordingly.

9.2.5 Incident handling and Reporting

An incident can arise from the following:

(I) Significant non-conformance with the EMP identified during an internal inspection

(II) Any non-conformance identified by either the authorities or an external audit

(III)Accidents or spills resulting in potential or actual environmental harm

(IV)Accidents or near misses that did or could result in injury to staff, visitors to site or the surrounding communities

(V) 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.

9.2.6 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:

(I) Monitoring selected environmental quality variables as defined in the objectives and targets.

(II) Ongoing inspections of the operational controls and general state of the operations.

(III) Internal audits to assess the robustness of the EMP or to focus on a particular performance issue.

(IV) External audits to provide independent verification of the efficacy of the EMP.

9.2.7 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).

9.2.8 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.

9.2.9 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.

9.2.10 Liaison

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

9.3 Overview of the Proposed Project

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

9.3.1 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:

(I)Identifying and defining the various environmental aspects and related potential positive and negative impacts that can result from the company's activities.

(II) Establishing a procedure to identify legal and other requirements to which the organisation is subject

(III) Identifying and defining appropriate mitigation and management measures, including those reinforcing positive impacts.

(IV) Establishing and maintaining documented, scheduled environmental objectives and targets at each relevant function and level within the organisation.

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

The proposed project will comprise 1100 cubic metres of LPG storage and filling plant. Detail description of the project is provided in Chapter 2 of this report.

9.3.2 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.

9.4 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.

9.4.1 Impacts and mitigation/ management measures

Table 4 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 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 provides a schedule for the implementation of management/mitigationactivities, 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.

9.4.2 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:

(1)Personnel and contractor management

(2) conduct and site management

(3) land owner relations

(4)Maintenance of complaints register

(5) Emergency preparedness; and

(6) 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.

9.4.3 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:

(I) 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.

(2) 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.

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9.5 Impacts and mitigation/ management measures

Table 4 presents the EMP for the proposed project. It covers on the proposed management and mitigation measures for the identified impacts. This information presented addresses the dual objective of the EMP, namely to fully disclose the commitments to be undertaken by the Proponent to provide managers and staff with a clear framework for EMP implementation.

In addition, the EMP provides 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.

Table 6 Summary of negative impacts and their mitigation measures

Possible impact	Mitigation
High demand for raw materials	Source from local suppliers, accurate budgeting
Fire Safety	Train all workers in Fire safety procedures Installation OF ESDs devices Carry out fireworks off site Install adequate fire fighting equipment and ensure regular maintenance
Vegetation disturbance	Only cut trees within the exact area of development
Dust emission	Avoid excavation in extremely dry weather
Generation of oil spillage and gas leakages.	Liase with licensed waste oil handlers and carry out regular waste water analysis. Regular monitoring and inspection of fuel tanks and gas storage vessels
High water demand	Install water conservation pipes, sensitize staff to conserve water
Environmental concern during the construction phase	Proponent will liaise with the environmental consultants throughout the construction phase
Workers accidents& hazards	Workers to put on PPEs and regular awareness creation
Increased Run-off	contsruction of sediment traps to detain water , vegetation buffers, silt fences and sediment logs
Generation of Exhaust emissions	Minimise idlling of engines and making unnesesary trips
Increased water Demand	storage of water.
Noise Pollution	substituting equipment with quieter ones,fitting equipment damping materials,mufflers,erecting barriers and enclosures
Dust emmission	Sprinkle water regulary on affected areas
Disposal of Excavated solid waste	Proponent to use only NEMA approved and Mmbasa county coucil approved dumping areas.
Increased use of Building materials	Proponent to source building materials from NEMA approved quarries

Table 7: Environmental management plan during construction phase

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh.)
1. Minimize extraction site impacts and ensure efficient use of raw materials in construction				
High Demand of Raw material	**1.** Source building materials from local suppliers who use environmentally friendly processes in their operations.	Proponent & Contractor/engineer	Throughout construction period	20000
	2. Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered.	Proponent & Contractor/engineer	Throughout construction period	50000
	3. Ensure that damage or loss of materials at the construction site is kept minimal through proper storage.	Proponent & Contractor/engineer	Throughout construction period	50000
	4. Use at least 5%-10% recycled, refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills	Proponent & Contractor	Throughout construction period	35000
2. Reduce storm-water, runoff and soil erosion				
Increased storm water, runoff and soil erosion	**1.** Surface runoff and roof water shall be harvested and stored for reuse.	Engineer/Proponent/QHSE/NEMA expert/contractor	3 months	35,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh.)
	2. 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	3 month	
3. Minimize solid waste generation and ensure efficient solid waste management during construction				
Increased solid waste generation	**1.** Use of an integrated solid waste management system i.e. through a hierarchy of options: 1. Source reduction 2. Recycling 3.Composting and reuse 4. Combustion 5. Sanitary land filling.	Engineer/Proponent/QHSE/NEMA expert	Throughout construction period	3,500
	2. 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.	Engineer/Proponent/construction manager/project manager	One-off	0
	3. Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of.	Engineer/Proponent/construction manager/project manager	One-off	18000
	4. 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	Engineer/Proponent/construction manager/project manager	One-off	1,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh.)
	5. Donate recyclable/reusable or residual materials to local community groups, institutions	Proponent	One-off	0
	6. 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	Proponent & Contractor	Throughout construction period	2000
	7.Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements	Proponent & Contractor	One-off	3,000
	8. Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste	Proponent & Contractor	Throughout construction period	0
4. Reduce dust emissions				
Dust emission	**1.** Ensure strict enforcement of on-site speed limit regulations	Engineer/construction manager/QHSE	Throughout construction period	0
	2. Avoid excavation works in extremely dry weathers	Contractor/ Engineer/construction manager/QHSE	Throughout construction period	15,000 per month
	3. Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles	Engineer/construction manager/QHSE	Throughout construction period	

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh.)
	4. Personal Protective equipment to be worn	Proponent	Throughout construction period	
	5.construction materials on site to be covered to prevent to be blown off by wind	Contractor	Throughout construction period	
5. Minimization of exhaust emissions				
Exhaust emission	**1.** Vehicle idling time shall be minimised	Proponent & Contractor	Throughout construction period	0
	2. Alternatively fuelled construction equipment shall be used where feasible equipment shall be properly tuned and maintained	Proponent & Contractor	Throughout construction period	0
	3. Sensitise 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	Engineer/construction manager/QHSE/	Throughout construction period	0
6. Minimization of Noise and Vibration				
Noise and vibration	**1.** Sensitise construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used.	Proponent & Contractor/ Engineer/construction manager/QHSE	Throughout construction period	0

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh.)
	2. Sensitise 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	Proponent & Contractor/ Engineer/construction manager/QHSE	Throughout construction period	0
	3. Ensure that construction machinery are kept in good condition to reduce noise generation	Proponent & Contractor	Throughout construction period	12,500
	4. Ensure that all generators and heavy duty equipment are insulated or placed in enclosures to minimize ambient noise levels.	Proponent & Contractor	Throughout construction period	1,000
	5. The noisy construction works will entirely be planned to be during day time when most of the neighbours will be at work.	Proponent & all site foreman	Throughout construction period	1000
7. Minimization of Energy Consumption				
Increased energy consumption	**1.**Ensure electrical equipment, appliances and lights are switched off when not being used	Proponent & Contractor	Throughout construction period	11,000
	2. Install energy saving fluorescent tubes at all lighting points instead of bulbs which consume higher electric energy	Proponent & Contractor	Throughout construction period	22,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh.)
8. Minimize water consumption and ensure more efficient and safe water use				
High Water Demand	1. Promptly detect and repair of water pipe and tank leaks	Proponent	Continuous	1,000/month
	2. Ensure taps are not running when not in use	Proponent	Continuous	500/month
	3. Install a discharge meter at water outlets to determine and monitor total water usage	Proponent/construction manager	One-off	1,000
	4.proper recycling of water from other uses for sprinkling dusty pavements	Contractor/ construction manager	Continuous	0
9. Minimize occupational health and safety risks				
	▪ 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/QHSE manager	Continuous	20,000
	▪ Construction of a perimeter wall around the project area	Contractor/Engineer/construction manager	On commencement	50,000
Personal Protective Gear (P.P.E)	• Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc should be made available and construction personnel must be trained to use the equipment	Proponent & Contractor/QHSE manager	Once off	20,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh.)
Health and safety impacts	• Implement all necessary measures to ensure health and safety of workers and the general public during operation of the housing project as stipulated in OSHA, 2007	Proponent & Contractor/QHSE manager	Continuous	-
First Aid	• Well stocked first aid box which is easily available and accessible should be provided within the premises	Proponent & Contractor	One-off	5,000
	• Provision must be made for persons to be trained in first aid, with a certificate issued by a recognised body.	Proponent & Contractor	One-off	10,000
Fire protection	• Fire fighting equipment such as fire extinguishers should be provided at strategic locations such as stores and construction areas.	Proponent & Contractor	One-off	20,000
	• Regular inspection and servicing of the equipment must be undertaken by a reputable service provider and records of such inspections maintained	Proponent & Contractor/ Proponent & /QHSE manager/fire&safety expert	Every 3 months	10,000
	• Fire escape routes and assembly point to be marked	Proponent & Contractor/ Proponent & /QHSE manager/fire&safety expert	Continuous	15, 000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh.)
	• Signs such as “NO SMOKING” must be prominently displayed within the premises, especially in parts where inflammable materials are stored	Proponent & Contractor	One-off	12,000

9.5.1Operational Phase EMP

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the operational phase

Table 8: Environmental Management Plan for the operation phase

Expected Negative impact	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh.)
1. Minimization of solid waste generation and ensuring more efficient solid waste management				
Solid waste generation	1. Provide solid waste handling facilities such as waste bins and skips	Proponent/Dry Docks LTD Management	One-off	10,000
	2. Ensure that solid waste generated at the offices and LPG plant is regularly disposed of appropriately at authorised dumping sites	Proponent/Dry Docks LTD Management	Continuous	13,000/month

Expected Negative impact	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh.)
	3. Ensure that staff at DRY docks logistic ltd manages their waste efficiently through recycling, reuse and proper disposal procedures.	Proponent/Dry Docks LTD Management	Continuous	–
	3. Donate redundant but furniture to charities and institutions	Proponent/Dry Docks LTD Management	Continuous	0
2. Minimise risks of sewage release into environment				
Sewage disposal	1connect the premises to sewer line	Proponent & Contractor	One-off	300,000
	2. Conduct regular inspections for drainage pipe blockages or damages and fix appropriately	Proponent & Contractor, Dry Docks logistics management	Continuous	500 per inspection
	3. 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/ , Dry Docks logistics management	Continuous	500/parameter
3. Minimize energy consumption				
Energy Resource Utilisation	1. Switch off electrical equipment, appliances and lights when not being used	Proponent, Dry Docks logistics management	Continuous	–

Expected Negative impact	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh.)
	2. Install occupation sensing lighting at various locations such as storage areas which are not in use all the time	Proponent, Dry Docks logistics management	One-off	10-40 % higher than ordinary lighting
	3. Install energy saving fluorescent tubes at all lighting points within the facility instead of bulbs which consume higher electric energy	Proponent/ , Dry Docks logistics management	One-off	10-40 % higher than ordinary lighting
	4. Monitor energy use during the operation of the project and set targets for efficient energy use	Proponent/ , Dry Docks logistics management	Continuous	7,000/month
	5. Sensitise occupants to use energy efficiently	Proponent/ , Dry Docks logistics management	Continuous	5000
4. Minimize water consumption and ensure more efficient and safe water use				
Water consumption	1. Promptly detect and repair water pipe and tank leaks	Proponent/ , Dry Docks logistics management	Continuous	10,000/month
	2. Users to conserve water e.g. by avoiding unnecessary toilet flushing.	Proponent/ , Dry Docks logistics management	Continuous	5000/month
	3. Ensure taps are not running when not in use	Proponent, Dry Docks logistics management	Continuous	5000/month
	4. Install water conserving taps that turn-off automatically when water is not being used	Proponent/ , Dry Docks logistics management	One-off	10-40 % higher than ordinary taps

Expected Negative impact	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh.)
	5. Install a discharge meter at water outlets to determine and monitor total water usage	Proponent/ , Dry Docks logistics management	One-off	12,000
5Fire risks, minimization, health and safety				
1. 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 fire safety procedures, install ESD at strategic point of the LPG plant		Proponent, Dry Docks logistics management/Fire and safety auditor	Continuous	–
6. Gas leakage and oil spillage risks				
1. Ensure regular monitoring of LPG tanks, install leakage detectos, 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, Dry Docks logistics management	Continuous	10,000/month

9.5.2Decommissioning Phase EMP

1. Minimize solid waste generation and ensure efficient solid waste management during decommissioning				
	8. used building materials and other waste from decommissioning must be transported and dumped in NEMA licensed carriers and Mombasa county council approved sites	Proponent & Contractor	Throughout the decommissioning period	45000
2. Reduce dust emissions				
Dust emission	**1.** Ensure strict enforcement of on-site speed limit regulations	Engineer/QHSE	Throughout the decommissioning period	0
	2. Avoid demolisions works in extremely dry weathers	Contractor/ Engineer//QHSE	Throughout the decommissioning period	15,000 per month
	3. Sprinkle water on graded access routes when necessary to reduce dust generation by machines	Engineer/QHSE	Throughout the decommissioning period	

	4. Personal Protective equipment to be worn	Proponent	Throughout the decommissioning period	
	5 demolished materials on site to be covered to prevent to be blown off by wind	Contractor	Throughout the decommissioning period	
3. Minimization of exhaust emissions				
Exhaust emission	**1.** Vehicle idling time shall be minimised	Proponent & Contractor	Throughout the decommissioning period	0
	2. Alternatively fuelled construction equipment shall be used where feasible equipment shall be properly tuned and maintained	Proponent & Contractor	Throughout the decommissioning period	0
	3. Sensitise 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, using mufflers	Engineer/construction manager/QHSE/	Throughout the decommissioning period	0
4. Minimization of Noise and Vibration				
Noise and vibration	**1.** Sensitise machinery drivers and machinery operators to switch off engines of vehicles or machinery not being used.	Proponent & Contractor/ Engineer/construction manager/QHSE	Throughout the decommissioning period	0
5. Rehabilitation of project site				

1. Implement an appropriate revegetation programme to restore the site to its original status	Contractor, Proponent	One-off	
2. Consider use of indigenous plant species in revegetation	Contractor, Proponent	One-off	
3. Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent area and the development.	Contractor, Proponent	Once-off	

10.0 CHAPTER TEN: CONCLUSION AND RECOMMENDATIONS

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

(a) The proposed installation of LPG tank has the support of the stakeholders,

(b) The project will be designed, constructed, and operated according to the acceptable industry norms and standards

(c) 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.

(d) The proposed project will generate socio-economic benefits which would not be realized if the no development of option is considered. Positive implications of the project emanate from its potential to provide employment opportunities, increase availability of cooking gas, and conservation of forests. It's thus our opinion that NEMA does consider approving the proposed project subject to adherence of the proposed EMP.

References

1. Government of Kenya: The Environment Management and Coordination Act 1999

2. Government of Kenya: The Environment (Impact Assessment and Audit) Regulations 2003

3. Government of Kenya: The Physical Planning Act 1996

4. Government of Kenya: Occupational Safety and Health Act,2007

5. Government of Kenya: Factories and Other Places of Work (Safety and Health Committee) Rules 2004

6. Government of Kenya: Factories and Other Places of Work (Medical Examination) Rules 2005

7. Government of Kenya: Water Quality Regulations, 2006

8. Government of Kenya: Waste Management Regulations, 2006

9. Government of Kenya: The Occupational Safety and Health Act, 2007

10. Government of Kenya: The Safety and Health Committee Rules 2004

11. Government of Kenya: Medical Examination Rules 2005

12. Government of Kenya: Noise Prevention and Control Rules 2005

13. Government of Kenya: Fire Risk Reduction Rules, 2007

14. Government of Kenya: Hazardous Substances Rules, 2007

15. Government of Kenya: Embakasi District Development Plan, 2008-2011.

16. Government of Kenya: Factories and Other Places of Work (Noise Prevention and Control) Rules 2005

17. British Standard (BS) 8233:1999: Sound Insulation and Noise Reduction for Buildings

18. British Standard (BS) 5228 Part 1, 1997: Noise and Vibration Control on Construction and Open Sites

19. 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

APPENDICES

Appendix 1: Copy of Certificate of Incorporation

Appendix 2: Copies of Land documents (certificate of lease and land lease documents)

Appendix 3: Copy of Architectural Plans

Appendix 5: Signed stakeholders consultation forms (Questionnaires, meeting minutes and attendance list)

Appendix 6: Copy of NEMA expert's licenses

Appendix 7: Copy of the Project report in a compact disk