FOSSIL SUPPLIES LTD.

ENVIRONMENTAL SOCIAL IMPACT ASSESSMENT (ESIA) REPORT

FOR THE PROPOSED CONSTRUCTION OF LPG COMMON USER FACILITY BY FOSSIL SUPPLIES LIMITED AT CHANGAMWE, MOMBASA COUNTY



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The experts are grateful to Fossil Supplies Limited (FSL) herein referred to as the proponent for the opportunity offered to carry out this assessment study for the Proposed Liquefied Petroleum Gas Facility in accordance with Section 58 of the Environmental Management and Co-ordination Act (EMCA) Cap 387 and Legal Notice No.8. We are also very grateful for the support accorded during the field and site reconnaissance, timely availing of the necessary required resources on the project which were important for the conclusion of this study process. We also appreciate the project neighboring residents who participated in the entire study process through filling of set questionnaires, interviews, and discussions based on the study objectives, and who volunteered the necessary information. We also wish to thank all the stakeholders including National and County officials who participated in the Public Participation forums. Finally, we thank the staff from Fossil Supplies Limited who participated in the study process that enabled us carry out this exercise successfully.

CERTIFICATION

This Environmental and Social Impact Assessment study report has been prepared with the authority from the proponent for presentation to the National Environment Management Authority (NEMA) in accordance with legal requirements stipulated in the Environmental Management and Coordination Act (EMCA Cap 387). All the information in this report is true and accurate to the best of our knowledge.

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EXECUTIVE SUMMARY

Fossil Supplies Limited, herein referred to as the proponent, proposes to construct a Liquefied Petroleum Gas (LPG) Common User Facility located on coordinates **Latitude 4° 0' 39.58092" S and Longitude 39° 37' 0.4926" E** within Changamwe in Mombasa County on a leased Kenya Railways Corporation (KRC) land. The proposed site is approximately 3.5 acres. The site is located at approximately 4 Km North of the Port of Mombasa and about 3 Km from the hub of Moi International Airport, Mombasa. The area hosts other oil terminals such as KPC Depot and Kenya Petroleum Refineries Limited (KPRL). Abutting the plot to the North East is Transpares Limited, to the West is APM (Great Lakes Port Limited) Container terminal and KPRL to the South.

The LPG Facility, being a common user will enable the oil marketers an alternative for importation and supply of liquefied petroleum gas at competitive price to the end users. This will also fulfill the Government's blue print of increasing the per capita consumption of liquefied petroleum gas to 15 Kilogram from the current consumption of less than 4.5 Kilogram. Therefore, the project primarily entails establishing liquefied petroleum gas depot for storage and loading facility for LPG Dealers.

In summary, the proposed project will cost approximately **USD 16,000,000** and will involve construction of the following components: -

- A storage area with four Mounded Bullet Tanks of 3,000m³ each giving a total capacity of 12,000 m³ equivalent to about 6,000 MT
- Fire Water Tank 2,500 m³ along with the required Foam compound.
- Fixed internal and external firefighting facilities
- Pumping station with pumps, compressors and odorizing system
- 4 Truck loading gantries
- With a future expansion provision for incorporating Rail Transport Cargo (RTC) loading/unloading area, with capacity for 6 wagons
- Fire and gas leak detection alarm systems
- Compressed air network for motorized valves
- Administrative, operations, firewater pumps and utilities buildings
- Truck parking zone.
- Secure high perimeter wall fence including CCTV with access control at all entry and exit points
- Security / flood-lighting system

The operation phase of the project will include the following activities

- Receiving LPG via a pipeline whose tie in point will be at an existing pipeline along the refinery road.
- Storage of LPG in the 4 mounded bullet tanks.
- Trucks and Rail wagons loading
- Facility maintenance activities
- Safety, fire protection and emergency response
- Traffic Management

Project Objectives

To design and implement a safe, environmentally sound, structurally and reliable LPG facility. The entire system has been studied with respect to reliability of design, state of the art control philosophy with intrinsic process safety considerations. Further, compliance of external safety measures like Pressure Relief System, Fire Fighting System, and Gas detectors have also been reviewed with respect to statutory guidelines, standards, codes of practice and best practices.

The safety of the facility will be enhanced by use of Mounded bullets which provide intrinsically passive, safe environment & eradicates the possibility of Boiling Liquid Expanding Vapor Explosion (BLEVE)

The proposed development project is in line with the Vision 2030's Economic and Social development pillars that puts emphasis on the industrial sector and the general infrastructure provision as the driving force of the country growth into the middle-class level important for the envisioned development and employment creation. The 2010 Constitution of Kenya calls for a sustainable development in an enabling environment to be created and enjoyed by all Kenyans to which job creation is pivotal. It also calls for economic growth through investments including but not limited to private investments to help achieve economic growth to which this proposed development falls under.

The Project benefits during the implementation of its key phases of designing, planning, construction, operational and decommissioning will include the following: -

- Creation of employment opportunities
- Provide clean and environmentally friendly energy source
- Promote the economic growth through creation of enhanced businesses opportunities
- Generate revenue to the county and national governments

- Contribute to the industrial growth as envisioned in the Vision 2030 development plan for a middle level development nation
- Opening up the local areas for future sustainable development and economic growth
- Supporting the local communities through initiated Community Social Responsibility projects (CSR) aimed at alleviating poverty and addressing community needs and economic development
- Improving the income earning capacities of the local people thereby improving their social and economic lives
- Conserving and managing the environment sustainably and promoting environmentally friendly development in coexistence with the natural environment integrated throughout its environmentally sustainable designs.

Project Activities

The main project activities will include excavation (earthworks) of the proposed site, construction of pump shed, compressor and control rooms, office block, washrooms, among other facilities. The project activities will have minimal environmental impacts of vegetation loss as a result of minimal vegetation clearance, dust emission (air pollution) during earthworks like excavation, noise pollution from machines, vehicles, equipment movement and other noise emitting construction activities and minimal water pollution due to excavation works, heavy machinery movements and liquid wastes originating from within the site, interruption of utility services like water pipeline connections within the area, solid waste build up, change of the area's aesthetic composition, air pollution, public accident and injuries, and traffic snarl ups along the area access roads, among other notable impacts.

The project proponent and contractor are expected to employ the following mitigation measures to ensure that these impacts are fully mitigated, revegetating the areas where landscape has been altered and vegetation interfered with, water sprinkling and use of dust nets to help minimize air pollution and other gaseous emissions, provision of ear muffs and ensuring regular servicing and maintenance of the site machineries, plants and equipment for minimal noise production, deployment of traffic marshals to control traffic flow in the affected road sections, prior relocation of the affected utility services within the area, and ensuring proper signage and public awareness creation among the people to ensure public safety, among other measures.

The proposed project is expected to commence upon obtaining all statutory approvals which include but not limited to NEMA, EPRA, NCA, KENHA and County approvals.

ESIA Methodology

The ESIA process was based mainly on past literature review, extensive desktop study, conduction of Public Participation meetings with key project stakeholders, and field reconnaissance; key informants' interview and questionnaire surveys, Review of relevant policies, laws, regulations, legal and institutional frameworks regarding air, water and environment, drafting of an Environmental and Social Management and Monitoring Plan (ESMMP) encompassing all project phases and factors.

Legal, Regulatory and Legislative Frameworks

The following are applicable to the proposed project:

- The Constitution of Kenya, 2010
- Kenya Vision 2030
- Policy Framework
- National Energy and Petroleum Policy 2015
- National Environmental Policy, 2013
- National Gender Policy (2011)
- Occupational Safety and Health Policy (2012)
- Workplace Policy on HIV/AIDS (2007)
- National Environment Action Plan (NEAP) 2007
- National Climate Change Action Plan (NCCAP) 2018-2022
- The Petroleum Act, 2019 and the subsidiary legislations
- The Energy Act 2019
- County Governments Act, 2012
- Physical and Land Use Planning Act, 2019
- Environment Management and Coordination Act, 1999 and the subsidiary legislations
- The Occupational Safety and Health Act (OSHA), 2007 and the subsidiary legislations
- The Water Act 2016
- Public Health Act (Cap. 242)
- People Living with Disability Act, 2012
- The Sexual Offences Act, 2014
- The HIV And AIDS Prevention and Control Act, 2006
- Occupiers Liability Act (Cap. 34)
- Children Act No. 8 of 2001
- The Employment Act, 2007

- Cities and Urban Areas Act 2012
- Public Roads and Roads of Access Act, Revised 2012 (Cap 399)
- The Kenya Roads Act, 2007
- International Conventions, Treaties and Agreements
- The African Charter on Human and Peoples Rights
- International Covenant on Economic, Social and Cultural rights, 1966 and International
- Covenant on Civil and Political Rights 1966.
- International Finance Corporation (IFC) General Environment, Health and Safety (EHS) Guidelines
- IFC Performance Standards for Environmental and Social sustainability
- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts.
- Performance Standard 2: Labour and Working Conditions.
- Performance Standard 3: Resource Efficiency and Pollution Prevention
- Performance Standard 4: Community Health, Safety, and Security.

Project Alternatives

Alternative	Remarks
Location Alternatives	The project site was selected based on the following • The land is already leased to FSL by Kenya Railways. Therefore, there will be no land acquisition processes leading to displacement of people and their livelihood. • The available land is prime for such projects which is currently under utilized • The location is zoned as an industrial area with established petroleum oil facilities and the operation of the proposed project can mutually benefit from the existence of the other facilities. • The location is served by a nearby LPG pipeline from which tie point will be installed.
Technology Alternatives	The bulk storage considered the following alternatives • Bullet tanks alternative - the alternative would have resulted to terminal with less than 60% of the planned capacity. The option also posed greater fire and explosion risk with potential of affecting other neighboring facilities. • Mounded Bullet tanks - The alternative had less fire and explosion risk and required less safety distance; hence this was preferred.
Design and Layout Alternatives	Design alternatives for the proposed project were considered in the decision analysis where various layouts for the mounded bullet tanks and loading facilities were considered. Fossil Supplies Limited have engaged an experienced consortium of engineers to undertake the Front-End Engineering Design (FEED) for the proposed project with a storage capacity of 12,000m³ comprising of 4 mounded bullet tanks with Truck / Rail Wagon loading facilities.
Delivery Pipeline Alternatives	The following pipeline alternatives were considered • Pipeline route from SOT manifold utilizing Port Road reserve to Changamwe round about to KPRL then to the project site was dropped because it was longer, unsafe and there was no existing ROW. • Route from KPRL to the project site abandoned due to its longer and also the ROW acquisition challenges • Direct tie in at existing KPRL/KPC LPG pipeline along Refinery Road was considered. The alternative consists of an existing ROW with an LPG and multi product pipeline.
Do Nothing Alternatives	The 'do-nothing' alternative is the option of not establishing the proposed LPG Facility at the identified site at Changamwe, Mombasa. This alternative would result in no environmental and social impacts in the project area. The 'do-nothing' alternative will not assist the Kenyan Government in reaching its targets for use of LPG as a source of Energy. Subsequently, the do-nothing alternative is not a preferred alternative and has not been assessed in this ESIA

Summary of the Stakeholder Engagement Plan

The following table is a summary of the views of various Stakeholders during the ESIA Public Consultation.

Subject	Stakeholder	Issue	Response
Community Health and Safety	EPRA, Mikindani Chief	Whether the mounded LPG bullet storage tanks will ensure that residents are safe from inhaled gas and in the event of an explosion and safe domestic use of LPG	-The mounded technology proposed by FSL is one of the safest and has been used in developed countries - The bullet tanks holding LPG will be encased in a concrete wall with sand surrounding the immediate metallic tank. - In the event of fire, the bullet tanks, being protected by 1m of sand and armored concrete sarcophagus eliminate any risk of implosion or fire, thereby limiting any possibility of fire outbreaks to the nearest tanks, communities, and business establishments - The mounding technology allows for reduced safety distance (the distance between 2 tanks) hence the proponent is able to utilize a small piece of land to construct tanks with larger storage capacities as compared to the bullet technology. -PIEA will be engaged to sensitize the community on safe domestic use of LPG
Employment	Women, Youths, PWDs Leaders and MCAs	Whether the Proponent will employ locals.	The proponent is committed in ensuring effective local content in terms of sourcing of skilled, semiskilled and unskilled labour throughout all the project phases.
Corporate Social Responsibility (CSR)	Deputy County Commissioner Office, Women, Youths, PWDs Leaders	Request for water, Health Centre and education facility for Changamwe residents	CSR activities will be as per the Company Policies and will be determined in consultation with community members and will take into account the greatest area of challenge to the people.

Subject	Stakeholder	Issue	Response
Traffic and movement patterns	KR, EPRA, County Administration	Whether there is a plan to manage traffic that will result from construction activities	• The contractors will undertake public awareness programs in consultations with the community to identify areas of particular risk and approaches to reduce risk. This is expected to include awareness programs along roads leading to the site targeting frequent users on traffic dangers. • The Project Contractor will develop a Traffic management plan for the construction phase of the project • The contractor will prepare a detailed plan for signage along the Construction Area to facilitate traffic movement, provide directions to various components of the Works, and provide safety signages
Skill Enhancement	MCAs, and Changamwe Chiefs	Whether there will be skill enhancement at the LPG facility to enable the employees secure jobs in similar developments once the plant has been decommissioned	•The setting up of the LPG plant will require highly skilled, skilled, semi- skilled and unskilled labour. The unskilled have to be supervised by the skilled personnel, however, the unskilled will be presented with an opportunity to learn from the skilled as they work together. • The proponent will train LPG operators on plant operation and safety as outlined in their program
Contractor Management	Community leaders	How the proponent will manage the Contractor and ensure they honor the agreements especially with the local communities and residents	• The Construction activities will be managed by a HSE Officer to ensure recommendations made in the ESIA are implemented by the Contractor. Additionally, the Proponent will hire a Community Liaison Officer from the community who will handle grievances related to the project and ensure that they are addressed appropriately.

Subject	Stakeholder	Issue	Response
Impact on Air Quality	Community Leaders	How the dust generated from construction will be managed	• The contractor will implement dust suppression measures including, sprinkling water, undertaking excavation works when its less windy, use of signage, dust traps and speed reduction as appropriate and applicable. • The contractor will regularly engage the neighboring business establishments whenever activities that are likely to cause nuisance or disturbance are planned.

Quantitative Risk Assessment (QRA)

The methodology for QRA included identification of the major hazards, a cause analysis, a consequence analysis and an estimation of the individual risks and societal risk. This was followed by comparing the risks with international criteria for acceptability and by reviewing suitability of emergency measures and organizational aspects.

Finally, measures were proposed to reduce or eliminate the risk, where not tolerable. The hazards that were identified as potentially serious were the release of LPG from the bursting of pipes, vessels, loading arms and hoses. BLEVE would result in fires and explosions with serious effects extending some distance across the site boundary. Through the QRA, it was confirmed that the combined individual risks (for employees and for the public) are tolerable. Societal risks are low and can also be regarded as tolerable. Risks that are tolerable should be reduced where practical and cost effective; otherwise, it may be accepted as “as low as reasonably practicable” (ALARP)

Potential Positive Impacts of The Proposed Project Facility

The proposed project will have positive impacts to the society and the general environment.

Some of the benefits include the following: -

1. Provision of a convenient LPG Common User Facility.
2. It will optimize use of the land; hence increasing its utility.
3. Increase economic investment hence increases in wealth which will translate in Government revenue increase.
4. The proponent will enjoy income generated through sale of products.
5. The project will also provide employment during both construction and operation phases.
6. It will create a market for goods and services, especially construction inputs which include raw materials, construction machinery.
7. Many secondary businesses are also likely to spring up during the operation phase especially those providing foods and beverages to the workers.
8. Increased competition for the provision of LPG, which might encourage price incentives by vendors leading to lower pricing of the products as well as increased quality of offered service.

Potential Negative Environmental Impacts of The Proposed Project Facility

The anticipated impacts during the project`s entire cycle namely, construction, operation and decommissioning phase include: -

1. Occupational accidents and diseases
2. Fire outbreaks
3. Increase in vehicular traffic in the area both from construction vehicles as well as during operational phase of the facility
4. Land degradation and contamination
5. Air pollution
6. Noise pollution during construction
7. Contamination of water resources
8. Solid and liquid waste generation
9. Dust nuisance during construction phase of the project
10. Vegetation loss
11. Increased demand for water and Electricity Supply To The Area
12. Impacts Of Solid Waste From The Proposed Lpg Plant
13. Impacts Of Sewage From The Proposed Lpg Plant

Proposed Mitigation Measures for The Likely Impacts

Aspect	Expected Impacts	Gross Rating	Recommended mitigation measures	Residual Rating
Air pollution	Generation of dust during site clearance, excavation, back filling and hauling operations along with transportation activities Emission of VOCs	Medium Negative	• Developing a site-specific air quality pollution prevention plan based on IFC PS 3, L.N 34 of EMCA 1999 and on the finding of impacts assessment of the ESIA report. • Construction site and transport-tation routes to be water sprayed on dry and windy days, especially if near sensitive receptors • Haulage trucks to be covered. • Use of well-maintained equipment to minimize the emissions during construction • Adherence to existing laws and regulations including L.N 34: Environment Management and Coordination (Air Quality) Regulations, 2014	Low Negative
Soil Degradation	Contamination of soil due poor waste management and through accidental spills of oil as a result of field refueling, onsite storage of fuel/oil and fugitive spills due to leaks	Medium Negative	• Ensuring that the site has adequate sanitary waste disposal facilities and waste bins • Storing Waste/used oil generated from generators and construction machinery and equipment on paved surface in a secure location at the project site. • The waste oil to be handled by licensed waste handler at frequent intervals. • Controlling and reducing at source the production of wastes and hazardous waste • Adherence to existing laws and regulations including L.N 121: Environment Management and Coordination (Waste Management) Regulations, 2006	Low Negative

Aspect	Expected Impacts	Gross Rating	Recommended mitigation measures	Residual Rating
Water Quality	Contamination of the surface runoff from the site due to poor waste management, fugitive spills on the soils and soils contaminated by construction chemicals. Contamination of subsurface water due to poor management of sanitary waste	Medium Negative	• Earthworks shall be halted when rain conditions are such that excessive erosion and silt loaded run-off can be expected. • The construction programme will avoid excessive exposure of bare earth surfaces which may be more prone to erosion. • If appropriate, settlement lagoons to be used to allow silts to be retained prior to discharge of run-off to the existing drainage channels or direct to sea (through the rock revetment) • Consideration will be given to undertaking routine maintenance of plant and vehicles off-site in a properly equipped cabro workshop with oil interceptors. • Avoidance of water accumulation and stagnation • Existing drainage channels to be cleared of silt / debris and trash screens installed if appropriate. • Adherence to existing laws and regulations including L.N 121: Environment Management and Coordination (Waste Management) Regulations, 2006	Low Negative
Public Safety	Fire and Explosion	High Negative	• Engage contractors with a well-developed EHS management system and with reputable experience in Oil and Gas. • Ensure that all the construction activities are well planned, the potential fire hazards identified and managed before undertaking the activities at the site through well supervised Permit to Work (PTW) system. • Monitoring the presence of petroleum fumes before undertaking the hot work processes along the ROW and within the tank farm area • All the activities along the ROW will be effectively coordinated to ensure evacuation of the product from the pipeline when high risk activities like welding are being undertaken. The team will be in a position to activate mutual ERP in case of any emergency during construction.	Medium Negative

Aspect	Expected Impacts	Gross Rating	Recommended mitigation measures	Residual Rating
Traffic	Increased traffic leading to traffic accidents and congestion	Medium Negative	• Creating and implementing awareness programs along roads leading to the site targeting frequent users on traffic dangers. • Developing and implementing traffic management plan for the construction phase of the project to control the number of trucks visiting the site and ensure safety • Use of signage along the construction area to facilitate traffic movement, provide directions to various components of the works, and provide safety advice and warnings. • The Contractor should provide temporary road signs and notices to indicate ongoing works; • The site Engineer and Contractor should choose traffic routes to reduce the impact in the neighborhood avoiding, as far as practical any sensitive areas; • The site Engineer and the contractor should ensure that traffic calming and speed control measures are put in place in consultation with the relevant authorities e.g., Traffic Police and Mombasa County Traffic Officer. The contractor should: • Introduce segregated pedestrian walkways; • Ensure there is reduced need for reversing vehicles, by introducing a one-way system; • Use a qualified banksman to control deliveries and reversing vehicles; • Clearly designate loading/off-loading areas. • The Project Contractor will regularly inspect the access roads conditions and whenever necessary, promptly repair damages related to construction traffic • Abnormal loads will be timed to avoid times when traffic volumes are likely to be higher e.g., start and end of school holidays, long weekends	Low Negative

Aspect	Expected Impacts	Gross Rating	Recommended mitigation measures	Residual Rating
Waste Management	-Soil pollution from sanitary waste -Release of the LPG during operation - Generation of the dust by the trucks visiting the site during operation	Low Negative	• The project will be designed to effectively drain the uncontaminated surface run-off from the site to the existing storm water drains and to connect the facility to the to the proposed sewer system for Mombasa. • Should the sewer system not be available during the operation of the project, a septic tank system will be installed to manage the sanitary waste. • FSL will develop and implement a site-specific waste management plan based on IFC PS3 and LN 120 and LN 121 of EMCA.	Low Negative
Business and investment opportunities	Availability of business and investment opportunity	Low Positive	• Promote the local suppliers in order to boost their financial base; • Inform the community in advance of the required materials and supplies needed and that meet the required specification	Medium Positive
Skills Development	Transfer of skills	Low Positive	• Initiate a capacity building program affordable to the local communities to enable them to benefit from the available economic opportunities • Communicate the skill requirements to the local community prior to construction and operational phases through easily accessible mediums such as community liaison officers, community noticeboards, local radio etc.	High Positive
Energy	Energy Usage	Low Negative	• Ensure that all lighting system are switched off when not in use • Install energy saving bulbs • Design the office infrastructure to maximize the use of natural light. • Install metering system for monitoring. • Carry out facility energy audit	Low Negative

Aspect	Expected Impacts	Gross Rating	Recommended mitigation measures	Residual Rating
Effluent	Effluent Management	Medium Negative	• All human waste water to be channeled into the sewer line • Install Oil Water Separator • Routine checkups and monitoring of the drainage system to avoid leakages and blockages. • Construction of separate storm water and waste water drain. • Implementing a system for the proper metering and measurement of water use to enable proper performance review and management.	Low Negative
Noise Pollution	Excess Noise and Vibrations	Medium Negative	• Establish means for the public to contact the engineer-in-charge (i.e., provide telephone number, email, etc.) and methods to handle complaints. • The use of hearing protection gear by workers when exposed to noise levels above 85 dB (A). • The contractor to ensure that noise & excessive vibration from construction activities are within permissible levels as per the provision of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. This includes among others adhering to permissible noise and vibration level. • Construction work should strictly be undertaken as per EIA license conditions • Use of well-maintained machineries with minimal noise emissions	Low Negative

Aspect	Expected Impacts	Gross Rating	Recommended mitigation measures	Residual Rating
Fire	Fire Control	High Negative	• Fire extinguishers to be placed at strategic positions • Escape routes to be provided. • Servicing of fire extinguishers as are necessary. Always inspect electricals. • Installation of a diesel engine driven fire pump and associated systems • Provide firefighting water storage tank with connected water network and firefighting nozzles • Provide a high-performance fire resistance wall	Low negative
Incidents and Diseases	Occupational Incidents and Diseases	Medium Negative	• Monthly fire drills shall be undertaken to test the response of the involved stakeholders; • Conduct statutory assessments i.e., risk, fire safety audit and Occupational Safety and Health audits annually through licensed advisors and auditors • Conduct statutory trainings under OSHA, 2007 and Rules under it. i.e., basic first aid, fire safety training, and Occupational Safety and Health committee training through approved training institutions • Provide adequate lighting. • Provision of firefighting equipment in strategic and well labelled areas; • Train workers on safe work practices, provide appropriate PPE; • Enforcement of use of PPE • Restriction of access to high-risk areas to authorized	Low Negative
Gender	Gender Inequality	Medium Negative	• Ensure equal employment opportunity for both men and women • Expose and involve women in construction activities where possible in an effort to transfer required skills. • Involve women groups in activities that they are good at such as landscaping • Enhance gender sensitivity and reduce gender discrimination in any activities.	Low Negative

Summary Of Project Benefits	
Benefit	**Impact**
Increased Employment Opportunities	• Improved livelihood standards of the local people. • Opportunities for specialized skill development.
Availability of Affordable Liquefied Petroleum Gas	• Improved livelihoods. • Improved business activities. • Availability of cleaner energy and positive impact on climate
Business Growth	• Economic growth – mushrooming of small-scale businesses in the vicinity • Opportunities for self-employment
Improved Security	• Improved business environment. • Improved individual and business safety and low crime rates
Revenue Generation	• Expansion of business and promote new developments • Improved infrastructure (roads, water, hospitals, etc.)
Improved Local Community Member's Living Standards	• Improved health. • National and county economic growth.
Improved Environmental Management and Conservation	• Clean source of energy. • Environmentally friendly source of energy (an alternative to environmentally destructive ones like charcoal).

Environmental Management Plan for The Proposed LPG Common User Facility.

The EMP developed for the proposed project will ensure that environmental pollution and or degradation does not occur as a result of implementation and operation of any of the components of the proposed development. The EMP covers the following management plans among others: -

1. Solid waste management plan;
2. Sewage management plan;
3. Noise management plan;
4. Dust management plan; and
5. Occupational Hazards Management Plan

The project proponent and contractor will need to undertake the following to ensure the success of the ESMP:

1. Develop and document environmental management policies that will guide construction work and other site operations during and after implementation of the project. These policies should address environmental conservation measures to be put in place, occupational health and safety and handling of waste generated by the project.
2. The project proponent to avail required finances for implementation of the EMP and ensure adherence to the EMP by the contractor implementing the project.
3. The project contractors to adhere to the environmental management plan.

Environmental Monitoring Plan for The Proposed LPG Common User Facility.

This plan provides for both active and reactive monitoring of various environmental parameters including:

1. Monitoring of the achievements of specific plans of the Environmental Management Plan, performance criteria and fulfilment of objectives.
2. Systematic inspection of workplace.
3. Surveillance and monitoring of the work environment, including the organization of work and activities involved.
4. Monitoring of worker's safety and health.
5. Monitoring of compliance with laws, regulations and requirements.
6. Environmental conservation and related activities in the area.
7. Work related injuries, ill health (including record keeping and monitoring of sickness/absence), disease and accidents.
8. Losses such as damage to property.
9. Deficient safety and health performance including HSEMS failures.

Decommissioning Plan for The Project.

A conceptual programme for closure of the LPG Facility is proposed as summarized:

1. Demolition waste management
All buildings, machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible
All foundations must be removed and recycled, reused or disposed of at a licensed disposal site
Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site
Donate reusable demolition waste to charitable organizations, individuals and institutions
2. Rehabilitation of proposed project site
Implement an appropriate re-vegetation programme to restore the site to its original status
Consider use of indigenous plant species adapted to geology and climate in re-vegetation

CONCLUSION

The most pertinent issues identified during the ESIA, are fire risk, traffic, labour and working conditions impacts. The impacts due to the project range from high to low, are site specific and has reversible impacts on the ecosystem of the project site owing to the construction and operation activities.

A Quantitative Risk Assessment (QRA) was carried out, which is a requirement under the OSHA 2007 to implement the project.

The Proposed LPG common user facility and associated infrastructures are unlikely to result in permanently damaging environmental and social impacts if the proposed mitigation measures proposed in this study are adequately implemented in all phases of the project. The potential for positive socio-economic benefits can be realized if the enhancement measures are put in place.

Based on the findings of the ESIA engagements with Lead Agencies, County Government Departments, Local Administrations, community representatives and residents living in the project area, there was no objection to the proposed project.

The Environmental Management Plan in this report has proposed several management measures to mitigate identified impacts and to enhance identified positive benefits of the proposed project.

Considering the proposed project location, design and construction technology, operational management by the proponent of the proposed common user LPG facility, the implementation of this project is of paramount importance and beneficial not only to the proponent but also to the County of Mombasa and the entire country at large. It is therefore our wish to recommend the project to go on with full compliance with the requirements of the law.

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ACRONYMS

API:	American Petroleum Institute
AGO	Automotive Gasoline Oil
ARV:	Anti-Retroviral
BS:	British Standard
CSR:	Community Social Responsibility
CWSB:	Coast Water Services Board
DB (A):	Decibels on the A-Scale
DHP:	Designated Health Practitioner
EA:	Environmental Audit
EHS:	Environment, Health & Safety
EMCA:	Environmental Management and Coordination Act
ERC:	Energy Regulatory Commission
ERP:	Emergency Response Plan
ESDS:	Emergency shutdown Device system
ESIA:	Environment and Social Impact Assessment
ESM:	Environmentally Sound Management
ESMMP:	Environmental and Social Management and Monitoring Plan
FH:	Fire hydrant
HSEQ:	Health Safety Environment and Quality
HSEMS:	Health Safety Environment Management System
KPA:	Kenya Ports Authority
KPC:	Kenya Pipeline Company
KRC:	Kenya Railways Corporation
KPRL:	Kenya Petroleum Refineries Limited
LPG:	Liquefied Petroleum Gas
MSDS:	Material Safety Data Sheet
NEMA:	National Environment Management Authority
NFPA:	National Fire Protection Association – USA
OSHA:	Occupational Safety and Health Act
PPE:	Personal Protective Equipment
PMS:	Premium Motor Spirit
TOR:	Terms of Reference

CHAPTER ONE: INTRODUCTION

1 Introduction

1.0 Overview of the Petroleum Sub-Sector in Kenya

The Energy Sector contributes 20% of tax revenue and makes up 4% of the Country's Gross Domestic Product (Budget estimates of 2016) 87% of Kenyans use solid fuels as their primary fuel source for cooking while 5% use Kerosene as a primary fuel. The heavy reliance on inefficient traditional biomass sources exacerbates forest degradation and climate change, and has detrimental impacts on health and poverty in Kenya. There are a number of ways to reduce some or all of these negative impacts, including using improved biomass cookstoves and switching to modern fuels such as LPG.

The Petroleum Sector in Kenya is organized into three Sections; the Upstream, the Midstream and Downstream. The Upstream Section involves the process of exploration, development and production of crude oil and natural gas. The Midstream Section revolves around storage, refining and transportation of crude oil into consumable petroleum products whereas in the Downstream Section, refined products are made available to the consumers through supply and distribution, for example at petrol stations (KPC, 2017).

1.0.1 Upstream

Kenya has four (4) petroleum exploration basin and these are; Lama Basin, Anza Basin, Mandera Basin and Tertiary Rift Basin. Oil and Gas Exploration in Kenya began in 1956 and the breakthrough came in March 2012 with the discovery well, Ngamia1 Well in Lokichar Basin in Turkana County. (KPC,2017). Following the exploration success of Lokichar Basin, the Government and Oil Exploration Firms started an Early Oil Production Scheme (EOPS) where crude is extracted, processed, and then trucked to Kenya Petroleum Refineries Limited in Mombasa.

1.0.2 Midstream

Initially crude oil was imported to Kenya via Kipevu Oil Terminal (KOT) and Shimanzi Oil Terminal (SOT) to Kenya Petroleum Refineries. However, the refinery stopped operations in September 2013. Currently, the main midstream activities in Kenya includes transportation of crude oil from Lokichar to Mombasa and exportation of the same using vessels via KOT.

1.0.3 Downstream

Involves distribution and marketing of petroleum products by Oil Marketing Companies. The distributing infrastructure includes white oil pipelines, depots, terminals, and service stations. The main petroleum products in Kenya include Automotive Gas Oil (AGO), Premium Motor Spirits (PMS), Illuminating Kerosene (IK) and Liquefied Petroleum Gas (LPG). The leading oil marketers in Kenya are VIVO Energy (operating Shell Service Stations), Total Energies, Rubis Energy (Acquired KenolKobil and Gulf Energy in 2019), OLA Energy and National Oil Corporation of Kenya (NOCK).

According to Energy and Petroleum Regulatory Authority. The downstream supply chain in Kenya is supported by the following critical infrastructure (Energy and Petroleum Regulatory, 2019) petroleum receipt and backloading jetties:-

- **Kipevu Oil Terminal (KOT)** located at Kipevu area Mombasa County and handles large petroleum vessels. Product is then transferred to the Government owned Kipevu Oil Storage Facilities (KOSF).
- **Shimanzi Oil Terminal (SOT):** used for importation of petroleum by small vessels at Mbaraki Terminal which is privately owned facility.
- **Africa Gas And Oil Limited (AGOL):** this is a dedicated LPG facility built under concessionary terms from the Kenya Ports Authority, it is connected to a common user manifold. The only storage depot connected to it is the AGOL mainland facility.
- **Kisumu Oil Jetty:** This is located on the shores of Lake Victoria and is used for the exportation of petroleum products to the countries boarding the lake and into the Eastern DRC and Southern Sudan
- **Petroleum Storage Tanks**: Kenya's total storage capacity is over 1,500,000,000 litres spread out across the country. Over 850,000,000 litres of this is operated by the Kenya Pipeline Company as primary intermittent storage.
- **Petroleum Pipeline:** The pipeline system consists of trunk lines and distribution lines from Mombasa running through Nairobi to the western Kenya towns of Nakuru, Eldoret and Kisumu totaling to about 1,342 Km.
- **Retail Networks:** Kenya has over 2,762 retail stations. The stations are clarified as tier 1,2,3 and 4 depending on land area, services offered and storage capacity.

1.1 LPG Import and Storage

Kenya imports all its LPG requirements following the closure of the Kenya Petroleum Refineries Limited (KPRL) in 2013. LPG is mainly imported from Iran, Mozambique, Qatar, USA Russia as shown below

Table 1.1: The 2016 LPG Imports Sources to Kenya

Country	Percentage 2016 Import Volumes
Iran	27%
Mozambique	22%
Qatar	13%
USA	13%
Russia	10%
Algeria	45
Mauritius	3%
Oman	2%
UAE	1%
Tanzania	1%
Others	4%

Source: Kenya Revenue Authority

Although the imports are mainly through the port of Mombasa, information from Kenya revenue authority indicates that there is a growth of imports from Tanzania into the country via road. In 2017, the imports from Tanzania were 6.24% with this figure expected to have gone higher in 2018/19 as legal compliance on imports declaration has improved.

The LPG import facilities are located in Mombasa and comprises of the following: -

1.1.1 AGOL Facilities

The AGOL imports LPG via a Single Buoy Mooring Jetty (SBM) owned by Kenya Ports Authority (KPA) but operated by AGOL. The anchorage is situated in Port Reitz west KOT and has draft of 11.3 meters of water. The anchorage /discharge fees payable to KPA is about USD $ 22 per ton. The KPA discharge pipelines terminate at the shores where a Common User Manifold is situated for pipeline connection by marketers. AGOL pipeline connects to a storage capacity of 20,500 MT with sufficient capacity for truck loading. The terminal is located adjacent to the SGR but is currently not connected to the rail system.

1.1.2 SOT Facilities

The Shimanzi Oil Terminal (SOT) is a common user jetty owned by KPA and can accept tankers of up to 30,000 MT DWT. However, the combined onshore LPG import storage capacity at SOT is about 960 MT (owned by marketing companies). When complimented

by other connected storage at Changamwe (Hashi with 350 MT, and Kenya Petroleum Refineries limited (KPRL) with 1,250 MT, the maximum total available capacity that can receive imports at SOT is about 2,610 MT.

Table 1.2: Summary of Mombasa LPG Import Facilities

MOMBASA IMPORT STORAGE		
COMPANY	**STORAGE CAPACITY (M.T.)**	**IMPORT FACILITY**
AGOL	20,500	AGOL
LIBYA OIL	200	SOT
SHELL	520	SOT
TOTAL	240	SOT
HASHI	400	Connected to SOT
KPRL	1,250	Connected to SOT
TOTAL	23,110	

Source: PIEA& Various Industry Sources

1.1.3 New Kipevu Oil Terminal (New KOT)

KPA is constructing a new petroleum jetty at Kipevu area of the Port. The jetty will include a dedicated LPG receiving pipeline (24-inch diameter) with a common user manifold for importers to connect to. There is an existing pipeline wayleave from this jetty that connects to the KPRL facility at Changamwe.

Proposed LPG Import Storage Facility at KPRL - The government had planned that KPC constructs a 24-inch pipeline from the new jetty at KOT to the KPRL site together with a 30,000 MT LPG common user import storage facility (that was to be enhanced to 50,000 MT in future). However, this plan appears to have changed whereby the government now appears to prefer a PPP investment between the government owned KPRL and a private investor. The modalities for such a plan have however not been articulated.

The PPP project would essentially involve a common user LPG import receiving and storage facility, with truck loading facilities and potential for connection to SGR for transportation inland. The project revenues would accrue from a tariff approved by the regulator, EPRA.

1.2 LPG Distribution in Kenya

Nearly 90% of Kenya LPG demands and all export demand are located inland, and these must be transported to inland secondary storage facilities.

1.2.1 Road

Transportation of LPG from Mombasa import facilities to the storage depots inland is currently 100% by road. All the import storage facilities in Mombasa load trucks apart from

KPRL, which acts as a temporary storage for LPG transfers to the marketers' depots at SOT and Changamwe.

1.2.2 Rail

Although the old meter gauge railway (MGR) from Mombasa to Nairobi is no longer serviceable. The Nanyuki-Nairobi railway has been revived by KRC for oil markets to transport petroleum products using railway line.

The main petroleum (including LPG) inland storage depot have historically been at Nairobi, Nakuru, Eldoret and Kisumu, however other newer and significant LPG demand centers have emerged and new LPG storage and filling facilities have come up in these areas. These are investments by the new ones and smaller markets entrants, and these have significantly improved LPG distribution capacity, economics, and consumer access filling is now nearer the LPG demand centers.

About 70% of LPG marketed in Kenya is used in the retail household segment, mainly in cylinders. The balance 30% is used in institutions (hotels, restaurants, schools, hospitals etc.) and for industrial manufacturing and is mostly in bulk. The cylinders in the retail market comprise of 1Kg, 3Kg, 6Kg and 13Kg. the 6Kg and 13 Kg account for about 95% of all cylinders in the market, with the 6Kg mostly used by the lower income segment.

1.3 Motivation for the Project

According to Kenya market research by Global Alliance for Clean Cookstoves (GACC), 87% of Kenyans use solid fuels as their primary fuel source for cooking while 5% use Kerosene as a primary fuel. The heavy reliance on inefficient traditional biomass sources exacerbates forest degradation and climate change, and has detrimental impacts on health and poverty in Kenya. (Clean cooking alliance, 2013). The research further indicates that over 15,000 Kenyans die annually due to exposure to household air pollution from burning solid fuels. >40% of childhood deaths are related to respiratory illness due to exposure to kerosene, wood and charcoal smoke. Average Kenyan household of 4 family members emits 1.2 tons of CO2 per year. Kenya has experienced regional deforestation and degradation, with an overall 55 decline in its forest area since 1990

To deal with the problem, Kenyan government set a long term goal of having 42 percent of households adopt clean cooking fuels. The goal was embedded in Kenya's Vision 2030 second medium term plan (2013-17) in alignment with the SE4II country action agenda. Liquefied petroleum gas (LPG) was to contribute 35 percent, biofuels 5 percent and electricity 2 percent. Additionally, the government of Kenya through the Energy Policy (2014) is committed to enhance consumption of LPG, being an environmentally friendly and economic modern fuel by: -

- Constructing, import handling, storage and distribution facilities;

- Providing fiscal incentives on LPG and related appliances; and
- Encouraging private sector to investment in additional capacity for handling and storage of LPG.

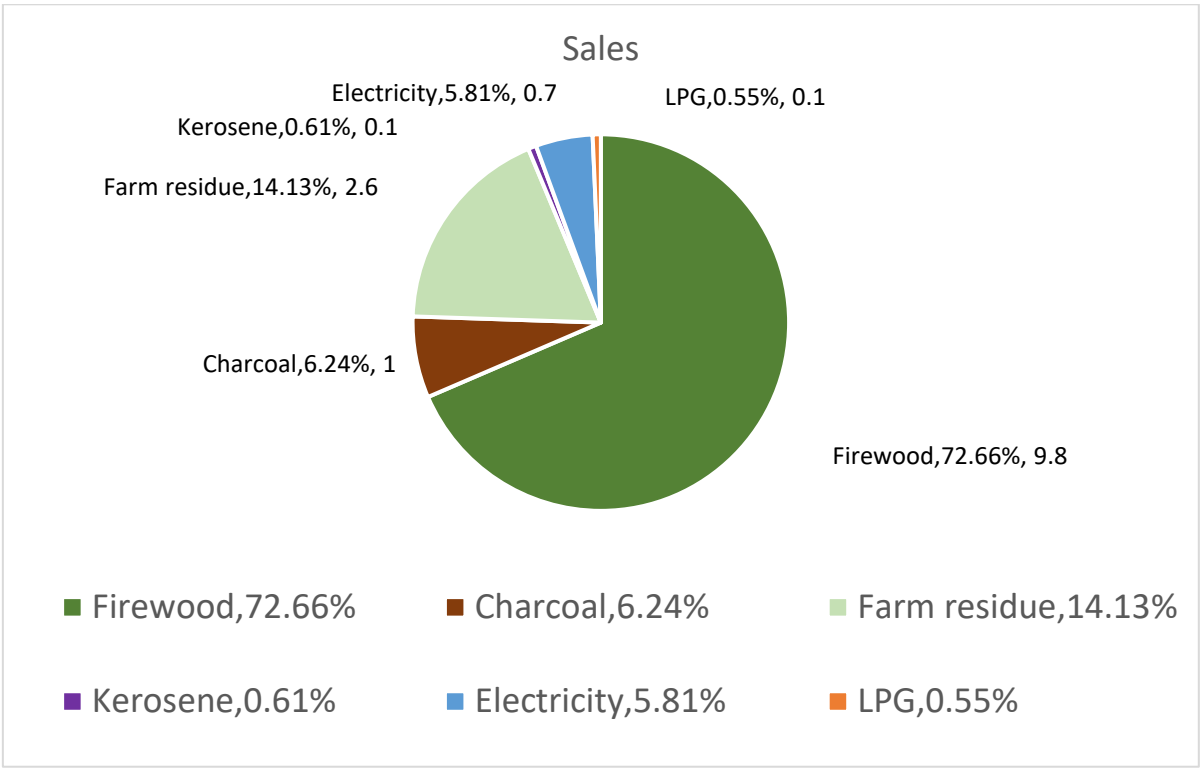
The key policy drivers are both environmental and health concerns. Increased use of LPG will reduce use of biomass (wood and charcoal) fuels and will reduce harmful indoor emotions (which cause respiratory diseases) from both biomass and kerosene use in domestic eating and cooking.

Government policies and strategies have therefore focused on increased availability and affordability of LPG, with special attention to LPG supply chain infrastructure and enhanced regulatory systems to ensure fair market competition

The ministry of petroleum and mining held a national stakeholders forum in May 2016 which made the following key recommendation to reform the LPG sector and increase LPG availability and affordability: -

1. To increase the overall LPG per capita consumption to 15 Kg by 2030. In 2019, the per capita demand stood at about 5.1 Kg (244,000 MT demand over a population of 47.6 million). The share of household energy attributed to fire wood and charcoal currently stands at 79% with LPG share at about 1.0 %.

FIGURE 1.1: Household Energy Consumption-2021



2. To enhance LPG supply chain and infrastructure including: -
    a. Increase import storage from 20,00 MT in the medium term to 50,000 MT in the longer term;
    b. Preferably the new import storage capacity should be licensed and operated as common user facilities;
    c. Target joint LPG importation by all marketers though an Open Tender System (OTS);
    d. Construct and commission a dedicated LPG import line at the new petroleum jetty in Mombasa;
    e. Increase inland storage at Nairobi, Nakuru, Kisumu, Eldoret and Sagana;
    f. Increased use of rail transportation for primary transportation of LPG

3. Implement effective LPG regulation to ensure fair market competition and a high level of safety compliance.
4. To encourage development of reticulated LPG system for gated communities.

The demand of LPG in the retail market has largely been constrained due to affordability and accessibility of LPG. The major cause for this has been lack of LPG infrastructure and expensive imports. However, if most of the above government strategies are implemented, LPG will be more accessible and affordable. Fossil Supplies Limited intends to contribute positively to the governments LPG strategy by constructing a 6,000 MT LPG Common User Facility at Changamwe in Mombasa County, increasing product receipt flow rate from SOT (and in future KOT) thus reducing the demurrage cost and connecting to the rail system which will enhance distribution of the LPG within the country.

1.4 Project Background

Fossil Supplies Limited (FSL) is located in Mombasa, Kenya and is part of the Petrocity Group of companies. It was established in 2001. The key business area of the Group of Companies is of supply and distribution of petroleum products. Fossil Supplies Limited handles the procurement and supply of petroleum products to the Group's established retail network of stations in Kenya operated by our sister company Petrocity Enterprises Ltd and also to the neighbouring countries.

The Group constructed a Petrocity Oil Terminal in Konza and was commissioned in 2013.

For retail distribution, the Group has 94 Petrol Service Stations spread across Kenya and Uganda. Petrocity Enterprises also provides a wide range of high quality automotive and industrial lubricants and bitumen for road construction. Fossil Supplies Limited is already in the LPG business and distributes the LPG through its own brand of Cylinders "PETGAS", through its affiliates Petrocity in Kenya and Uganda. The above ably

demonstrates Fossil Supplies Limited has the financial and technical capacity to undertake the proposed project.

1.4.1 Project Description and Location

Fossil Supplies Limited (FSL) intends to construct 4 LPG Mounded Bullet Tanks each with capacity of 3,000 M^3 totaling to 12,000M^3 which equates to about 6,000MT and eventually connect to existing KPC/KPRL LPG Pipeline at Refinery Road.

Mounded bullet tanks which provide intrinsically passive, safe environment and eradicates the possibility of Boiling Liquid Expanding Vapor Explosion (BLEVE) will be used other than above ground tanks which possess various safety challenges. Though LPG handling possess many challenges, due to its inherent dangerous properties, modern state of art safety features has been taken into consideration while designing the facilities using different codes.

The entire system has been studied with respect to reliability of design, state of the art control philosophy with intrinsic process safety considerations. Further, compliance of external safety measures like Pressure Relief System, Fire Fighting System, and Gas detectors have also been reviewed with respect to statutory guidelines.

The Proposed Liquefied Petroleum Gas (LPG) Common User Facility will be located on coordinates Latitude 4° 0’ 39.58092” S and Longitude 39° 37’ 0.4926” E within Changamwe Sub County in Mombasa County on leased Kenya Railways Corporation (KRC) land. The site is located at approximately 4 Km North of the Port of Mombasa and about 3 Km from hub of Moi International Airport, Mombasa. The area hosts other oil terminals such as KPC Depot and Kenya Petroleum Refineries Limited (KPRL). Abutting the plot to the North East is Transpares Limited, to the West is APM (Great Lakes Port Limited) Container terminal and KPRL to the South.

Map 1.0 Google View of The Proposed Project Site

1.5 Definition of Technical Terms

The following words or phrases shall be limited to the meaning indicated against them:

Environment: includes the physical factors of the surroundings of human beings including land, water, atmosphere, climate, sound, odour, taste, the biological factors of animals and plants and the social factor of aesthetics and includes both the natural and the built environment.

Environmental management: The protection, conservation and sustainable use of the various elements or components of the environment.

Environmental Monitoring: The continuous or periodic determination of actual and potential effects of any activity or phenomenon on the environment.

Incident: Any unplanned occurrence that may lead to ill health, injury, damage to property or adverse environmental impact.

Noise: Any undesirable sound that is intrinsically objectionable or that may cause adverse effects on human health.

Overburden soil: Soil and/or soft rock above materials to be excavated, removed and replaced.

Pollution: Any direct or indirect alteration of the environment so as to affect any beneficial use adversely.

Project: Any venture, programme or policy that leads to projects which may have an impact on the environment.

Proponent: A person proposing or executing a project, programme, or undertaking that can affect the environment.

Reuse: The use of a product more than once in its original form, for the same or a new purpose.

Waste: Any matter discharged, emitted or deposited in the environment in such volume, composition or manner likely to cause an alteration of the environment.

1.6 Project Objectives

The proposed project aims at importing, supplying and distributing affordable and environmentally friendly liquefied petroleum gas with intention to promoting industrial and infrastructural development of the area, country and the region at large.

Other objectives of the proposed project include but not limited to:

1. To generate revenue to the proponent, county and national government for economic, infrastructural, and industrial development.
2. Supply of affordable clean and environmentally friendly liquefied petroleum gas for domestic and industrial use.
3. Construction of standard and spacious warehouses for the storage of bulk liquefied petroleum gas prior to supply and distribution to various retail outlets countrywide.
4. To promote economic growth, industrial and infrastructural development through industrial and services provision.
5. To improve the social economic welfare status of the local community members,
6. Income generation to the people involved in various project implementation phases for improved living standards.
7. To promote ecologically and environmentally friendly and sound industrial building designs, plans and implementation process that will ensure environmental conservation, management and protection.

1.7 Project Justification

The proposed development project will be significant in creating employment opportunities to the locals as well as improving their living standards. The project will also open up the area for future development and business growth; revenue generation to the national and county governments for development, economic growth and infrastructural development. As a private investor and working together with the county/national government to ensure growth and development in modern industrial sector to help solve the problem of low industrial growth and high unemployment levels, thus contributing towards development goals such as Vision 2030.It will also ensure affordable and adequate manufactured goods/materials in secure, clean and healthy environment.

1.8 Approach of the ESIA Processes

1.8.1 Summary of the ESIA process

In April 2019, the cabinet secretary of environment and Forestry on the advice of National Environment and Management Authority (NEMA) amended the second schedule of the Environmental Management Act, 1999.The amendment was through LN 31 on classification of project (low, medium and high risk) and LN 32 on undertaking the ESIA for low and medium risk projects. The proposed project is a high-risk project.

NEMA issued a public notice dated March 2020 on processing of Environment Impact Assessment Reports. The notice stated that for high-risk projects, the ESIA Study shall be conducted in accordance with the general environment impact assessment guidelines as provided by Part 111 of the Environment (Impact Assessment and Audit) Regulations, 2003.The guidelines require an ESIA Terms of Reference to be prepared and submitted to NEMA for approval after which an ESIA study is undertaken and Study Report submitted to NEMA.

This ESIA has been undertaken based on available information and data out of which a study report (SR) has been prepared for submission to the NEMA for consideration. An appraisal of the current baseline status of the project area and the anticipated impacts, mitigation measures as well as development of an environment and social management plan is the focus of the assignment.

The ESIA work comprise of specialist environmental studies which are target to the potential significant impacts likely to be experienced as a result of the proposed development. Each topic is included as a separate section in the main body of the ESIA Study report or included as an appendix.

The Experts prepared and submitted the TOR for the ESIA which was approved by NEMA on 4th November 2022.

1.9 ESIA Study Report Structure

The structure of the ESIA Study bids summarized below.

- Chapter 1 : Introduction
- Chapter 2 : Site, Project Description of the Project
- Chapter 3 : Baseline Information
- Chapter 4 : Policy, Legal and Institutional Framework
- Chapter 5 : Public Consultation and Participation
- Chapter 6 : Environmental and Social Impacts
- Chapter 7 : Project Alternatives
- Chapter 8 : Cumulative Impact Assessment
- Chapter 9 : Environmental and Social Management Monitoring Plan
- Chapter 10 : Project Decommissioning
- Chapter 11 : Emergency Response Plan
- Chapter 12 : Quantitative Risk Assessment
- Chapter 13 : Conclusions and Recommendations

1.10 **ESIA Objectives**

The general objectives of carrying out this ESIA study is to fulfil the requirements of the Government of Kenya on environmental regulations and the project proponent's desire to make sure that the proposed project activities do not adversely impact the environment. However, the specific objectives of the ESIA study are: -

1. To identify potential positive and negative environmental impacts of the proposed project activities.
2. To assess the significance of these impacts.
3. To propose mitigation measures for the significant negative impacts of the project on the environment.
4. To assess the relative importance of the impacts of alternative plans, designs and sites.
5. To generate baseline data for monitoring and evaluation of how well the mitigation measures can be implemented during the project cycle.
6. To present results of the ESIA study in such a way that they can guide informed decision-making by the relevant authorities.

1.11 **Scope Of the Study**

The study interrogates the anticipated environmental impacts of the proposed development with the Environmental (Impact and Audit 2003 Regulations). The report will cover and provide the following information: -

1. The activities that shall be undertaken during the project implementation process, construction, operation, maintenance and decommissioning phases.
2. Baseline data of the location of the project, including physical area that may be affected.
3. The materials to be used, products and by-products, including waste management.
4. Review of the policy, legal and the administrative/institutional framework.
5. The nature of the project.
6. The potential environmental impacts of the project and the mitigation measures to be put in place during construction, operation and decommissioning phases.
7. An Action Plan for the elimination of hazards and minimization of risks and adverse environmental impacts at the proposed project site.

1.12 **Methodology**

The methodology used in conducting and writing of this ESIA study report included but was not limited to the following: -

1. A site reconnaissance and visual survey to determine the baseline information of the proposed project site.
2. Comparative study of the proposed project with the existing land uses in the neighborhood.
3. Review of the project documents and discussions with the proponent.

4. Assessment of the site to detail the various existing and likely impacts of the project on the environment.
5. Assessment of health and safety issues and conservation concerns.
6. Seeking public views through interviews, questionnaire, public participation, focused group discussion.
7. Proposing measures to prevent hazards, and
8. Extrapolating and inferring environmental conditions and responses from baseline information or from other similar cases where actual data is lacking, preparation and submission of the ESIA Study report.

In undertaking the ESIA study, the experts employed a participatory approach that entailed a range of research methods.

1.12.1 Desktop Review

This involved desktop studies and review of all relevant available documents on the project activities, design, plans and components from the proponent. The study team also reviewed all the available and relevant national and international legal environmental documents, standards and guidelines. In addition, national and county level planning documents like Kenya Vision 2030, The 2010 Constitution, Mombasa County Integrated Development Plan, Petroleum and Energy Act of Kenya relevant to the project area were reviewed. Area maps and plans were also reviewed.

1.12.2 Field Study

The study employed primary research method of qualitative and quantitative among relevant stakeholders. The environmental assessment team conducted reconnaissance and field visits to the proposed project site to obtain further data and consult the stakeholders and the public about the proposed project. This established the nature of the surroundings which included existing infrastructure, economic and social set up of the local communities as well as collecting their views on the proposed project. Similarly, observations entailed documentation on the physical characteristics of the area including the biological environment. Interviews and questionnaire administration for Public Participation were carried out with neighbors to the project as well as those most likely to be affected by the project. Additional consultations with project proponent provided essential background and baseline information on the proposed project.

1.12.3 Data Synthesis

The data collected was used to prepare a comprehensive environmental and social management and monitoring plan encompassing the potential impacts, mitigation measures and monitoring indicators which form part of this report.

1.12.4 Reporting

The main output of this study is an ESIA project study report for submission to NEMA.

1.13 Assumptions and Limitations

1.13.1 Assumptions

In undertaking this investigation and compiling the ESIA, the following has been assumed:

- The information provided by the client and the project engineer is accurate and unbiased.
- The scope of this investigation is limited to assessing the environmental impacts associated with the proposed project.
- It is assumed that no spoil dumping areas, borrow pits and quarries will be created for this project and sand will not be harvested from the nearby Indian Ocean. It is assumed that existing quarries and borrow pits will be used and that such borrow pits / quarries are in possession of the required environmental authorizations
- It was assumed that the motivation for planning and feasibility study of the project were undertaken by the developer with integrity, and that information provided to date by the project developer was accurate.
- It is assumed that the delivery LPG pipeline at KPRL/KPC pipeline will be approved by KPRL giving a no objection to the tie in.

1.13.2 Limitations

The planning for the proposed project is at the Front-End Engineering Phase and therefore some of the specific details are not available at this stage of the ESIA process. This ESIA process forms a part of other studies and as these studies progress, more information will become available to inform the ESIA process. This study was done with the information available to the specialist at the time of executing the study, within the available timeframes. The sources consulted are not exhaustive, and additional information which might strengthen arguments, contradict information in this report, and/or identify additional information might exist. The specialist did try to make an evidence-based approach in the compilation of this report and did not intentionally exclude scientific information relevant to the assessment A limited amount of finalized project details from the project developer means that some of the actual project projections may be higher or lower than estimated in this report.

1.13.3 Knowledge Gaps

This ESIA identifies and assess the potential environmental impacts associated with the proposed LPG Facility and associated infrastructure. However, the scope of impacts presented in this report could change, should new information become available during the ESIA Phase. The purpose of this section is therefore to highlight gaps in knowledge when the ESIA study of the project was undertaken.

Current gaps in knowledge at the ESIA include the following:

- The final depth of piles foundation, specifications of the mounded bullet tanks, product pumps, fire water pumps and associated pipelines and
- Specific construction details of the proposed project, including detailed engineering drawings and construction specifications.

1.14 Team of Experts

Table 1.3: Team of Experts

Name	Qualifications	Competence
Ezekiel Olukohe	Bsc Environmental Science	EIA/EA Lead Expert 8379
Eng. Isaac Mbuvi	Bsc. Electrical & Communications Engineering, MSc in OSH, Registered Engineer with EBK No. A 3093 IEK M 4023	Professional Electrical Engineer EIA/EA Lead Expert 6900 OSH Consultant Fire Safety Auditor
George Mukeku	Bsc, Mechanical Engineering	Mechanical Engineer
Pollucon Services	NEMA Gazetted Laboratory	Environmental Laboratory
Juma Mwanaharusi	B. Communications and Journalism	Sociologist

CHAPTER TWO: SITE, PROJECT DESCRIPTION, DESIGN, PROCESSES, WASTES AND PRODUCTS

2.1 Site Location and Description

2.1.1 Site Location

The site is located on coordinates **Latitude 4° 0' 39.58092" S** and **Longitude 39° 37' 0.4926" E** within Kenya Railways Marshalling Yard along Mombasa-Nairobi Highway A109 in Changamwe Sub-County, Mombasa. It is approximately 4 Km North of the Port of Mombasa and about 3 Km from hub of Moi International Airport, Mombasa.

2.1.2 Site Description

The project site environment is in an Industrial Zone and neighbourhood within 5Kms radius comprises of the following: -

S/No.	Name
1.	Kenya Railways Corporation, Changamwe
2.	Kenya Petroleum Refineries Limited
3.	Kenya Pipeline Company Ltd
4.	APM Container Freight Terminal
5.	Transpares Limited
6.	CMC Motor Corporation
7.	Multiple Hauliers EA Ltd
8	Mombasa Cement
9	Kenya Ports Authority
10	Moi International Airport Mombasa
11	Tunaweza Kenya Apparel EPZ Kingorani

2.1.3 Study Area and Area of Influence (AoI) for the ESIA

The study area for this Environmental Social Impact Assessment (ESIA) is generally 5 Km radius from the project site to the furthest end and 1Km to the shortest end and is within Changamwe and Mikindani villages. The ESIA study area is mainly associated with areas that could be affected by the potential impacts that could arise from the project site's activities.

The Area of Influence (AOI) for the ESIA covers 50 Km radius to Kilifi county and Mazeras from project site.

2.2 Project Description

Fossil Supplies Limited (FSL) intends to construct 4 No. new LPG Mounded bullet tanks with a total capacity of 6,000MT and eventually connect to existing KPC/KPRL Pipelines. The project will occupy an area of approximately 3.5 hectares in a leased KRC land by Fossil Supplies Limited and will have the following components: -

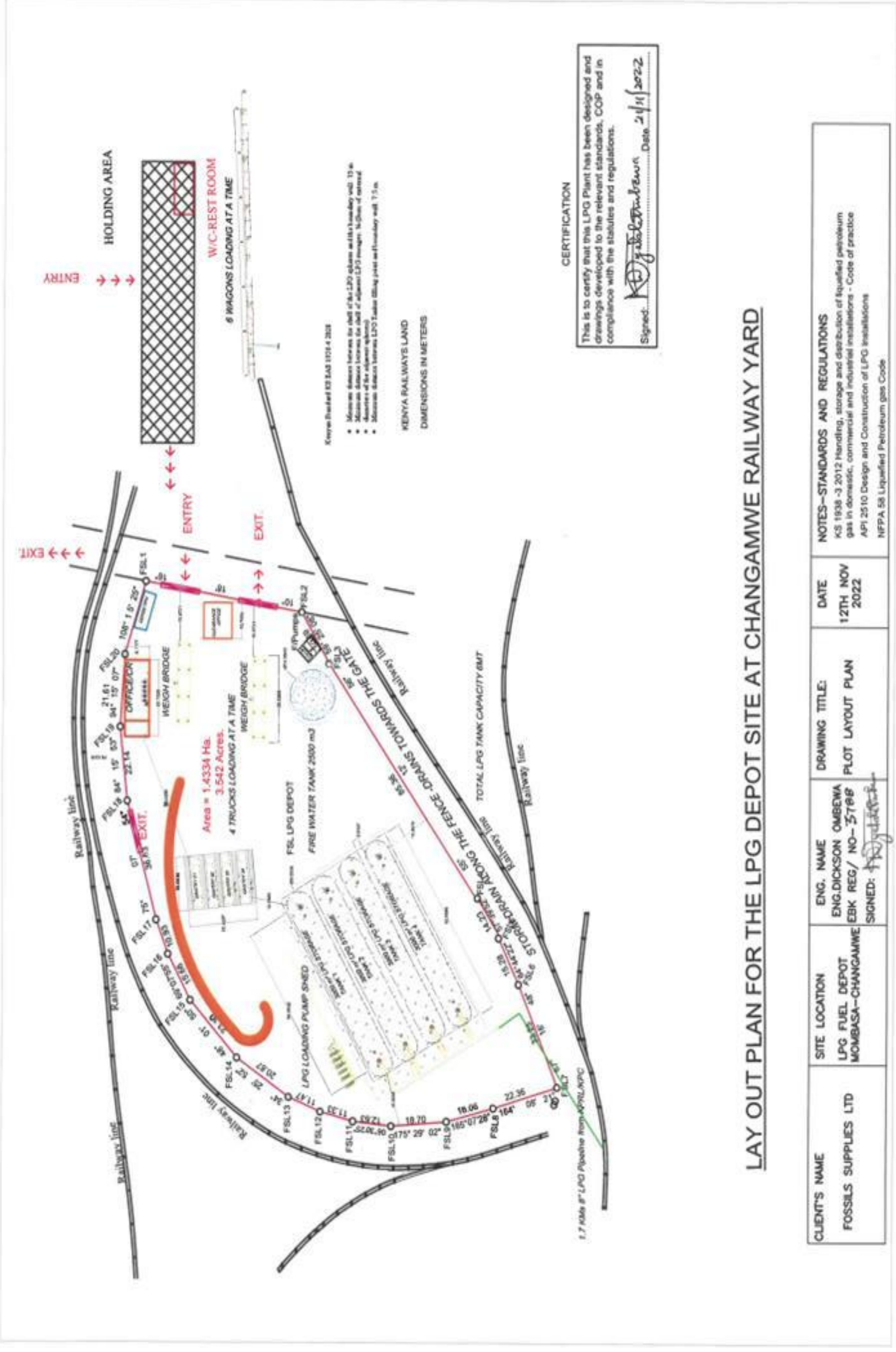
- A storage area with four Mounded Bullet Tanks of 3,000m³ each giving a total capacity of 12,000 m³ equivalent to about 6,000 MT
- Fire Water Tank 2,500 m³ along with the required Foam compound.
- Fixed internal and external firefighting facilities
- Pumping station with pumps, compressors and odorizing system
- 4 Truck loading gantries
- With a future expansion provision for incorporating Rail Transport Cargo (RTC) loading/unloading area, with capacity for 6 wagons
- Fire and gas leak detection alarm systems
- Compressed air network for motorized valves
- Administrative, operations, firewater pumps and utilities buildings
- Truck parking zone.
- Secure high perimeter wall fence including CCTV with access control at all entry and exit points
- Security / flood-lighting system

Control room/operational office, with 4 bulk tanker-loading points with deluge systems, trucks parking area, firewater tank, water sprinkler system and all standard requirement's auxiliary facilities such as a filling point, Hydrant location, jetty, piping and an office.

The compressed air for motorised valves of the storage, pumping and loading areas will be supplied by two electrically driven compressors (1 operational, and 1 standby) and a buffer tank. The compressors will be located in the utilities building.

Gas, fire detectors and ESD button will be installed in pumping area.

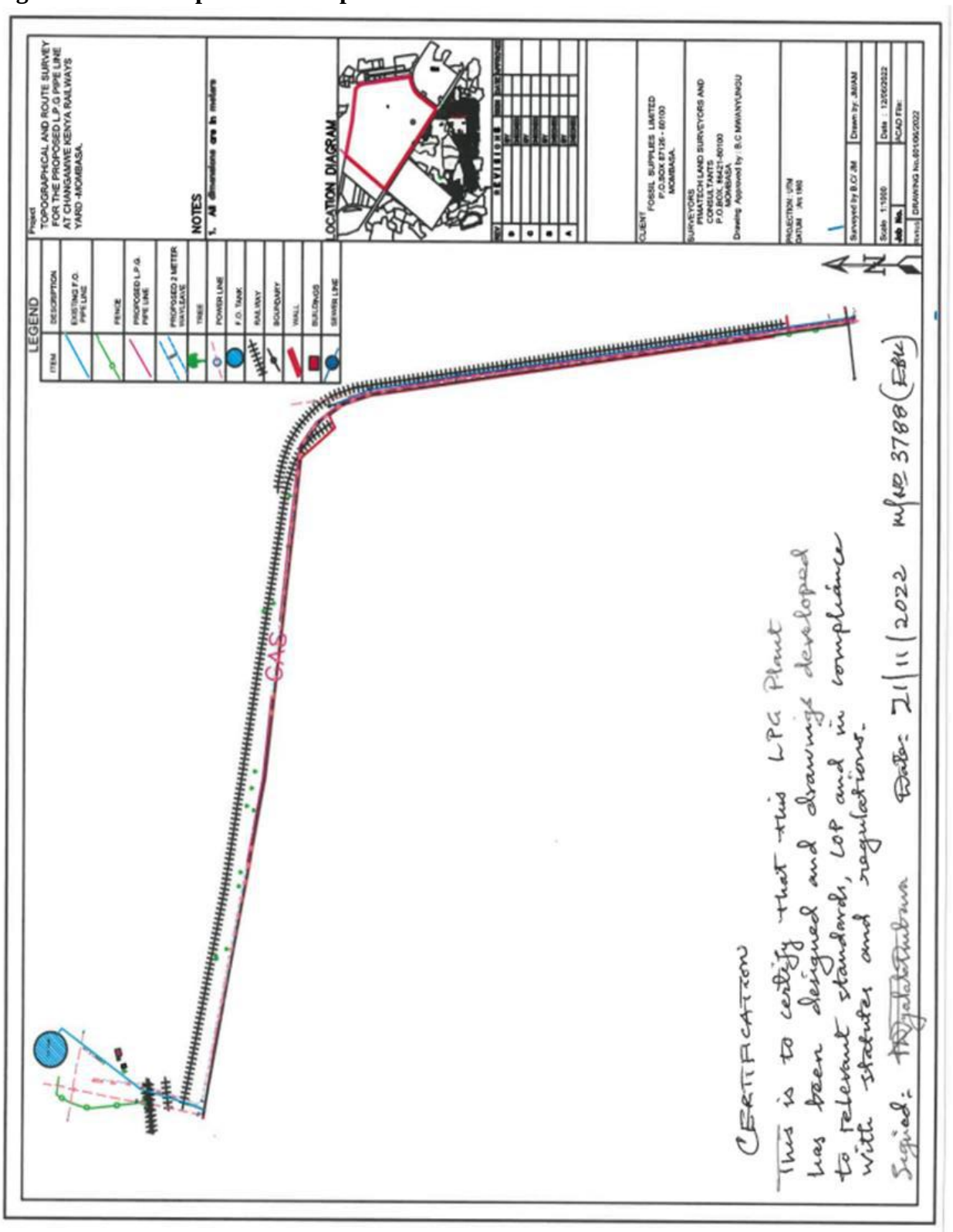
Figure 2.1 FSL Proposed LPG Terminal Layout Plan



2.2.1 Delivery Pipeline Route

The LPG will be delivered to the project site through an 8-inch pipeline whose tie in point will be at an existing KPRL/KPC pipeline along the refinery road as shown in the sketch below.

Figure 2.2 FSL Proposed LPG Pipeline Route



2.3 Project Design

2.3.1 Overview

The facility will include: -

- A storage area with four Mounded bullets 3000 m3 each
- Water Tank-2500 m3 and
- Slope Tank-200 m3
- A pumping station with pumps, compressors and odorizing system
- A loading Gantry area with four loading Arms-LPG
- A loading Gantry area with four loading Arms
- Future-RT loading/unloading area with capacity for 6 RTCs
- Fixed firefighting facilities
- Fire and gas detection and alarm systems
- Compressed air network for motorized valves
- Administrative, Operations, Firewater pumps and utilities buildings
- Truck/Car parking area for employees and visitors
- Secure perimeter walls and fences with access control at all entries and exit points.

2.3.2 Mounded Bullet

Mounded Bullet tanks have less fire and explosion risk and required less safety distance.

The equipment for each Mounded Bullet Vessel is: -

1. Flanged inlet and outlet connections.
2. Flanged manholes (with mechanical handling facilities) on the top and the bottom of the tank.
3. Internal piping for liquid inlet.
4. Motorized valves (air driven) on all main inlet and outlet connections.
5. Excess flow valves and backpressure check valves on main liquid inlet and outlet connections.
6. Internal Whessoe type valve on product outlet nozzle
7. Pressure relief facilities with 100% spare capacity to enable testing and removal of a valve whilst the tank remains operational. Mechanical handling facilities are required for these valves.
8. Automated tank gauging system (with averaging temperature recording).
9. Independent high and high-high level alarm systems
10. Pressure transmitter at bottom and top of the spheres of tank
11. Stilling wells for tank gauging, in accordance with the requirements of the equipment / system suppliers.
12. Water draw off connection with valve and piping including drain pot to second valve
13. Full access stairs (from the finished floor level) and platforms.
14. The liquid outlet line from each tank will have a connection for product sampling.

The system is designed to allow the following operations: -

1. To receive product from Pipeline
2. To load trucks
3. To unload trucks (limited operation)
4. To transfer product (liquid and vapour) between tanks
5. To recirculate product in the same tank, for product mixing

Gas and fire detectors and ESD buttons will be installed in the storage area.

2.3.3 LPG – Pumps

Loading pumps will be centrifugal. Truck loading pumps will be directed to a common manifold. RTC loading pump will not be connected to the common manifold.

1. P-01, P-02, P-03, P-04: Operational for trucks loading. They will be designed to load one truck in approximately 45 minutes and will have a flow rate of 60 m^3/hour.
2. RTC: Operational for RTCs loading. They will be designed to load one wagon in approximately 45 minute and will have a flow rate of 100 m^3/hour.
3. Spare pump designed for trucks loading and RTC loading with a flow rate of 100 m^3/hour, this pump can replace one of the truck loading pumps or the RTC loading pump in event of breakdown.
4. Automatic sequences in the loading management system will control the start-up of the pumps and the operation of the loading flow rates.

Loading pumps will be centrifugal. Truck loading pumps will be directed to a common manifold. RTCs loading pump will not be connected to the common manifold.

The compressed air for motorized valves of the storage, pumping and loading areas will be supplied by two electrically driven compressors (1 operating, and 1 spare) and a buffer tank. The compressors will be located in the utilities building.

Gas, fire detectors and ESD button will be installed in pumping area.

Truck loading: 40 trucks of 24T: 960T per shift

2.4 LPG Basic Properties

LPG consists mainly of mixtures of propane and butane. The construction of a bulk storage facility for LPG has a few key influences, which have been considered to safely and effectively store LPG in a bulk installation.

2.4. 1 LPG Climatic Influencers

The location of the facility greatly influences the properties of the LPG being stored due to the ambient conditions on-site.

- Mombasa-Climate type: Tropical 4

- Room temperatures-The average annual minimum temperature is: 21.0 °C The average annual maximum temperature is: 31.0 ºC
- Basic wind speed: 30,3 m/s
- Maximum wind gust: 37,4 Km/h (July 2021)
- Average humidity: Over 75% (all year)
- Maximum average rainfall amount: 265,3 mm (May 2021)
- Seismic requirement: Seismic Zone IV according Kenya Seismic Classifications 1973
- The vapour pressure of LPG varies according to the temperature of the surroundings and in areas of higher ambient temperatures, a higher pressure will be required to liquefy the LPG.

2.5 Safety Distances

2.5.1 Introduction

When constructing an LPG facility strong emphasis should be placed on designing the facility according to the correct and applicable codes and standards in the area/country of construction. These standards will provide an engineer with the correct information and guidance to correctly and more importantly – safely design an LPG bulk storage facility. One of the key concerns when designing an LPG bulk storage facility is the correct implementation of safety distances. These govern the required safety distances between storage (pressurized) vessels with other storage vessels, whether it is another LPG storage vessel or another chemical storage vessel. These safety distances also govern the allowable minimum distance between an LPG pressure vessel and the plot borders, roads etc.

2.5.2 LPG Tanks

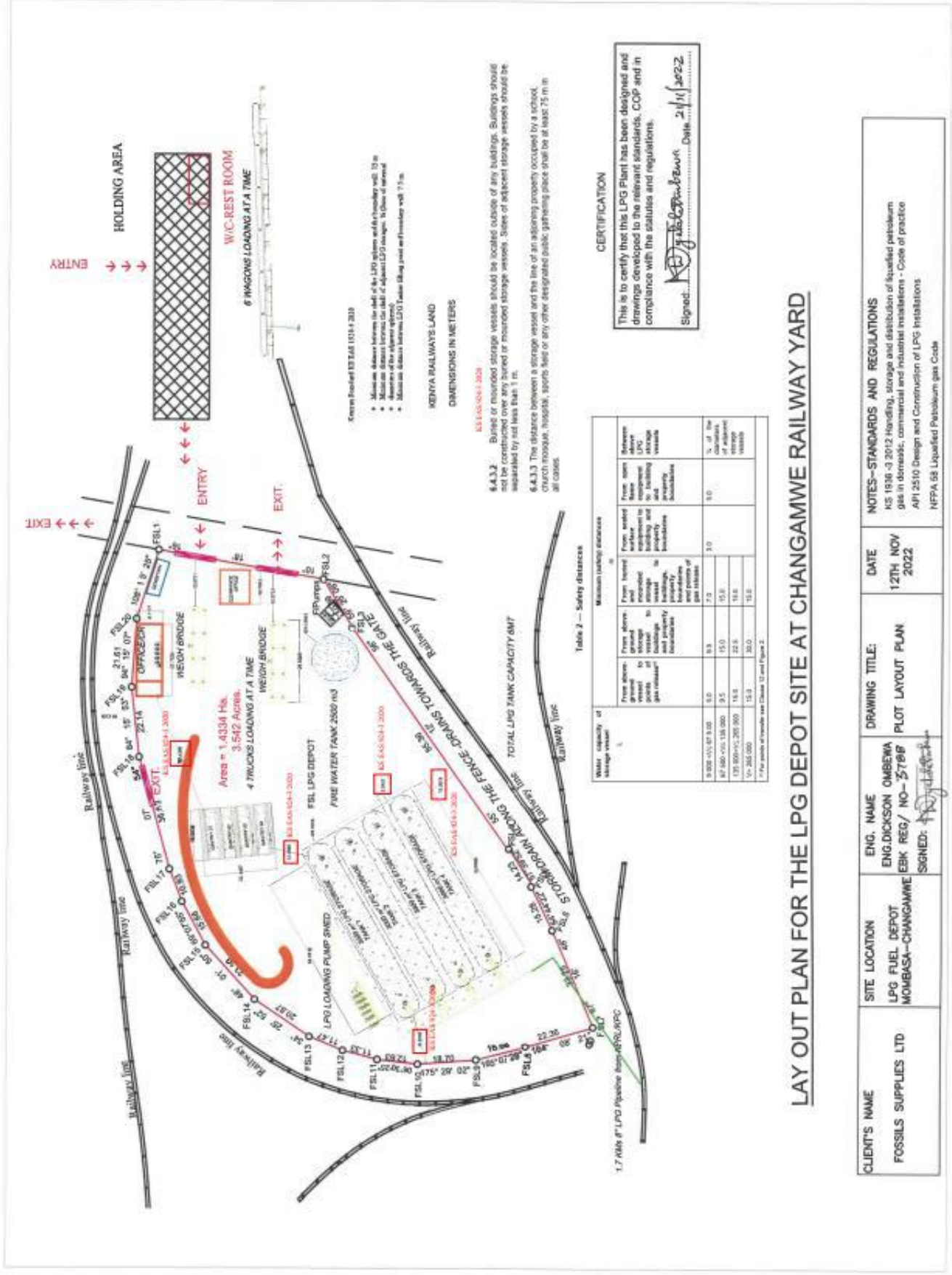
The safety distances limit the overall storage that can be stored safely at a certain facility. The use of an internationally accepted standard is therefore very important during the feasibility stages and estimations of the possible storage on site.

Safety distances have been taken according to the Kenyan Standard KS EAS1924_3_2020., and are the following:

a) Minimum distance between the shell of the LPG Tanks and the boundary wall: 15 metres
b) Minimum distance between the shell of adjacent LPG storages: ¼ (Sum of external diameters of the adjacent Tanks)
c) Minimum distance between LPG Tanker filling point and boundary wall: 7.5 metres

FSL is compliant to the safety distances as per KS Standards as shown in Figure 2.3 below

Figure 2.3 FSL LPG Safety Distances Mapping



I. LPG Mounded Storage Facilities

- System Design as per API 2510
- Four (4) Mounded bullets of 3000 MT capacity total

II. Bullet Details

- Operating LPG storage capacity of each Bullet 3000MT
- Operating capacity considered as 85% level of the volumetric capacity of bullet
- Size: Length (TL~TL) 52m x Diameter 7 m
- Operating / Design Pressure 8.6 /14.5 Kg/cm2g
- Design Temperature (-) 27°C to 55°C
- Material ASTM A 516 Gr.60, (IT) or equiv.

III. Normal Bullet Operation

- 2 mounded bullet is receiving mode,
- 2 dispatch mode

IV. LPG Pump Details

- 6 nos. of LPG forwarding pump to be used.

V. Corrosion Allowance

- Internal Corrosion Allowance: 3 mm (minimum).

VI. Pressure Safety Valve

- Each vessel shall have at-least two Safety Relief Valves (SRV).
- The full flow capacity of each SRV on mounded vessel(s) shall be minimum 30% of the capacity required for an equivalent size of above ground vessel.

VII. Gas Detection System

- Suitable gas detectors Infrared type shall be placed at critical locations in the LPG storage area such as near the ROVs, and all pumps in inspection tunnel or dome connection, near water draining/ sampling points.
- First level alarm shall be set at 20% of Lower Explosive Limit (LEL) and second level alarm at 60 % of LEL

VIII. Noise Criteria

Nearby equipment15m

- The maximum allowable noise level nearby equipment shall be 85 dB within one meter from the equipment, during normal operation and with control valves in line.

IX. Near Working Environment

- Overall noise level in the working environment shall be below 85dB at 1metre outside plant limit.
- The average noise level shall be 60 dB at 100 m from the boundary of plant.

2.6 LPG Storage: Gas Composition

When designing the facility, proper investigations should be made regarding the typical composition /ratio of propane to butane should be done to establish the correct design solution for the facility. The table below indicates the large difference between the vapour pressures of propane and butane. Should the actual LPG being stored contain more propane than the anticipated during the design stage, the vessels could fail due to insufficient design pressures
and cause major safety hazards, whilst overdesign could increase the CAPEX of the facility when the propane content of the LPG gas stored is much lower than designed for.

Table 2.2 LPG Design Pressures

	Design grade
C3%	15
C4%	85
Vapour Pressure	4.8 bar (gauge) at 40 ºC

Pressure design of the bullet is 17 bars.

During operation, it shall, however, be the responsibility of the operators to ensure that the incoming LPG conforms to the propane/butane ratio according to which the facility has been
designed.

2.7 LPG Storage Solutions

2.7.1 LPG Spheres

The first spherical LPG storage vessels (‘Horton Spheres’) were constructed in 1923 by Chicago Bridge & Iron Company (CBI) and allow for effective large volume storage of LPG. (Ezzel, 2016)
The largest benefit with regards to the sphere is their ability to store very large amounts of LPG in proportionally small areas. This ability arises because an LPG sphere has a very large volume to surface area ratio. Furthermore, the required wall thickness of an LPG

sphere of the same diameter as that of a bullet is much less. LPG bullets can, however, reach extreme lengths (up to 70m), allowing for higher storage volumes.

Large spheres, however, have a large concentrated load (point load) on a small section of earth, leading to higher groundwork design constraints. Spheres not be moved once constructed as they lose integrity during deconstruction (due to a high amount of welding points) compared to a bullet that can be split into fewer sections. (BNH Gas Tanks, n.d.).

Spheres' complex designing procedures usually also extend the construction period for the spheres but in turn, spheres allow for less piping and connections when compared to multiple bullets. (BNH Gas Tanks, n.d.).

2.7.2 LPG Bullets

Another form of storage (and probably the most common) is the LPG bullet.

2.7.2.1 Above-Ground

Aboveground storage in bullet-form is similar to that of spheres. Bullets, however, are usually installed pre-fabricated in smaller units with cases of large (50+m) in length have been done in various locations across the world with some reaching lengths of 70m as in the case of Sunrise Energy LPG Import Terminal (Engineering News, 2014). Richards Bay, owned by South African independent bulk liquid and gas storage operator Bidvest Tank, the facility's four LPG storage tanks are each 60 m long and 16 m in diameter, making them the largest such storage tanks in the world. -5650MT-(Engineering News, 2020)

Bullets have the advantage of being able to be moved in sections as well as having a more uniformly distributed load across the ground surface due to multiple supports and often multiple (smaller) bullets. Settling occurs less readily and bullets are therefore a safer option in locations with more severe weather conditions (Ezzel, 2016) or challenging geotechnical areas. Bullets can also be transported should it be necessary via minimal sections after vessel deconstruction leading to minimal welded seams and possible weak points after reconstruction.

Regular maintenance can also much more readily be completed in the case of bullet tanks compared to a large sphere, with the possibility of some of the bullets staying in operation during scheduled maintenance, whilst the use of a large sphere will shut down all operations until maintenance is complete (BNH Gas Tanks, n.d.).

2.7.2.2 Mounded / Buried

Mounded bullets are bullets that are buried beneath a mound, typically trapezoidal, consisting of sand/ground and a cover of a binding material like asphalt. The mounding is usually also fitted with walls at two opposing ends with some cases being surrounded with a wall. Mounded or buried bullets are a trade-off between available storage and the necessity

to allocated extra civil and mechanical work to accommodate the actual mounding. The use of mounded bullets allows for narrower spacing between adjacent LPG bullets as well as less strict safety distances with regards to other properties in close proximity.

This is turn allows for more available plot space for the actual storage of LPG. When constructing mounded bullets, it is, however, important to consider the gravitational force that the mound material exerts on the shell of the bullet and also on the supports for the vessel. Connections on underground tanks should be located in positions that are easily accessible to operate and maintain.

Mounded bullets are considered to be a safer option for LPG storage than conventional methods, such as Horton spheres, buried storage etc., because situations leading to a possible Boiling Liquid Expanding Vapour Explosion (BLEVE) are eliminated. Mounded bullet installation is more space efficient than spheres. The Mound shall be designed such that maximum six Bullets are accommodated in one single mound and the separation distance between 2 adjacent bullets shall be 2 metres.

Figures 2.4 Typical LPG Mounded Bullet Tanks

2.8 Standards and Regulations

The Basic Standards and Regulations considered for the engineering design are the following: -

2.8.1 LPG Storage

a) KS EAS1924_3_2020.Handling, storage and distribution of liquefied petroleum gas in domestic, commercial and industrial installations - Code of practice
b) EEMUA-Guide for the design, construction and use of mounded horizontal cylindrical vessels for pressurised storage of LPG at ambient temperature PUBLICATION 190
c) API 2510 Design and Construction of LPG Installations
d) NFPA 58 Liquefied Petroleum gas Code
e) EN 13445 - Design, fabrication, and inspection Unfired Pressure Vessels
f) British standard PD 5500-2003. Specification for unfired fusion welded pressure vessels

2.8.2 Storage Tanks

API 650- Welded Steel Tanks

2.8.3 Fire Fighting Systems

(a) NFPA 13: Standard for the Installation of Sprinkler Systems
(b) NFPA 14: Standard for the Installation of Standpipe, Private Hydrant and Hose Systems
(c) NFPA 15: Standard for Water Spray Fixed Systems for Fire Protection
(d) NFPA 20: Standard for the Installation of Stationary Pumps for Fire Protection
(e) API 650 Welded Steel Tanks
(f) API 2510 Design and construction of LPG Installations

2.8.4 Electrical Installations

(a) NFPA 70 National Electrical Code
(b) NFPA 77 Recommended Practice on Static Electricity
(c) IEC Code

2.8.5 Piping

ANSI B.31.3 Chemical plant and petroleum refinery piping
ANSI B.31.4 Liquid petroleum transportation piping systems
ANSI B.16.5 Pipe Flanges and Flanged Fittings

A statement indicating the service that the pipeline will render, the specifications of the pipeline, the characteristics of the fluid to be conveyed through the pipeline.

(a) Outside or nominal diameter of the pipeline

(b) Wall thickness of the line pipe material
(c) Type and Grade of line pipe.
(d) Designed maximum operating pressure.

2.8.6 Liquid Petroleum Transportation Piping Systems

Definition: Liquid Petroleum shall include, refined products-AGO/PMS.
Gas Liquids, liquefied Petroleum Gas-LPG
Design Criteria: Reference Code ANSI/ASME B 31.4

a. Rules, practices and standards for oil and gas industry are issued by AP institute and followed by almost all oil and gas companies in the world Among the many standards issued by the institute, there is also a standard for the design of pipelines: API STANDARD 5L. Within this standard, materials for oil and gas transportation pipelines are specified, with denomination API 5L.
b. This is a family of carbon steels almost equivalent to ASTM A53 / A106. Equipment specified to these standards is typically more robust than general industrial applications.
c. The two commonly acceptable grade of line pipes for this service shall be either those materials conforming with the ASTM A 106 Grade B or API 5L Grade B for low pressure range for high working pressure or large diameter pipelines, and any of the API 5LX range for high working pressure or large diameter pipeline where lower grade would require excessively thick walls to cope with the desired working pressure.
d. The line pipe shall be seamless in fabrication, being of the Electric Resistance Welded (ERW) or Double Submerged Arc Welded (DSAW) types only.
e. The design shall generally be in accordance with the standard ANSI/ASME B31.4 and its subsequent revisions published by the American Society of Mechanical Engineers under the title Liquid Petroleum Transportation Systems.

2.8.7 Construction Procedure

a) All metallic pipeline material to be buried shall be coated with any of the following systems – coal-tar enamel, Asphalt enamel, polyethylene tape, epoxy, asphalt mastic, urethane or other material specially approved.
b) The pipeline construction shall generally follow the of the standard ANSI/ASME B 31.4.
c) All pipeline construction shall be carried out in a manner that will minimize disturbance to the environment.
d) Special precautions shall be taken to protect the pipeline from washouts, unstable soil, landslides or another hazards that may cause the pipeline to move or be subjected to abnormal loads.
e) Excavation for the pipeline shall follow good pipeline practice and consideration for public safety as provided for in the Standard API RP 1102.

f) All pipeline welding shall be in accordance with the provisions of API 1104/1107 while welding inspection shall be by non-destructive method preferably using Radiographic method contained in API 1104.
g) Minimum soil coverage of pipelines shall be as follows:
    - Dry land – 1.0 metre
    - River Crossings and Riverbeds – 1 metre
    - Drainage ditches, Rail Road and Highway Crossing – 1.5 metres
    - Rocky Areas – 0.9 meters
    - Swamp – 1.0 meter
    - Shipping Channels – 2.0 meters.

2.8.7.1 Inspection and Testing

a) The pipeline material and construction shall be inspected visually and examined radiographically according to the standard ANSI/ASME B 31.4.
b) All tests shall generally be hydrostatic and be conducted in a manner that will ensure the protection of life, property and the general environment of the pipeline.
c) The entire length of the pipeline shall be tested to the designed rated pressure while any in-line pressure vessel or pre-fabricated manifold on the pipeline shall be tested to the manufacturer's specifications.
d) The pressure recording instruments to be used for the tests shall have a valid calibration certificate which should not be more than a year of issue and the chart record of the test shall be continuous and legible and all test results and any remedial action taken shall be submitted to KPRL/KPC for approval before Tie-in/ commissioning of the pipeline. The Accuracy of the pressure recorder shall be within two per-cent (2%) of its range.
e) Unless otherwise permitted by the Owner, pressure test duration shall not be less than twenty-four hours of continuous test both for leaks and material failures. Buried pipeline of up to 100 meters in length and all surface running pipelines can be tested for less periods but not lower than (1) hour.

2.8.7.2 Test Code

a) The actual test pressure throughout the duration of test shall not exceed 110% of the minimum yield strength of the pipe material, hence the testing equipment shall be preset not to produce more than this pressure during the test.
b) The test medium shall be water;
c) All buried pipelines shall be tested to a pressure not less than 1.25 times the maximum designed operating pressure.
d) Surface pipeline transmitting liquid petroleum or gas shall be tested up to a pressure not less than 1.4 times the maximum designed operating pressure.
e) All pipelines shall be tested to a minimum pressure of not less than 700 kilopascals.

f) The maximum test pressure in all cases shall not result in a hoop stress, greater than 110 percent of the specified minimum yield strength of the pipe material based on its nominal wall thickness.
g) Valves and fittings on the pipeline under test shall not be subjected to a pressure greater than the manufacturer's test pressure rating during the test.

2.8.8 Corrosion Control

The following shall constitute the minimum requirements and the procedure for cathodic protection of ferrous pipe and its components from internal and external corrosion the design of which shall generally follow the specifications and procedures prescribed in NACE RP 0169 and section 10.1&10.2 of API RP 1160 managing pipeline system integrity and external corrosion control of buried or submerged pipeline.

This shall consist of application of coating to the pipeline and its cathodic protection to achieve the following objectives: -

a) Protective Coating

i. Shall be applied in such a way that it will mitigate corrosion and adhere to the pipe metal surface sufficiently enough such that it will effectively resist under film migration.
ii. Shall be ductile and strong enough to resists cracking and damage during handling an under soil stress.
iii. Shall be compatible with any supplemental cathodic protection and if is an insulating type material shall have low moisture absorption.
iv. Shall be applied in such a way that no irregularities protrude through it and no holiday gaps exist in the coating all along the whole length of the pipeline.
v. The points of connection of any attachment to pipeline shall be equally sealed with the coating, together with the attachments themselves.

b) Cathodic Protection System

i. This shall be provided by either a galvanic anode or impressed current anode system installed in such a way that it mitigates corrosion and contains method of determining the degree of cathodic protection achieved on the pipeline. The criteria for the selection of an appropriate protection system shall be as listed in section19 7 paragraph 7.5 of NACE standard RPO 169 and relevant subsequent provision.
ii. The system shall be installed not later than one year after the laying of the pipeline in such a way that the pipe coating at the points of installation are in place.
iii. The cathodic protection system shall be electrically isolated at all interconnections to other pipeline systems or structures except where the two structures are mutually protected by the same system.
iv. The cathodic system shall be protected against damage by atmospheric electrical discharges, underground cables and power lines.

v. Except for underwater pipelines, sufficient test leads shall be installed on buried pipelines for occasional check of the effectiveness of the cathodic protection to be carried out by electrical measurements. Such test stations shall include all pipe casing installations, insulating joints, all crossings and main manifold junctions.
vi. A minimum separation of 3 meters shall be maintained between electric transmission tower footings, ground cables and earthlings, power lines and the pipelines under protection.

c) Monitoring of Cathodic Protection Systems

i. Cathodic protection facilities shall always be maintained in serviceable condition and be electrically tested and inspected once a year with appropriate corrective measures taken where such inspections reveal any weakness in the system.

However, all sources of impressed current rectifiers and other associated devices shall be inspected and tested at quarterly intervals to ensure that they are functioning properly.

2.8.9 Gas Transmission And Distribution Pipeline

2.8.9.1 General Design Considerations

Scope: Design, fabrication, installation, inspection, testing of LPG transmission and distribution systems.

2.8.9.1.1 Design Criteria and Materials Specifications

Applicable standard shall be the ANSI/ASME B31-8 under the Title “Gas Transmission and Distribution Piping Systems”

a) All materials to be used shall generally conform to the specifications in appendix B of the reference Standard ASME B31.8 for the structural materials of the line pipe, valves, fitting s and flanges, bolting and tubing.
b) The pipelines shall be generally seamless or of the ERW and SCAW types.
c) Weld ability of the ferrous pipe material shall be tested in accordance with the requirements of API standard 1104 ASME Section IX.

2.8.9.1.2 Design, Construction Testing of Gas Pipeline

Applicable Standards and Specifications

a) The standards and codes specified in ANSI/ASME B31.8 and National Association of Corrosion Engineers Standards RPO169 generally referred to as NACE standard RPO169 shall be followed in the design and construction of gas pipelines and their corresponding corrosion control installation respectively.
b) Long distance gas transmission pipelines shall be made of steel, the design and construction of which shall be governed by the population density indices specified in ANSI/ASME B31.8 and the corresponding design factors. Also the specified construction types of pipelines in the proximity of main roads and railroads and the mode of their crossing shall be complied with.
c) The minimum depth of burial shall be as specified but where these minimum depths cannot be achieved or the pipeline at these points shall be encased, bridged or specially reinforced to withstand any anticipated external load.
d) All buried pipelines to be protected against corrosion.
e) Inspection of pipeline construction materials and its appurtances, welding, ditching, stringing and the general installation shall follow the procedure of the ANSI/ASME B31.8.

2.8.9.2 Operation And Maintenance Of Gas Pipelines.

This shall be as specified in the provisions of NACE standard RP1069 shall be followed in the design and maintenance for the associated corrosion control system of the pipeline.
Any gas pipeline that will not be put into use for more than six months after construction shall be filled with inert gas or nitrogen and if it is to be put into use after one year of completion shall be pressure tested before being put into use

2.8.10 LPG Compressors

Gear driven compressor shall be used. There shall be a minimum of two compressors, one on duty and one on standby.

Compressor shall be provided with the following features as a minimum: -

- Pressure gauges in suction and discharge.
- Temperature gauge in discharge
- Discharge safety valve and a vent valve, their outlets leading to flare.
- Suction and discharge block valves (lock open type)
- Suction strainer
- Check valve in discharge
- A discharge to suction recycle valve for achieving capacity turndown during start-up.

Other indications/ protections may also be provided along with those recommended by compressor manufacturer and installed according to manufacturer's instructions.

2.8.10.1 Air Compressor

The quality of instrument air shall conform to the following specifications:

- Pressure 7 Kg/sq.cm. g
- Moisture Dew Point, 19°C at 7 Kg/sq.cm. g
- Quality Oil free

For the plant air/ service air, the specifications are given below:

- Pressure 7 Kg/ sq.cm. g
- Moisture No free moisture
- Quality Oil free

Air compressor to be installed on a Duty and Standby (Redundancy) basis.

2.8.11 Metering System

Two Positive Displacement Meters (PDM), one on duty and one on stand-by will be provided at receipt terminal at LPG plant area used for custody transfer as well as leak detection purpose. Suitable filtering facility shall be used before metering. Meter Prover to be provided.

2.8.12Electrical Area Classification

All electrical fittings/equipment to be of Flame-proof type in hazardous areas.

2.9 Instruments

- The storage tanks shall have minimum two differential type of level indicators and one independent high-level switch.
- One level indicator shall be float type and the other may be differential pressure (DP) type or any other proven type.
- DP type level transmitter shall either be sealant filled type or LP side tubing heat traced.
- High level alarms shall be set at not more than 85% level of the volumetric capacity of the sphere.
- Audio visual indication shall be at local panel & control room.
- The relieving load for the safety valves, (minimum 2 nos. installed, each having 100% relieving capacity) shall be based on fire condition and no credit shall be taken for fire proofing on the vessel.
- For safety reasons, the discharge of safety valves shall be connected to flare system wherever available. In this case Pressure Safety Valves (PSVs) shall have lock open (or car seal open) type isolation valves on both sides of Pressure Safety Valves.
- A weep hole with a nipple at low point shall be provided on the vent pipe in order to drain the rain water which may get accumulated otherwise. Weep hole nipples

shall be so oriented that in case of safety valve lifting and consequent fire, the flame resulting from LPG coming out from weep hole does not impinge on the sphere or structure. A loose-fitting rain cap with a chain (non-sparking) fitted to vent pipe shall be provided on top of PSV.

2.10 Safety/ Security System

The features of safety/ security system for the different areas in the LPG terminal shall be as follows: -

2.10.1 Fire Water Storage

i. Water for the hydrant service shall be stored in above ground tank,2500M3 of steel or concrete. The effective storage capacity shall be not less than 4 Hrs. aggregate working capacity of Fire Water pumps.
ii. Storage tank/ reservoir shall be in two inter connected compartments (or two separate tanks) to facilitate cleaning and repairs.

2.10.2 Fire Water Pumps

i. Flooded suction centrifugal type fire water pumps shall be installed to meet the designed fire water flow rate and head.
ii. An automatic (pressure switch operated auto start-stop) jockey pump of capacity 7 Kg. /cm2 to maintain this pressure at the farthest end of the hydrant system.
iii. The fire water pump(s) including the stand by pump(s) shall be of diesel engine driven type. The pumps shall be capable of discharging 150% of its rated discharge at a minimum of 65% of the rated head. Each engine shall have an independent fuel tank of suitable size for 6 Hrs. continuous running.
iv. Fire water pump house/ Fire water tanks or reservoir shall be located at least 60 M (minimum) away from LPG sphere.

2.10.3 Fire Hydrant Network

i. A fire water ring main shall be provided all around perimeter of the LPG Plant facilities with hydrants/ monitors spaced at 30 metres centre to centre. Fire hydrants and monitors shall not be installed within 15 metres from the facilities/ equipment to be protected.
ii. External fire hydrants shall be installed at strategic places.
iii. Fire hydrant network shall be in closed loops to ensure multidirectional flow in the system. Isolation valves shall be provided to enable isolation of any section of the network without affecting the flow in the rest. The isolation valves shall be located normally near the loop junction. Additional isolation valves shall be provided in the segments where, the length of the segment exceeds 300 metres.
iv. Fire hydrant ring main shall be laid at a height of 300 mm to 400mm above finished ground level except at road crossings where the pipelines shall be laid underground.
v. The mains shall be supported at regular intervals not exceeding 6 meters.

vi. The system for above ground portion shall be analyzed for flexibility against thermal expansion and necessary expansion loops shall be provided where necessary.

If Fire water ring main is laid underground the following precautions shall be taken: -

i. The Ring main shall have at least one meter earth cushion in open ground and 1.2 metres cushion under the road crossings.
ii. The Ring main shall be provided with protection against soil corrosion by suitable coatings/ wrappings.
iii. In case of poor soil conditions, it may be necessary to provide concrete/ masonry supports under the pipe line.
iv. Fire water ring main shall be sized for 120% of the design water rate. Design flow rates shall be distributed at nodal points to give the most realistic way of water requirements in an emergency.
v. Hydrants/ monitors shall be located bearing in mind the fire hazards at different sections of the premises to be protected and to give most effective service.
vi. Hydrants/ monitors shall be provided for every 30 metres in case of hazardous areas and may be spaced 45 metres in other areas.
vii. Connections for fire water monitors shall be provided with independent isolation valves.
viii. Hose boxes with 2 nos. hoses and a nozzle shall be provided between the hydrant points.
ix. Considering radiation levels in the event of a fire hydrants/ Monitors/ Control valves shall be located at a safe distance (minimum distance of 15 metres) and from hazardous equipment/ buildings.
x. The deluge valves shall be located outside the kerb wall at a safe distance in case of LPG spheres / bullets. A fire wall shall be provided for the protection of deluge valve and for operating personnel.

2.10.4 Material Specifications

All the materials used in fire water system using fresh water shall be of approved type as indicated below.

In case of sea water service, the fire water main pipes shall be concrete mortar lined internally.

i. Pipes Carbon Steel
ii. Isolation Valves Cast iron/ Cast Steel
iii. Deluge valves Cast iron/ Cast steel
iv. Hydrant Stand post Carbon Steel Outlet valves Gunmetal/ Aluminium
v. In case of underground mains, the isolation valves shall be located in brick masonry chamber.

vi. The above ground fire water main and the fire hydrant stand post shall be painted with corrosion resistant "Fire Red" paint.
vii. Water monitor and hose box shall be painted "Luminous Yellow'.

2.10.5 Medium Velocity Spray Sprinkler System

i. Medium velocity sprinkler system based on heat and other detection shall be employed.
ii. Quartzoid Bulb protection can be provided in open areas. The Quartzoid Bulbs designed to blow at 79 deg. centigrade (max.) and Quartzoid Bulb network shall be maintained with plant air at a pressure of about 3.5 Kgs/sq.cm. g through a restriction orifice and is such that the discharge of air through one Quartzoid Bulb will depressurise the downstream side of the restriction orifice.

2.10.5.1 Automatic Detection System

The Electro pneumatic heat detectors can be provided in the sheds and they work on the following principle:

- Rate of rise - 10 deg. C of temperature rise/minute.
- At 79 deg. C (max.)

The EP detectors are divided into groups and alternate detectors are connected in one circuit. Two detectors from two different groups shall function/ operate for actuation of sprinkler system. The actuation of detectors shall initiate the Opening of deluge valve.

1. Audio-visual alarm at the fire pump house/ control panel.
2. Fire siren.
3. The diesel pump will start based on their set pressure to supplement/ to maintain the fire water pressure in the ring main

2.10.6 First Aid Fire Fighting Equipment

2.10.6.1 Portable Fire Extinguishers

i. Portable fire extinguishers shall be located at convenient and strategic locations and shall at all times be readily accessible and clearly visible.
ii. The maximum running distance to locate an extinguisher in working areas shall not exceed 15 metres.
iii. The top surface of the extinguisher shall not be more than 1.5 metres high.
iv. The fire extinguishers shall be provided at various locations

2.10.7 Wheeled/ Mobile Fire Fighting Equipment

i. One No. Mobile 75 Kg DCP fire extinguisher shall be provided in LPG storage vessels/ LPG Pump House area, Truck loading/ unloading gantry area.
ii. The Dry chemical powder used in the extinguishers shall be Sodium Bicarbonate as per BS: 5306-4. Nitrogen/ Carbon Dioxide shall be used as expellant gas.

iii. A trolley with suitable first aid fire protective accessories shall be readily available in the LPG terminal.

2.10.8 Hoses, Nozzles and Accessories

i. Reinforced rubber lined hoses (63mm) conforming to IS:636 (type A or B) shall be provided.
ii. The hoses shall be of 30 meters standard length and shall be provided with instantaneous male & female couplings.
iii. 50% spare Hoses shall be stored in the LPG terminal. There shall be at least 2 Nos. spare nozzles in each category viz. Jet Nozzles with branch pipes, Fog Nozzles, universal Nozzles, water curtain Nozzles, Spray Nozzles and Triple purpose nozzles in the terminal hose boxes.
iv. The following accessories/ first aid items shall be provided in the terminal: -
    1. Fire hoses 100% of no. of hydrant points.
    2. Safety helmets as required (Min. 10 Nos.) 1 no. for each
    3. Hose Boxes alternate hydrant point.
    4. Stretcher with Min. 2 Nos. each blankets.
    5. First aid box Min. 2 nos.
    6. Rubber hand gloves Min. 2 pairs for electrical purpose.
    7. Low temperature 4 pairs rubber hand gloves for LPG emergency.
    8. Low temperature Protective Min. 2 sets clothing for LPG emergency.
    9. Explosimeter Min. 2 Nos.
    10. Fire proximity suit Min. 1 No.
    11. Resuscitator Min. 2 Nos.
    12. Breathers Min. 1 No.
    13. Breathing apparatus with one spare cylinder, (Cap. 30 minutes)
    14. Water jet blankets Min. 2 nos.
    15. Gas detectors Min. 2 Nos.
    16. Audio visual alarms showing the location of gas leakage shall be provided on the control panel.
    17. First level alarm can be set at 20% LEL and second level alarm at 60% LEL.

2.10.9 Terminal Layout Drainage

LPG at atmospheric pressure and temperature is a gas which is 1.5 to 2.0 times heavier than air and density of the liquid is approximately half that of water and ranges from 0.525 to 0.580 @ 15 degrees C. Since LPG vapour is heavier than air, it will be allowed to flow and settle down in the Shallow Spill collection sump. Drainage will be sloped away from storage vessels, property boundaries etc. and towards low incident areas as shown in the Terminal Layout. Protective clothing such as gloves and goggles shall be worn when there is any possibility of contact with LPG to prevent frost bite.

2.10.10 Safety Distances

Spheres are the most economical form of storage for envisaged capacities 3000 MT of each vessel.

The safety distances as given are the distances in plane between the nearest point on a vessel other than the filling/ discharge line and a specified feature, e.g. adjacent vessel, site boundary etc. The ground underneath or adjacent to connections into LP Gas tanks or LP Gas ancillary equipment to be concreted or compacted and free from depressions, pits, culverts or drains.

Separation Distances between Tanks, Important Buildings and Other Properties must be complied with.

2.10.11 Fire Water System Design

The system comprises of the following elements: -

i. Hydrant system within Terminal/equipment.
ii. Remote/manually operated water deluge sprinkler for LPG spheres.
iii. Water turrets for LPG pumps/ compressors, bulk loading/ unloading area.
iv. Pumping requirement shall be based on NFPA 15:
v. Deluge sprinkler system based on the surface area of one sphere (single largest fire incident) at a water density of 10 lpm/m².
vi. Min. of 2 Nos. of diesel driven water pumps to provide 100% requirement plus one no. of electric water pump (50% requirement as standby).
vii. Water storage min. 30 min of aggregate pumping capacity.

2.10.12 Fire Alarm System

i. A sufficient number of manual call points shall be provided in the terminal in Detail Design.
ii. Electrically operated Fire Siren audible to a distance of minimum 1000m from the periphery of the terminal.
iii. Manually operated fire sirens shall be provided at strategic places according to Detail Design.
iv. For fire condition the siren shall be walling sound for minimum `2 minutes and for all clear signal it shall be straight run siren for 2 minutes.
v. For Disaster condition the wailing sound given shall be repeated thrice with a minimum 10 seconds gap.

2.10.13 Communication System

- Communication system like telephone/ PA or paging or walkie-talkie shall be provided.
- In the hazardous areas flame-proof telephones shall be provided.
- Wherever possible Hot line connection between FSL and external agencies such as Mombasa County Fire Brigade/KPA Fire Station etc. shall be provided

2.11 Water Requirement

Water requirement for the proposed project is given in the table below. The required water will be met from Mombasa Water Supply Company, a borehole within the terminal and storage tank of sea water tapped from the ocean.

Table 2.3 Project Water requirement

Water requirement for the Project	Water Requirement	Litre/per day
1.	Domestic	5,000
2.	Fire Fighting	83,000
3.	Total	98,000

2.12 Power Requirement

Power Requirement for the project will be sourced from Kenya Power and a standby generator.

Power will be required for the following:

1. Fire Pump Motors
2. Compressor Motor
3. LPG pump Motor
4. Lighting
5. Borehole Pump
6. Socket Outlets
7. Future Capacity
8. Security System
9. Air Conditioning/Ventilation
10. Gas Leak Detection System
11. Instruments

Table 2.4 Project Power requirement

Power Requirement Details	Proposed Capacity	Source
Pump motor power	250KVA	Kenya Power
Other power	100kva	Kenya Power
Emergency power	275kva	Diesel Generating set

2.13 Other Design Considerations

Kenya has limited number of regulations to guide in design, construction and operation of liquefied petroleum gas storage and filling station. Subsequently the country relies on international codes of practice, standards and guidelines for the design, construction and operation of such facilities. The design of various structural, engineering and physical works to be employed in the establishment of the liquefied petroleum bulk storage depot will be in line with the requirements of the Physical Planning Act of 1996, Public Health Act standards and requirements for sanitary works, the Mombasa County City Council physical planning standards and regulations for structural and building development, and the Energy Act, 2012 requirements and standards.

Critical areas of design which will consider these regulations and standards will be;

- The structural and engineering planning standards and requirements in designing of the building walls, foundations, and the strengthening of various building slabbing and wall.
- The plumbing works within the buildings involving fixing and piping connections for sewerage, water and gas.
- Engineering works involving designing of electrical connection within the buildings, designing the elevator area, electricity substation, storm drainage and sewerage drainage systems within the buildings, among other activities.
- Mechanical, structural, construction and civil works should be designed and carried out accordingly.
- The general designing of the different sections of the storage depot to the required planning standards and requirements.

2.14 Project Construction Activities and Inputs

The construction activities will involve the construction of the hoarding structures to cordon off the proposed site from the general public, earthworks (ground excavation) in selected areas, and the construction of building foundations. The sub-sequent construction activities shall include the following:

- Assembling of the material inputs, equipment, trucks and machineries required for the proposed construction activities.
- Hiring the required personnel like the environment, health and safety officers, engineers, human resource persons, security guards, site workers (skilled, semi-skilled and casual labourers).
- Clearing of the construction site of debris.
- Commencing the construction activities according to the laid down project implementation timeline, plans and designs.
- Making the final touches on the finished areas.
- Connection to the necessary services such as electricity, sewerage, and water.

- Occupation of the liquefied petroleum gas bulk storage depot after the acquisition and issuance of an occupancy certificate as required by the Physical Planning Act of 1998 standards and regulations.

2.14.1 Inputs

The proposed development will utilize the following material inputs during the proposed construction activities:

- **Land: -** This is where the proposed building's foundation works will be carried out, storm drainage systems, sewerage works and underground electric cabling will be undertaken. The required land has already been acquired and is approximately 7.321 hectares,
- **Labour: -** Qualified engineers, surveyors, foremen and draughtsman, skilled and semi-skilled, casual labourers, health and safety officers shall be involved in the implementation of the proposed project. The proponent shall source local labour as necessary during the entire project cycle.
- **Fuel: -** The machines to be used, trucks, tractors, equipment, and lorries will require fuel to run them during the excavation works, material input supply and transportation process, concrete mixing, and inspection.
- **Material inputs:-** The material inputs for the building's construction work include cement, sand, tiers and struts, water, stainless steel metal and glass, aggregates, murram soil, electrical wires for electricity connection, cast iron versatile tiles for office floor, building stones, aluminium glass for doors and windows, window cills, UPVC waste drain pipes for drainage systems, hoop irons for walls reinforcement, hard-core materials, inspection plates at the bends, tar and ballasts for the construction and tarmacking of the access roads, different colour paints for walls, fiber board clad for reinforcing masonry block work wall, window casements, water tanks and water pipes, roofing tiles/materials, spades, wall, glass and steel metal drilling machines, timber, electric wire mesh for fencing, barbed wire, hand held tools applicable to the proposed development project among other materials. During the operation phase of the proposed development, key material inputs for use will be water, liquefied petroleum gas, and air. The contractor will ensure that no material inputs will be delivered to the site without being tested and accompanied by a compliance certificate. All readily supplied materials e.g. cement, will also be accompanied by compliance certificates from manufacturers.

During the time of field visit proposed site was still in its original condition with the existing developments within the area remaining intact.

2.15 Project proposed works

The project will be implemented in phases starting with the most critical project works and the most needed facilities/structures.

The proposed project works will include;

1. General designing and planning of the proposed liquefied petroleum gas storage depot.
2. Construction work which will involve mainly
    a. Treating of soils under slab and around external foundation for termite control.
    b. Construction of building foundations.
    c. Civil work which will involve mostly stabilizing of soils on cut embankment.
    d. Structural work which will involve implementing all RC works to structural engineer's details, determining the depth of the building foundation to structural engineers' approval and reinforcing of all walls of thickness with hoop iron.
3. Mechanical works which will mainly include all plumbing and drainage works, all floors accessible service ducts, inspection plates and all bends, deep seal or anti-vac to all fittings connected to the SVP"s and waste pipes, encasing of underneath drain pipes, testing of pipes before plastering, and the coordination of mechanical and electrical works.
4. Electrical works which will involve laying of all conduits, and coordination of electrical and mechanical works.
5. Fire work which will consist of installation of water ring main in water fire hydrant, provision of underground water tank with automatic electric booster pump for ring main, provision of automatic push button fire alarm system, and provision of heat and smoke detectors in each room, nine (9) kilogram dry powder fire extinguishers to structural engineer's specifications.
6. Control systems installation including water supply control & fault detection system, power supply control & fault detection system including generators, lighting control & fault detection system, air conditioning, air quality, ventilation control & fault detection system, fire sprinkler, detection & alarm control & fault detection system.
7. Mobilisation of required equipment, machineries, labour, and plants for soil excavation, levelling, compacting and material transportation, concrete mixers and transporting trucks.
8. Identification, acquisition, supply and transportation of the required construction materials to the site.
9. Proposed site vegetation clearance, excavation (earthworks) works, land filling and levelling of the ground.
10. Masonry work, concrete mixing, plumbing and steel metal processing (fabrication).
11. Roofing works, landscaping, gardening, and
12. Occupation of the buildings upon the inspection and issuance of an occupation certificate.

2.16 LPG Facility Site Requirements

2.16.1 Location

While assessing the suitability of any site for location of LPG storage facilities, the following aspects are considered:

- In addition to the requirements for safety distances as given, the location of residential quarters, other industries, public railways, public roads, public waterways, overhead power lines, working areas etc. based on risk analysis study of the proposed site should be taken into account as required by the Statutory/Standards and Code regulations.
- Adequate availability of water from a nearby reliable source of water should be ensured.
- The topographical nature of the site with special reference to its effect on the disposal of escaping LPG shall be considered.
- The access of mobile firefighting equipment to the storage vessels under all foreseen circumstances, preferably from two sides and upwind (prevailing wind) is an important parameter.
- Predominant direction of wind and velocity shall be considered.
- Storage vessels shall be located downwind of tank lorry/wagon gantries and other potential ignition sources at lower elevation.
- Storage vessels shall not be located within the same dykes where other flammable liquid hydrocarbons are stored.
- Storage vessels shall be laid out in single row each sphere forming a group. Spheres shall be grouped together and will be provided with a piping manifold.
- Storage vessels shall not be located one above the other.

2.16.2 Accessibility

The connectivity of the site is as follows: -

i. Airport connectivity - The site is about 3 Km away from the Moi international Airport.

ii. Rail connectivity- The site is in KRC yard for Meter Gauge railway and about4 Km away SGR Freight Terminal.

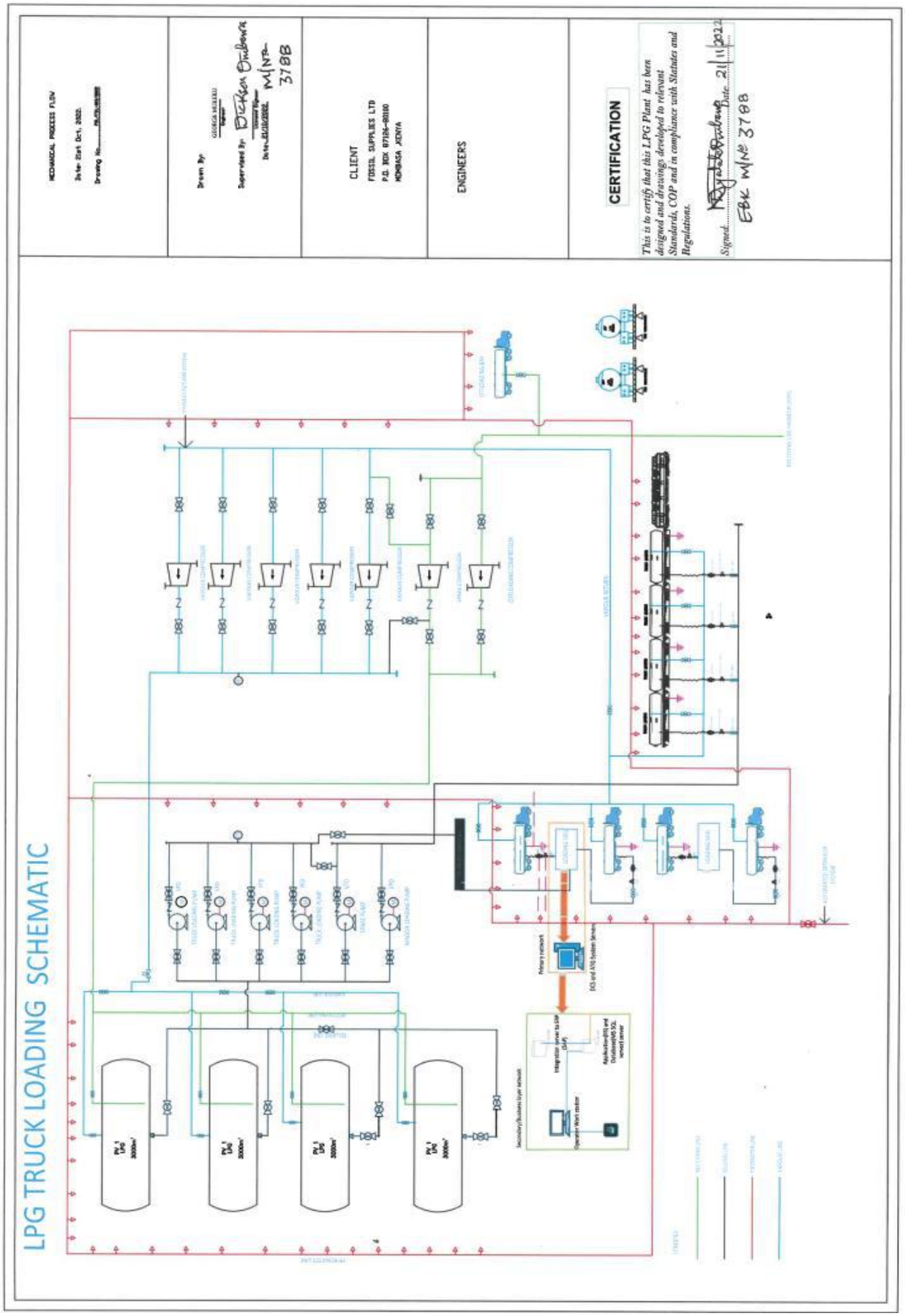
iii. Road connectivity- The site is about 100m from A 109, Mombasa-Nairobi Highway

2.16.3 Concept Design Pipe Line from Mombasa Port to Storage Tanks

In this report, it is proposed that the existing SOT gantry be used for LPG ship offloading, having taken into account distance, existing gantry facility, way leave availability, possibility to share pipeline, terrain etc.

Tie in to the existing 8” KPC/KPRL oil pipeline at a suitable point and tee-off to the LPG Common user facility.

Figure 2.6 FSL LPG Preliminary Mechanical Design



2.17 Natural Condition for Design

Mombasa is located at Longitude 39 Degrees 40 Minutes East and Latitude 4 Degrees 4 Minutes South (KPA Headquarters) on the East Coast of Kenya, facing the Indian Ocean. Mombasa belongs to the tropical monsoon area.

2.17.1 Wind

There is the *Northeast Monsoon (Kazikazi)*from December to February, which is "the dry season" and the *Southwest Monsoon (Kusi)*from April to October, "the rainy season." There are the *Inter Monsoon Seasons* (March-April and September-November). During the NE Monsoon, according to UNEP (1997), 50% of wind blow from the East (maximum: 7.7m/sec, average: 5m/sec), 29% from Northeast (maximum: 4m/sec, average: 3m/sec), 21% from the North (maximum: 2m/sec, average: 1m/sec). In the Southwest monsoon 75% of wind blow from the South (maximum: 9.0m/sec, average: 5m/sec), 25% from the Southwest (maximum: 5m/sec, average: 4m/sec).
The maximum wind, ever recorded at Moi International Airport in the past 10 years from 1995 to 2005, was 22.5m/sec from 120 degrees (counted from the North), i.e. from the ESE direction, which occurred in the months of July and August.
The above wind data imply that the operations in the Mombasa Port are seldom affected by wind.

2.17.2 Temperature

According to UNEP, in Mombasa, the highest temperature of 33°C on average occurs in February, and the minimum temperature occurs in July, or about at 20°C.

2.17.3 Rainfall

The maximum rainfall occurs in May, 240mm/month, and minimum in January and February, less than 20mm/month. The rainfall intensity is one of the most important design conditions in LPG terminal project. This is because the LPG terminal requires a broad yard area, and its drainage system becomes an important consideration.

2.17.4 Lightning

Protection is required in tropical countries due to possible lightning strikes.

2.18 Products and by-products

The expected product from this development project is 6,000MT LPG Common User Terminal and its associated facilities, designed sections and partitions as per the design and approved project plans. However, the product of this assessment is the detailed compiled Environmental and Social Impact Assessment report encompassing all study findings for submission to NEMA. The expected by-products from the project are left over plant slabs,

excavated overlaying soil wastes from the site, solid and liquid wastes from sanitary facilities, used cement bags, used oil from equipment, trucks and machineries which does not constitute significant by-products from the proposed development.

2.18.1 Waste

There will be liquid, solid and gaseous wastes from the project site. These will be from project activities during construction, operation and decommissioning phases. Wastes during the operation phase will include used papers, cement bags, cans, bottles, metal chips, timber wastes, organic wastes, plastic wastes, containers and effluent wastes from sanitary facilities while wastes from decommissioning phase will include salvaged equipment, sign boards, left over steel metals, plant slabs among others.

2.18.2 Waste Management

The principle objective of waste management program is to minimize the pollution of the environment as well as to utilize the waste as a resource. This goal should be achieved in a way that is environmentally and financially sustainable.

- **Solid Waste:** Solid wastes that are anticipated include paper from the cement bags, concrete slabs, organic wastes, sawdust, plastic paper bags and metals used for the construction. The technologies for the management of the solid wastes will incorporate the segregation of the waste at the source, collection into a central location (skip) then transportation of the waste for final disposal at a designated garbage dump site by a contracted NEMA licensed waste handler.
- **Liquid waste:** This will include effluent from toilets and bathrooms at the construction site during operation phase. At the proposed site, waste water from the site construction activities will be channeled through constructed storm drainage system into the connected existing sewer line for safe disposal, and which has been constructed to the required standards as per the Physical Planning regulations and Public Health Act requirements at the project site. Sanitary facilities like the bathrooms and pit latrines will also be used for the management of liquid waste which shall be decommissioned at the end of this project. Used oil and grease from workshops shall be stored in plastic containers for safer depositing or be taken back to the respective dealers.
- **Demolition wastes:** Wastes from demolished structures are classified as demolition wastes. The constituents of this waste are stones, concrete slab, cement plaster, steel metals and plumbing pipes for water/gas/oil etc. These shall be used elsewhere and those that cannot be re-used shall be taken to approved dumpsites run by NEMA licensed waste handlers who have complied with the Environmental Management and Coordination (Solid Waste Regulations) Act of 2006 requirements.

2.19 Decommissioning Phase

It marks the end of the facility life span during which the proposed project structures and facilities are demolished, concrete slabs removed and the resulting site rehabilitated in phases as per the outlined rehabilitation plan to a near original state as required by the laws on environmental management.

2.20 Project Cost

The proposed 12,000MT common user liquefied petroleum gas facility is estimated to cost **USD 16,000,000** (See attached BoQ)

The cost will be spread throughout the project cycle. The project proponent has in place most machineries, construction material inputs, labour, and equipment needed for the work. These equipment and machineries are haulage vehicles, concrete mixing and transporting trucks, aggregate materials, all tools and equipments plus the needed human labour (skilled, semi-skilled and casual labour).

CHAPTER THREE: BASELINE INFORMATION

3.1 Project Location

The proposed project site plot is within an industrial area in Changamwe, Mombasa County. The site is located at approximately 4Km North of the Port of Mombasa and about 3Km from the hub of Moi International Airport, Mombasa. The area hosts other oil terminals such as Kenya Pipeline Company Total Energies, Kenya Petroleum Refineries Limited (KPRL)and Hashi Energy Limited. Abutting the plot to the west is the meter gauge railway line and both permanent and temporary human settlements, Mosques and schools. The proposed project site is on geographical positioning system coordinates Latitude 4° 0' 39.58092" S and Longitude 39° 37' 0.4926" E.

3.1.1 Site Ownership

The proposed site is owned by the project proponent Fossil Supplies Limited by leasing from Kenya Railways Corporation (see appendix).

3.2 Administrative Units

The County is divided into six Sub-Counties of Mvita, Nyali, Changamwe, Jomvu, Kisauni, and Likoni, and has thirty county assembly wards, thirty locations and fifty-seven sublocations. The proposed project site lies within in Changamwe Sub- County.

Figure 3.1 Mombasa County Map

3.3 Physical Environment

3.3.1 Topography:

The County lies within the Coastal lowland which rises gradually from the sea level in the East to about 132m above sea level in the mainland. The terrain is characterized by three distinct physiographic features of coastal plain, covering parts of the South Coast; the Island; and the hilly areas that rises gently from 45m to 132m above sea level. Other key physical features include, the fringing coral reefs, cliffs and tidal flats, sandy beaches, the coastal plain and a hilly severely dissected and eroded terrain. There is also the broken and severely dissected and eroded belt that consists of Jurassic shale overlain in places by residual sandy plateau, found in Changamwe Division. Finally, there is the undulating plateau of sandstone that is separated from the Jurassic belt by a scarp fault. The proposed project site is a flat terrain.

3.3.2 Soils:

The soil types are broadly associated with the geological formations along the physiographic zones in the county as detailed by Ministry of Agriculture (1988).

The project site has predominantly loam soil which favours the proposed construction works.

3.3.3 Water Resources and Sanitation

The reticulated water supply system is owned and managed by Mombasa Water and Sewage Company and comes from Mzima Springs in Taita-Taveta County, Marere, and Sabaki/Baricho in Kilifi County and Tiwi Boreholes in Kwale County. The supply only meets 65 percent of the county water demand. Because of its highwater table favourable for sinking boreholes and wells to supplement the piped water supply it is approximated that close to 6,245 wells and 6,941 boreholes (GoK 1999) have been sunk so far. The county has three permanent springs, water pans and a number of boreholes operated by private investors, NGOs and local CBO's in the rural areas. Natural drainage in the county is mainly formed by semi-perennial rivers and streams like rivers Kombeni and Tsalu that drain into the Indian Ocean. There are three permanent springs in the rural parts of the county. The proposed project site is connected to the Mombasa Water and Sewerage Company Limited main water pipeline for piped water supply.

3.3.4 Climate, Rainfall, Temperature and Disaster Risk Vulnerability Profile

Climate is influenced by monsoon winds with the rainfall pattern being characterized into long rains (April – June with an average of 1,040 mm) and short rains (end of October - December with an average of 240mm). The annual average rainfall for the county is 640mm. The annual mean temperature in the county is 27.9 degrees Celsius with a minimum of 22.7degrees Celsius and a maximum of 33.1degrees Celsius. The hottest month is February with a maximum average of 33.1degrees Celsius while the lowest temperature is in July with a minimum average of 22.7degrees Celsius. The climate regime in the county has led to two major agro-climatic zones which support existing coastal

forests, marine and terrestrial ecosystems. The project area experiences the same climatic conditions as the larger Mombasa County.

3.4 Biological Environment

3.4.1 Flora

The county has a natural forest cover of approximately 300 ha and 138ha acres of agro forestry. The county has three main mangrove forests that are protected by the Kenya Forests Service. The vegetation of the project area includes grass and grown indigenous vegetation.

3.4.2 Fauna

The County is home to buffaloes, wildebeests, giraffes, hippopotamus, tortoise and a multiplicity of birds and butterflies. The proposed project site does not have any endemic wildlife species except the small insects and birds which cannot be greatly affected by the proposed project activities.

3.4.3 Forests

The county has a natural forest cover of approximately 300 ha and 138ha acres of agro forestry. It hosts three main mangrove forests that are protected by the Kenya Forests Service. There are 8 species of mangrove trees and shrubs found along the Kenya coast Rhizophora mucronata, Ceriopstagal, Bruguieragymnorrhiza, Sonneratia alba, Xylocarpusgranatum, Avicennia marina, Lumnitzeraracemosa and Heritieralittoralis. The mangrove swamps along the Kenyan coast cover approximately 53,000 hectares.

3.5 Land Use and Zoning

Land in Mombasa County has number of land tenure regimes which include public land, private land and community owned land. Land use zoning includes mainly for residential; industrial and warehousing; physical infrastructure; social amenities; urban; agriculture; mining; and tourism activities. The proposed site is situated within the industrial area in Changamwe area within. The proponent has acquired a change of user permit from industrial purposes to petroleum storage thus making it compatible with other development activities in the area ruling out any future development conflicts.

3.6 Infrastructure

3.6.1 Roads, Harbour and Rail Network

The County has a total of 257.17Km of bitumen surface roads, 127Km of gravel surface roads and 91.29 Km of earth surface roads in the county. The County has 10 Km of railway line and three railway stations. The County has one international airport and other smaller airstrips. The county well covered telecommunication and host both private and government communication facilities. The port of Mombasa is a key resource and the gateway to the East and Central African region. The port serves the entire region’s export

and import needs. Currently, the port has 19 deep-water berths with two additional berths nearing completion and two oil terminals. The proposed project site is accessed through Mombasa to Nairobi Road.

3.6.2 Energy supply and Access

The main source of energy is electricity supplied by the Kenya Power and Lighting Company. Other sources of energy include solar, gas and diesel-powered generators. Gas is used mainly for cooking and industrial purposes. According to a report by KNBS & SID (2013) Mvita constituency had the highest level of LPG use in Mombasa County at 23% which was almost eight times that of Likoni constituency, which had the lowest share at 3%. Mvita constituency was 14 percentage points above the county average. The report further found out that Shimanzi/Ganjoni ward had the highest level of LPG use in Mombasa County at 31%. This is 31 percentage points above Mwakirunge ward, which had the lowest share. Shimanzi/Ganjoni was 22 percentage points above the county average. The proposed project area is well connected to the Kenya Power and Lighting Company's national grid for energy supply. Additionally, the proposed project site will have an automatic generator as an alternative source of energy in the absence of electricity supply.

3.6.3 Water

The main water sources are wells and boreholes. The reticulated water supply system in the county is owned and managed by Mombasa Water and Sewerage Company. This water supply comes from Mzima Springs in Taita Taveta County, Marere and Sabaki/Baricho in Kilifi County and Tiwi Boreholes in Kwale County. It is estimated that the water supply only meets 65 per cent of the County's water demand. There are 6,245 wells, 6,941 boreholes, three permanent springs, water pans and a number of boreholes operated by private investors, NGOs and local CBOs. The project area is well connected to the piped water supply from Mombasa Water and sewerage Company Limited which is adequate and reliable.

3.6.4 Telecommunication and Postal Network

Telecommunication and postal services are available in literally every part of Mombasa County. The project area is well served with all the mobile phone network providers and the wireless phone connections including Safaricom, Airtel and Telkom. The project area is well connected to the various key communication networks.

3.7 Socio-Economic profile

3.7.1 Population Size and Composition

According to the 2009 Kenya Population and Housing census the total population of the county was 939,370 people comprising 484,204 males and 455,166 females. It was projected to reach 1,051,825 in 2012 and rise to 1,271,920 persons by 2017.

3.7.2 Cooperatives, Trade, Commerce and Financial Institutions

There over 38 banks and several microfinance institutions within the county which are important institutions as they offer credit facilities. The county has over 214 registered cooperative societies and a total membership of 35,987. The number of active women groups and youth groups in the county are 877 and 884 respectively while self-help groups in the county are 782. There are several NGOs in the county with the main ones being DSW, WOFAK, CWD, EAWS, SOLWODI, ICRH (K), KANCO, AHF (K), MYWO, The Kenya Red Cross Society, Action Aid (K), World Vision, APHIA Plus Coast and Care International.

3.7.3 Agriculture, Livestock and Fisheries

The main crops under cultivation in the county include cassava, cucurbits family, maize, vegetables, millet and sorghum. The total acreage under food crop stands at 400 ha while the total acreage under cash crop is 500 ha. The county has a considerable number of domestic livestock kept for domestic and commercial purposes. The main livestock bred in the county include goats, sheep, cattle, and poultry. The county has 65 Km^2 of open water and an Exclusive Economic Zone extending 200 nautical miles into the Indian Ocean. There are 14 fish landing sites and one fish processing plant.

3.7.4 Education Institutions

The County has a total of 645 primary schools, 95 public and 550 private, 28 public secondary schools, four youth polytechnics, one technical training institute (Mombasa Technical Training Institute) and a teacher training college (Shanzu Teachers Training College). There is one chartered public university (the Technical University of Mombasa) and many satellite campuses of public universities. Additionally, there are 770 ECDE centres within the county, 85 public and 685 private centres.

3.7.5 Markets and Urban Centres

The entire county is characterized as an urban area with different zones such as industrial, low, medium and high-density residential areas, the central business district, sub-urban, peri urban and informal settlements.

3.7.6 Mining

The Mining activities in the County are minimal with the notable mining activity being limestone mining by Bamburi Cement factory in Kisauni Sub- County and scale extraction of coral blocks in some parts of the county. It offers prospects for sea bed mining with a number of companies currently undertaking seismic survey within the county's off shore prospecting oil, gas and coal deposits.

3.7.7 Tourism

The major tourist attractions include ancient tourist attractions and world heritage sites among them Fort Jesus Museum (a UNESCO World Heritage site), the Likoni Ferry Services and the gigantic Elephant Tusks mould, old town, the old Port, sandy beaches, the Mombasa Marine Park, Haller Park and Butterfly Pavilion. There are over 430 beach and

tour operator firms that provide various tourist-related services. The county has over 201 registered hotels and lodges with a total bed capacity of about 8,000 beds and average annually bed occupancy of 64 percent.

3.7.8 Employment

Major employers include the hotel industry, Kenya Ports Authority, Government of Kenya, Container Freight Terminals and various private institutions such as banks. A significant number is also employed by offering services shipping lines, ship repair, servicing yards, container freight stations, transport, clearing and forwarding firms and grain bulk handling. Majority of the employment is found in the formal sector. The total county labour force stands at 545,303. Unemployment rate stands at 15 percent. County unemployment rate is much higher than the natural unemployment rate (NUR) of between 4% and 6%. The proposed project will help create many job opportunities for the local people.

3.7.9 Health

The county has one level five hospital, two level four hospitals, over 35 public dispensaries and health centres, 18 clinics and 4 special clinics.

CHAPTER FOUR: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 National Legal Framework

4.1.1 The Constitution of Kenya, 2010

The Constitution of Kenya Article 42, on the environment provides that every person has the right to a clean and healthy environment which includes the right to have environment protected for the benefit of the present and future generations. Article 69, of the Constitution provides for the establishment of systems of environmental impact assessment, environmental audit and environmental monitoring. The Constitution also states that the State shall eliminate processes and activities that are likely to endanger the environment and the State shall utilize the environment for the benefit of the people of Kenya. The Constitution of Kenya clearly states that every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

These environmental rights are enforceable in a court of law (Article 70). Land must be used in a sustainable manner, and in accordance with the principles of sound conservation and protection of ecologically sensitive areas. The State may regulate the use of any land or right over any land in the interest of land use planning (Article 66). The Constitution thus gives recognition to public, community and private land. Land use regulation goes beyond exploitation merely for economic purposes, and lays emphasis on conservation.

Article 174 of the Constitution sets out the objects of devolution of government, which include: (a) giving powers of self-governance to the people and enhancing their participation in the exercise of the powers of the State and in making decisions affecting them; (b) recognizing the right of communities to manage their own affairs and to further their development; (c) protecting and promoting the interests and rights of minorities and marginalized communities; (d) promoting social and economic development and the provision of proximate, easily accessible services throughout Kenya; (e) ensuring equitable sharing of national and local resources throughout Kenya; and (f) facilitating the decentralization of State organs, their functions and services, from the capital of Kenya.

The Fourth Schedule of the Constitution sets out the functions devolved to the county governments, including agriculture; county health services; control of air and noise pollution; cultural activities; county transport; animal control and welfare; county planning and development; pre-primary education; implementation of specific national government policies on natural resources and environmental conservation; county public works and services and fire-fighting services and disaster management.

The proposed project activities will ensure that the ecological processes and the environment are not severely damaged through proper implementation of the proposed mitigation measures put in place to ensure that the project construction, renovation, installation and operation activities do not adversely affect the surrounding environment.

4.1.2 Vision 2030

Kenya Vision 2030 is the country's new development blue print covering the period 2008 to 2030. The blue print aims at transforming Kenya into a newly industrializing "middle-income country providing a high-quality life to all its citizens by the year 2030. The Vision is based on three "pillars"; the economic, the social and the political. The adoption of Vision 2030 came after the successful implementation of the Economic Recovery Strategy for Wealth and Employment Creation (ERS) which has seen the country's economy back on the path to rapid growth since 2002 when Gross Domestic Product (GDP) grew from a low of 0.6% and rising gradually to 6.1% in 2006, one of the foundations for Vision 2030 is infrastructure. The Vision aspires for a country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities, and telecommunications. In this Vision to ensure that the main projects under the economic pillar are implemented, investment in the nation's energy sector is given the highest priority. The proposed development project will promote the economic growth of the locality and transport sector during construction and operation phases and help propel Kenya to a middle-income country as envisioned in the Vision 2030 development plan by developing the energy sector, one of the key target sectors in the plan.

4.2 National Policies

4.2.1 The National Environment Policy, 2013

The National Environment Policy aims to provide a holistic framework to guide environmental and natural resource management in Kenya. It also ensures that the link between the environment and poverty reduction is integrated into all government processes and institutions in order to facilitate and realize sustainable development at all levels in the context of a green economy, enhancing social inclusion, improving human welfare, creating employment opportunities and maintaining a healthy functioning of the ecosystem.

This policy presents the framework to deal with the ever-growing environmental issues and management challenges in Kenya like harmonizing of sectoral policy instruments with the Environmental Management and Coordination Act and the Constitution, implementing the Land Policy, valuing of environmental and natural resources, rehabilitating and restoring environmentally degraded areas, loss of biodiversity, concessions and incentives, urbanization and waste management, pollution, energy, climate change and disaster management, conservation of shared natural resources, invasive and alien species, public participation, environmental education and awareness, data and information, poverty, weak enforcement, and fragmentation.

4.2.2 National Policy on Water Resources Management and Development (Sessional Paper No.1 of 1999)

- The four specific objectives guiding in the management of water resources in Kenya include; Preserve, conserve and protect available water resources and allocate it in a sustainable, rational and economic way;

- Supply water of good quality in sufficient quantities to meet the various water needs, including poverty alleviation, while ensuring the safe disposal of wastewater and environmental protection;
- Establish an efficient and effective institutional framework to achieve a systematic development and management of the water sector; and
- Develop a sound and sustainable financing system for effective water resources management, water supply and sanitation development.

4.2.3 The National Energy and Petroleum Policy 2015

Sessional Paper No. 4 of 2004 was the previous policy guiding the energy sector in Kenya. The new draft policy has been prepared to bring on board emerging issues such as Vision 2030, and more importantly, the functions of county governments in the new Constitutional dispensation. Increased use of LPG will be encouraged to reduce dependence on biomass and eliminate the use of kerosene in homes. Natural gas may be used for power generation, transport and domestic purposes.

4.2.4 Policy on Environment and Development

This is presented as the Sessional paper No. 6 of 1999 on Environment and Development. The overall goal is to integrate environmental concerns into the national planning and management process and provide guidelines for environmentally sustainable development. It portrays portable water and water for sanitation as being central to satisfying basic human needs. Water resources have an extremely high value, and effective mechanisms for managing and conserving water could result into economic benefits as well as sustainable use of this vital resource. Its key objectives are protecting water catchments; ensuring that all development policies, programmes and projects take environmental considerations into account; and enhancing, reviewing regularly, harmonizing, implementing and enforcing laws for the management, sustainable utilization and conservation of natural resources.

The policy recommends the need for enhanced re-use/recycling of residues including water and wastewater as well as increased public awareness raising and appreciation of clean environment. It also enhances participation of stakeholders in the management of natural resources within their respective localities. The project proponent is encouraged to practise waste water recycling and re-use of some waste materials. The resultant sanitary effluent waste will be disposed into the main Mombasa Water and Sewerage Company Limited main sewerage network serving the area.

4.2.5 The Land Policy (Sessional Paper No. 3 of 2009)

The overall objective of the National Land Policy is to secure land rights and provide for sustainable growth, investment and the reduction of poverty in line with the Government's overall development objectives. Specifically, it seeks to develop a framework of policies and laws designed to ensure the maintenance of a system of land administration and management that will provide all citizens with the opportunity to access and beneficially occupy and use land; economically, socially, equitably, and environmentally sustainable allocation and use of land; effective and economical operation of the land market; efficient use of land and land based resources; and efficient and transparent land dispute resolution

mechanisms. The previously existing land laws have been repealed and the law consolidated into three statutes, namely the Land Act 2012, the Land Registration Act 2012 and the National Land Commission Act 2012.

4.2.6 The Kenya Health Policy (2012 – 2030)

The policy is based on the Constitution of Kenya 2010, Vision 2030 and global health commitments. Its broad aim is to ensure equity, people-centeredness and participation, efficiency, multi-sectoral approach and social accountability in delivery of healthcare services.

4.2.7 The National Environmental Sanitation and Hygiene Policy, (2007)

The Environmental Sanitation and Hygiene (ESH) Policy is intended to improve people's health and quality of life. It aims at clarifying the various roles in order to enhance the existing legal and constitutional framework and to encourage the private sector, civil society and community participation in the planning, implementation and ownership of ESH services; protect the environment from pollution and its negative effects on human health; and reduce poverty.

4.2.8 National Gender Policy (2011)

The overall goal of this policy is to mainstream gender concerns in the national development process in order to improve the social, legal/civic, economic and cultural conditions of women, men, girls and boys in Kenya.

The policy aims at ensuring gender equality and women's empowerment and mainstreaming needs and concerns of women, men, girls and boys in all sector of the development in the country so that they can participate and benefit equally from development initiatives.

Application: this policy would especially apply to the recruitment of construction labor for the proposed project, where women should have equal opportunity as men for available jobs. This policy also requires provision of a work environment that is safe and conducive to women and men, considering gender -disaggregated differences and vulnerabilities. This for example applies to onsite workers sanitation facilities, where women should have separate facilities from men.

4.2.9 Occupational Safety and Health Policy (2012)

This policy and all related regulations aim to safeguard the safety, health and welfare at work of all persons working in a given workplace.in addition to full compliance to all the stipulated legislation under this policy, the EPC contractor shall;

- Intergrade the company's operations, systems and procedures that ensure a safe working environment that is without risks to health.
- Develop and implement a comprehensive internal occupation safety and health policy
- Carry out appropriate risk assessment in relation to the safety and health of persons employed and, on the basis of these results, adopt preventive and protective measures

- Ensure insurance for and compensation of employees on work related injuries and diseases contracted in the course of the employment and for connected purposes as stipulated under the work injury compensation benefit act 2007

4.2.10 Workplace Policy on HIV/AIDS (2007)

The main objective of this policy is to provide a framework to address HIV and AIDS in the workplace. the principles that guide the policy are in accordance with international convention, national laws, policies, guidelines, and regulations. They include recognition of HIV /AIDS as a workplace issue; non-discrimination; gender equality, safety and health work environment, workplace ethics and confidentiality.

4.3 National Regulatory Frameworks

4.3.1 Environmental Management and Co-ordination Act, 1999 and Environment Management and Coordination (Amendment) Act, 2015, Cap 387

Environmental legislation in Kenya is provided in over 77 statutes. In order to provide a structured approach to environmental management in Kenya, the EMCA Act was enacted on January 14th 2000 as a framework law and contains provisions for the ESM of the proposed and ongoing Projects respectively in Kenya. With the coming into force of the EMCA, the environmental provisions within the sectoral laws were not superseded; instead, the environmental provisions within those laws were reinforced to better manage Kenya's ailing environment.

Section 58.(1) Of the Act states "Notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya, any person, being a proponent of a project, shall, before financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second Schedule to this Act, submit a project report to the Authority, in the prescribed form, giving the prescribed information and which shall be accompanied by the prescribed fee". Environmental Management and Coordination Act 1999 provide a legal and institutional framework for the management of the environmental related matters. This EIA study has been conducted and the final report compiled pursuant to section 58 (1) of the EMCA Act and its respective stipulations.

4.3.2 EMCA Related Regulations

4.3.2 Environment Management and Coordination Act,1999

The proposed expansion of the LPG depot is subject to the requirements of Legal Notice 101 of 2003: The Environment (Impact Assessment and Audit) Regulations,2003 (ESIA/EA Regulations) published in terms of Section 58 of the Environmental Management and Coordination Act,1999 (EMCA) and amended in 2015. This section provides a brief overview of the ESIA Regulations and their application to the project.

EMCA is the national Act that provides for the authorization of certain controlled activities listed in the Second Schedule of the Act. In terms of Section 58 of the EMCA, the potential

impact on the environment associated with these listed activities must be considered, investigated, assessed and reported to the NEMA. The NEMA is the competent authority that may issue an ESIA License for the proposed project in consultation with other lead agencies.

The need to comply with the requirements of the regulations ensures that decision -makers are provided the opportunity to consider the potential environmental impacts of a project early in the development process, and assess whether adverse environmental impacts can be avoided, minimized or mitigated to acceptable levels. Comprehensive independent environmental studies are required to be undertaken in comprehensive independent environment studies are required to be undertaken in accordance with the EMCA and the ESIA/EA Regulations to provide NEMA and other lead agencies with sufficient information in order for an informed decision to be taken regarding the project.

An ESIA is an effective planning and decision-making tool. It allows the potential environment and social consequences resulting from a technical facility during its establishment and its operation to be identified and appropriately managed. It provides the opportunity the developer to be forewarned of potential environmental and social issues and allows the resolution of the issue(s) reported in the ESIA report as well as for dialogue with stakeholders.

4.3.2.1 Environmental (Impact Assessment and Audit) Regulations, 2003

The Environmental Impact Assessment and Audit Regulations, 2003 are subsidiary regulations of EMCA, 1999 and stipulate the steps to be followed in undertaking an EIA study. The Regulations highlight the stages to be followed, information to be made available, role of every stakeholder and rules to be observed during the EIA process. This EIA study has been conducted as per the provisions and guidelines of the Environmental Impact Assessment and Audit Regulations, 2003; has been planned, designed, compiled and implemented based on the very regulations. It shall also be maintained and guided by the same regulations and an environmental audit study will be done periodically to monitor compliance with the set environmental standards.

4.3.2.2 EMCA (Water Quality) Regulations, 2006

The above regulation was promulgated on September 4th 2006 and became effective on July 1st 2007. This regulation provides for the sustainable management of water used for various purposes in Kenya. Its provisions are;

(1) *Every* person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act.

(2) No person shall throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution.

Part IV Section 24 states that "No person shall discharge or apply any poison, toxic, noxious or obstructing matter, radioactive wastes, or other pollutants or permit any person to dump any such matter into water meant for fisheries, wildlife, recreational purposes or any other uses". According to these regulations, "Every person shall refrain from any action which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act".

The proponent shall follow the necessary precautionary measures not to pollute underground water or surface water. The proponent will be required to immediately notify the authority any occurrence of pollution incidence at the site. Use of oils on site will be carefully done to control spills on the surface. Servicing of machines/trucks will be carried out at designated service bay. The waste water from the construction site and construction works will be disposed into the storm water drain and into the main Mombasa Water and Sewerage Company Limited sewer line for safe disposal.

4.3.2.3 EMCA (Waste management) Regulations, 2006

The Waste Management Regulations were promulgated on September 4th 2006 and became effective on July 1st 2007. This regulation is comprehensive and covers the management of various kinds of waste in Kenya. Various clauses relevant to the project are:

Section 4 (18): No owner or operator of a trade or industrial undertaking shall discharge or dispose of any waste in any state into the environment, unless the waste has been treated in a treatment facility and in a manner prescribed by the Authority in consultation with the relevant lead agency. Minimal waste is expected from the undertaking.

Section 4(2) and 6 explain that the waste generator must collect, segregate (hazardous waste from non-hazardous) and dispose waste in such a facility that shall be provided by the relevant local authority.

Section 5 provides for methods of cleaner production (so as to minimise waste generation) which includes the improvement of production processes through conserving raw materials and energy.

In section 14 (1) every trade or industrial undertaking is obliged to install anti- pollution equipment for the treatment of waste emanating from such trade or industrial undertaking.

The proponent shall ensure that the garbage collector contracted has a valid license from the National Environment Management Authority (NEMA). So as to comply with this, the contractor shall take precaution not to dump wastes in areas not registered and designated as dumpsites, and all waste disposed of as per the Waste management regulations. Wastes from sanitary facilities will be disposed to the main Mombasa Water and Sewerage Company Limited sewer line while the storm water will be channeled to the existing local county council drainage tunnels within the town.

4.3.2.4 EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009

In May 2009, the Minister for Environment and Mineral Resources promulgated the above regulations for management of noise and excessive vibration. The general prohibition states that no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. The regulations further provide factors that will be considered in determining whether or not noise and vibration is loud, unreasonable, unnecessary or unusual.

For fixed installations, excessive vibration under these regulations is defined as any vibration emanating from the source and exceeds 0.5cm/s. Rules 5 and 6 of the regulations define noise levels for various types of activities that generate noise. The first schedule to the regulations defines permissible noise levels measured 30m from the boundary fence of a project. A noise license will be required during the construction phase of the project and a noise survey conducted once operation is recommended for presentation to the authority. The proponent shall implement these measures, ensure that all noise equipments, tools, vehicles, are in good working condition to reduce noise. The project contractor will be required to avoid carrying out noise emitting activities and work within the stipulated time periods plus carry out regular noise monitoring/acquire noise permit in extreme cases.

4.3.2.5 EMCA (Air Quality) Regulations, 2013

The objective of these Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The general prohibitions state that no person shall cause the emission of air pollutants listed under First Schedule (Priority air pollutants) to exceed the ambient air quality levels as required stipulated under the provisions of the Seventh Schedule (Emission limits for controlled and non-controlled facilities) and Second Schedule (Ambient air quality tolerance limits).The proponent shall implement the mitigation measures provided in the EMP to prevent air pollution from cement dust, excavated soil and exhaust fumes which are the leading source of particulate matter emission in the air from such projects. The proponent will also conduct regular air quality monitoring to ensure for safe air circulation.

4.3.2.6 Legal Notice 150 Of 2016 Replacement of the Second Schedule of EMCA

In In April 2019 the Cabinet Secretary for Environment and Forestry on the advice of National Environment Authority amended the second schedule of the Environmental Management Act, 1999. The amendment was through LN 31 of 2019 on classification of projects (low, medium and high risk). Additionally, LN 32 of 2019 effected an amendment to the ESIA Regulations prescribing requirements on the ESIA for low and medium risk projects. The proposed project is a high-risk project.

4.3.2.7 Environmental Management and Coordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation, 2009

The Objectives of these Regulations include-

- to provide for the conservation and sustainable use of wetlands and their resources in Kenya;
- to promote the integration of sustainable use of resources in wetlands into the local and national management of natural resources for socio-economic development;
- to ensure the conservation of water catchments and the control of floods;
- to ensure the sustainable use of wetlands for ecological and aesthetic purposes for the common good of all citizens;
- to ensure the protection of wetlands as habitats for species of fauna and flora;
- provide a framework for public participation in the management of wetlands;
- to enhance education research and related activities; and
- to prevent and control pollution and siltation.

Application: The Proposed Project is in close proximity to the Indian Ocean. The Proponent shall comply with the provisions of the above regulations in-order to preserve the surrounding seashore ecosystem.

NEMA issued a public notice dated March 2020 on processing of Environmental Impact Assessment Reports. The notice stated that for high-risk projects, Environmental Impact Assessment Study shall be conducted in accordance with the general environmental impact assessment guidelines and sector environmental impact assessment guidelines as provided for in Part III of the Environmental (Impact Assessment and Audit) Regulations, 2003. These EIA/EA regulations require an ESIA Terms of Reference to be prepared and submitted to NEMA for approval after which an ESIA study is undertaken and Study Report (SR) submitted to NEMA.

Application: An environmental impact assessment study must be undertaken in respect of the Proposed Project, and the study must comply with the guidelines applicable to high-risk projects. The experts prepared and submitted the TOR for the ESIA which was approved by NEMA on 14th October 2022.

4.3.3 Other Environment, health and safety, physical planning related laws

4.3.3.1 Water Act, 2016

1. The schedule applies to the abstraction of underground water
2. A person intending to construct a borehole shall not begin to construct the borehole or well without giving a notice of intention to the Water Resources Authority.
3. The person constructing the borehole or well shall allow any person authorized by the authority to access the site at any reasonable time.
4. A permit is required from the Authority for: -

    i. Any use of water from a water resource

    ii The discharge of a pollutant into the water resource.

In any contravention of this Act, then the Authority, the Regulation Board, The County Government or licencee may require within a reasonable time require the person to remedy the contravention by

i. Clean up the pollution

ii. Remove or Destroy any works, plant or equipment used in contravention.

4.3.3.2 The Penal Code CAP 63

Chapter XVII on "Nuisances and offences against health and convenience" contained in the penal code strictly prohibits the release of foul air into the environment which affects the health of the persons. It states "Any person who voluntarily vitiates the atmosphere in any place so as to make it noxious to the health of persons in general dwelling or carrying on business in the neighbourhood or passing along a public way is guilty of a misdemeanour". Waste disposal and other project related activities shall be carried out in such a manner as to conform to the provisions of the code.

4.3.3.3 Occupational Health and Safety Act No.15 of 2007 and the 2007 Subsidiary legislation (Cap 514)

This Act of Parliament was enacted to provide for the health, safety and welfare of persons employed in workplaces and for matters incidental thereto and connected therewith.

Its relevant clauses and stipulations relevant to the proposed project are;

- Part II of the Act provides the General Duties that Occupiers must comply with in respect to health and safety in the workplace. Such duties include undertaking S&H risk assessments, S&H audits, notification of accidents, injuries and dangerous occurrences, etc.
- Part III of the Act provides the administrative framework for supervision of the Act.
- Part IV deals with the enforcement provisions that the DOSHS has been provided with under the Act. It discusses the instances when Improvement and Prohibition Notices can be issued as well as the powers of OSH officers.
- Part V of the Act requires all workplaces to be registered with the DOSHS. The Occupier has to apply for registration of their project with the DOSHS on completion of installation of the crusher and before the operational phase of the project.
- Part XI of the Act contains Special Provisions on the management of health, safety and welfare. These include work permit systems, PPE requirements and medical surveillance. All sections of this part of the Act will be applicable to this project during the operational phase.
- Part XIII of the Act stipulates the fines and penalties associated with non-compliance of the Act. It includes those fines and penalties that are not included in other sections of the Act and will be important for an Occupier to read and understand the penalties for non-compliance with S&H provisions.

- Part XIV of the Act is the last section of the Act and contains miscellaneous provisions which are not covered elsewhere. Most of the sub-sections under this part of the Act will be applicable to mining projects and it is in the interest of an Occupier to read, understand and ensure compliance with it.

Some of the important subsidiary legislations which operationalized the Act and are applicable to the proposed project are described below.

I. **Safety and Health Committee - Rules 2004 Legal Notice (L.N) 31 of OSHA 2007**

These rules came into effect on April 28th, 2004 and require that an Occupier formalize a Safety and Health (S&H) Committee if there are a minimum of 20 persons employed in the work place. The size of the S&H Committee depends on the number of workers employed at the place of work. For a Proponent and Contractor, the Occupational Safety and Health Act and the S&H Committee Rules 2004 are important as they require compliance with the following measures:

- Posting of an Abstract of the Factories and Other Places of Work Act in key sections of each area of the workplace.
- Provision of first aid boxes in accordance with Legal Notice No. 160: First Aid Rules of 1977.
- Ensuring that there are an appropriate number of certified first aiders trained by a DOSHS approved institution and that the certification of these first aiders is current.
- Provision of a General Register for recording amongst other things all incidents, accidents and occupational injuries.
- Appointment of a safety and health committee made up of an equal number of members from management and workers based on the total number of employees in the company.
- Training of the safety and health committee in accordance with these rules.
- Appointment of a safety and health management representative by the proponent. The Safety & Health Committee must meet at least quarterly, take minutes, circulate key action items on bulletin boards and may be required to send a copy of the minutes to the DOSHS local office. Proper record keeping including maintenance of all current certificates related to inspection of critical equipment such as the tractor, transport vehicles and the generator, etc. Such inspections need to be undertaken by a competent person certified by the Director of the DOSHS.

II. **Noise Prevention and Control Rules**

These rules have set minimum and maximum exposure limits beyond which workers and members of the public should not be exposed to noise without adequate means of protection. The rules also have limits for exposure out of workplaces. The rules have several recommendations on a comprehensive noise control program for workplaces that includes a requirement for medical examination of workers who are exposed to noise. The rules have also set the minimum noise levels that should emanate from a facility to public/neighbouring areas by day or by night. The proponent will provide functional

earmuffs for those operating the noise emitting machines and those working in noisy environments; and keep on renewing their noise and vibration permit from NEMA. All in all, the project proponent will be required to adhere to all the stipulations of the OSHA Act, 2007 requirements and regulations.

III. **Medical Examination Rules, 2005**

These rules provide for Occupiers to mandatorily undertake pre-employment, periodic and termination medical evaluations of workers whose occupations are stipulated in the Second Schedule of the Act and the First Schedule of the Regulation. The workers are to undergo medical evaluations by a Designated Health Practitioner (DHP) duly registered by the DOSHS. Exposure to airborne crystalline silica present negative impacts to human health, the workers exposed to the dust will be required to undergo medical examinations in accordance with the above Rules. The project proponent is required to ensure that on site workers are examined medically and appropriate gears availed to them while at site, like earmuffs, helmets, overalls and respiratory gears.

IV. **Fire Risk Reduction Rules, 2007 Legal Notice (L.N) 59 of OSHA 2007**

These rules were promulgated by the Minister for Labour on April 16th 2007 and apply to all workplaces. The rules apply to this sector project in several ways as enumerated below;

Rule 16 requires a Proponent to ensure that electrical equipment is installed in accordance with the respective hazardous area classification system. It is also a requirement that all electrical equipment is inspected after six months by a competent person and the Proponent is required to keep records of such inspections.

Rules 29 – 31 refer to the installation and maintenance of firefighting systems in workplaces. Fire extinguishers are to be mounted at least 60cm above ground while a fire hose reel must be located within a radius of 30m. Fires can arise from electrical fault at the site. Worker's safety will be given priority during both construction and operation phases of the project. The proponent shall adhere to the provisions of OSHA, 2007 and the subsidiary rules and regulations under it.

4.3.3.4 The Work Injury Benefits Act (WIBA), 2007

The WIBA Act provides for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes;

Section 7(a) of the Act, on the obligations of the employer, requires an employer to obtain and maintain an insurance policy with an insurer approved by the State in respect of any liability that the employer may incur under this Act to any of his employees.

Section 10(1) States that an employee who is involved in an accident resulting in the employee's disablement or death is subject to the provisions of this Act, and entitled to the benefits provided for under this Act. It also states expressly that an employer is liable to

pay compensation in accordance with the provisions of this Act to an employee injured while at work.

On First Aid covered in section 45(1), an employer is supposed to provide and maintain such appliances and services for the rendering of first aid to his employees in case of any accident as may be prescribed in any other written law in respect of the trade or business in which the employer is engaged. The proponent shall acquire insurance cover for all the workers for the time they will be working at the project site which will enable them get compensation in case of accident occurrence.

4.3.3.5 The Public Health Act Cap 242

Part IX, section 115 of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires local authorities to take all lawful, necessary, reasonable and practicable measures to maintain areas under their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health. During the project works, construction activities, installation and operation, the management will comply with the provisions of this Act in terms of constructing storm drains and sanitary facilities to the required standards and ensuring that the site is safe from nuisance or pollution of any nature.

4.3.3.6 The Land and Environment Court

The Land and Environment Court is established under the Environment and Land Court Act, 2011 (No. 19 of 2011). It is empowered by law, given the status of the High Court and has the jurisdiction to hear and determine disputes, actions and proceedings concerning acquisition of land as well as matters pertaining to the environment.

4.3.3.7 The County Council Act Cap 265

Section 163 allows councils to control or prohibit all businesses, factories and workshops which, by reason of smoke, fumes, chemicals, gases, dust, smell, noise, vibration or other cause, may be or become a source of danger, discomfort or annoyance to the neighbourhood, and to prescribe the conditions subject to which such businesses, factories and workshops shall be carried on. The same section allows municipal councils to prohibit, control and regulate trade and trading activities within their jurisdiction.

4.3.3.8 The Mombasa County Council By-Laws

Project is under jurisdiction of Mombasa County Council. The council operates by laws to govern all aspects of management and is also at liberty to use the various pieces of legislation to enforce conservation and pollution control measures at the Council. Council by laws relevant to conservation, the general nuisance by laws is quite pertinent. They include:

i. Deposit of Rubbish

Any person who shall without authority deposit or cause or permit to be deposited any soil, vegetation, refuse or debris or any land in the council shall be guilty of an offence.

ii. Noise

Any person who, in connection with any building operations, demolition or road construction work, causes or allows to be caused noise which is so loud, continuous or repeated as to operations constitute a nuisance to the occupants of any premises in neighbourhood, shall be guilty of an offence.

iii. Approval of Building Plans

After the site has been successfully identified, plans must be drawn and submitted for approval by the local authority. Amongst other requirements, the plan must have:

1. Proper drainage system,
2. An approved incinerator or legal waste disposal facility,
3. Proper sanitary facilities, and
4. Adequate natural and artificial light and ventilations.

iv. Occupational Certificate

After the plans are approved and construction work completed the premises must be inspected by the Local Authority for the purpose of confirming whether the site complied with the approved plans then an occupation certificate issued as provided by the public Health Act and Building Code. The proposed project is under the jurisdiction of Mombasa City County Council hence all the stipulated rules and regulations will be strictly followed.

4.3.3.9 The Physical Planning Act of 1996 CAP 286

The Act allows for prohibition or control over the use and development of land and building in the interest of proper and orderly development of an area. Section 30 states that any person who carries out development without 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.

Section 36 states that if in connection with a development application, a local authority is of the opinion that the proposed development activity will have injurious impact on the environment; the applicant shall be required to submit together with the application an environment impact assessment (EIA) report. EMCA, 1999 echoes the same by requiring that such an EIA is approved by the National Environmental Management Authority (NEMA) and should be followed by annual environmental audits. The proposed project construction, installation and operation activities must be granted license by the relevant local authority as the EIA study process is in order with section 36 of this Act.

4.3.3.10 Traffic Act Cap. 403

In Section 51, only proper fuel should be used in vehicles. Similarly, vehicles should be well maintained to prevent any fumes/exhaust that could pollute the environment. All vehicles transporting construction materials will be granted permits authorising them to transport materials to the construction site plus all the equipment, lorries and heavy vehicle drivers will possess up to date driving licenses and certificates identifying them and the type of

lorries/vehicles/equipments they are authorised to operate, plus deployment of traffic marshals to help control the traffic flow along Kipevu access road.

4.3.3.11 Building Code 2000

The building code under Septic and conservancy tanks, section 202 allows for installation of septic tanks/ conservancy tanks where a sewer system has not been provided that the proponent abides with the provisions under the set table. The effluent waste water from the project site will be channeled to the main Mombasa Water and Sewerage Company Limited network and, storm water drains for proper storm water disposal.

4.3.3.12 Energy Act

80.(1) A person shall not conduct a business of importation, refining, exportation, wholesale, retail, storage or transportation of petroleum, except under and in accordance with the terms and conditions of a valid license. The proponent shall apply to Energy Petroleum Regulatory Authority (EPRA) for a license to transport, handle and store bulk liquefied petroleum gas at the terminal plant during the operation phase. The proponent also will acquire license for dealing in bulk Liquefied Petroleum Gas storage and other petroleum products.

4.3.3.13 Weights and Measures Act, Cap 513

The above named Act mandates the Weights and Measures Department to annually certify the mechanical pumps and dispensers in order to ensure that they are properly calibrated to dispense the right amounts of the petroleum products. During the certification exercise, the measuring mechanisms inside the pumps are sealed with a seal-mark of quality assurance. The Weights and Measures Department issues a Certificate of Verification for all the mechanical pumps which is usually valid for one year. The proponent shall apply for the Certificate of Verification from the Weights and Measures Department.

4.3.3.14 Merchant Shipping Act, 2009

This is an Act of Parliament to make provision for the registration and licensing of Kenyan ships, to regulate proprietary interests in ships, the training and the terms of engagement masters and seafarers and matters ancillary thereto; to provide for the prevention of collisions, the safety of navigation, the safety of cargoes, carriage of bulk and dangerous cargoes, the prevention of pollution, maritime security, the liability of ship-owners and others, inquiries and investigations into marine casualties; to make provision for the control, regulation and orderly development of merchant shipping and related services; generally to consolidate the law relating to shipping and connected purposes of surveys, monitoring and inspections; restriction on trading in Kenyan waters; carriage of bulk cargoes and dangerous cargoes;

4.3.3.15 Climate Change Act, 2016

The Act provides a framework for mitigating and adapting to the effects of climate change on various sectors of the economy; facilitating and enhancing response to climate change; and providing guidance and measures on how to achieve low carbon climate resilient

development, among other things. It lines up with international best practices and standards. It establishes the National Climate Change Council which is tasked with coordinating climate change issues.

4.3.3.16 The Petroleum Act, 2019

The Petroleum Act, 2019 came into effect on 28 March 2019, repealing the Petroleum (Exploration and Production) Act, Chapter 308 Laws of Kenya which entered into force in 1984. The Petroleum Act was enacted to consolidate into one statute the laws relating to petroleum operations which includes revenue sharing, local content, transparency, accountability, licensing, setting the scene for growth of petroleum sector, permitting requirements and establishment of National Upstream Petroleum Advisory Committee and Energy and Petroleum Regulatory Authority (EPRA).

The following is a summary of the sections that are relevant to the proposed project

- Part IX, Section 74. (1) A person who wishes to—
  - undertake refining, importation, export, bulk storage or transportation of petroleum crude or products must have a valid license issued by the Authority;
  - sells petroleum in bulk to another person for the purpose of export or for retail sale in Kenya must have a valid license issued by the Authority;
  - uses a vehicle for the purpose of transporting petroleum in bulk shall have a valid petroleum permit in respect of that vehicle issued by the Authority; and
  - drives a vehicle, or engage a driver, for the purpose of transporting petroleum in bulk by tanker shall ensure that such driver is certified for that purpose by the Authority. –

- Part IX, Section 75. The licensing authority shall in granting or rejecting an application for a license or permit take into consideration the social and cultural impacts, the need to protect environment, OSHA requirements, compliance to applicable Kenyan standards, location of the project, economic and financial benefits of the project, cost an financing arrangements, ability of the applicant to operate in a manner designed to protect the health and safety of the users, the technical and financial capacity of the applicant, where applicable the proposed tariff offered and any other matter that the licensing authority may consider likely to have a bearing on the undertaking.
- Part IX, section 79: The application for a license or permit holder shall be accompanied by an environmental liability policy as may be prescribed by the authority
- Part IX, Section 80. (1) A licensee or permit holder shall cause to be displayed within the premises, the license or permit, or a certified copy.
- Part IX, Section 86. A person who intends to construct a pipeline, bulk storage facility, [….] or designated parking space for petroleum tankers shall, before commencing such construction apply in writing to the licensing authority for a

permit to do so. The permit shall specify the name and address of the proposed facility, be accompanied by the registration documents of the owner, detailed layout plans and specification from a professional engineer, project location, pipeline route, type and capacity of the facility and be accompanied by an environmental and social impact assessment license.

- Part IX, Section 92: (1) A person who offers for sale in Kenya or transports or stores petroleum meant for use in Kenya shall ensure that the specifications of such petroleum conform to the relevant Kenya Standard, but where no such standard exists, the relevant international standards approved by the Kenya Bureau of Standards: Provided that no person shall divert to sell in Kenya, goods destined for other markets.
- Part IX 97. (1) A person engaged in petroleum business shall comply with the applicable environmental, health and safety laws.

Application: Fossil Supplies Limited will be required to adhere to the following requirements of the Petroleum Act:

- Apply for a construction permit from EPRA before commencement of the construction work. The application should specify the name and address of the proposed facility, be accompanied by the registration documents of the owner, detailed layout plans, design specifications and standards from a professional engineer, project location, pipeline route, type and capacity of the facility and be accompanied by an environmental and social impact assessment license.
- Apply for an operating license to import, for bulk storage and distribution of the LPG. The application should contain an environmental liability policy, ESIA license, demonstrate compliance to OSHA requirements, applicable Kenyan standards, location of the project, economic and financial benefits of the project, cost and financing arrangements, ability of the applicant to operate in a manner designed to protect the health and safety of the users, and the technical and financial capacity of the applicant.
- FSL will be expected to ensure that the specifications of the proposed project conform to the relevant Kenya Standard, but where no such standard exists, the relevant international standards approved by the Kenya Bureau of Standards.
- Display the Permit within the premises.

Comply with applicable environmental, health and safety laws during the operation which include:

- EMCA 1999, including the updated Act of 2015 and the subsidiary legislation
- OSHA 2007 and the subsidiary legislation
- Work Injury Benefits Act (WIBA), No. 13 of 2007 and subsidiary legislation.

4.3.3.17 The Employment Act, 2007

The Act provides for general terms and conditions of employment in Kenya and applies to both domestic and foreign contracts of employment. It is the relevant legislation that harmonizes relationships between employees and employers, protects workers' interests and welfare, and safeguards their occupational health and safety through:

a) Prohibition against discrimination of any employee or prospective employees (on race, color, language, religion etc.);
b) Prohibition of sexual harassment;
c) Making a provision on contract of services; and
d) Stipulating rights and duties in employment including weekly rest, working hours, annual leave, maternity and paternity leaves, sick pay, etc.

Application: For the 18 months of project construction (and subsequent operation and maintenance), this Act will govern management of the labour force hired. The Act also applies in regard to occupational safety of project staff

4.3.3.18 People Living with Disability Act, 2012

This Act of Parliament provides for the rights and rehabilitation of persons with disabilities; to achieve equalization of opportunities for persons with disabilities; to establish the National Council for Persons with Disabilities. Part III of the act outlines the rights and privileges of persons with disabilities. Section 12 on employment states that:

i. No person shall deny a person with a disability access to opportunities for suitable employment.
ii. A qualified employee with a disability shall be subject to the same terms and conditions of employment and the same compensation, privileges, benefits, fringe benefits, incentives, or allowances as qualified able-bodied employees.
iii. An employee with a disability shall be entitled to exemption from tax on all income accruing from his employment.

Section 15 on discrimination of employment states that:

1. Subject to subsection (2), no employer shall discriminate against a person with a disability in relation to

a) the advertisement of employment.
b) the recruitment for employment.
c) the creation, classification, or abolition of posts.
d) the determination or allocation of wages, salaries, pensions, accommodation, leave or other such benefits.

e) the choice of persons for posts, training, advancement, apprenticeships, transfer, promotion, or retrenchment the provision of facilities related to or connected with employment; or many other matters related to employment.

2. Notwithstanding subsection (1), an employer shall be deemed not to have discriminated against a person with a disability if

a) the act or omission alleged to constitute the discrimination was not wholly or mainly attributable to the disability of the said person;
b) the disability in question was a relevant consideration in relation to the particular requirements of the type of employment concerned.

4.3.3.19 The Sexual Offences Act, 2014

This Act protects people and employees from any unwanted sexual attention or advances by staff members. This act ensures the safety of women, children and men from any sexual offences which include: rape, defilement, indecent acts.

Application: This law will govern the code of conduct of the Contractor's and Subcontractor's staff and provide repercussions of any wrongdoing.

4.3.3.20 The HIV And AIDS Prevention and Control Act, 2006

This Act provides measures for the prevention, management and control of HIV and AIDS, to provide for the protection and promotion of public health and for the appropriate treatment, counseling, support and care of persons infected or at risk of HIV and AIDS infection, and for connected purposes.

Application: This Act will ensure that the Contractor and Sub-contractors make provision for VCT services for employees and locals, as well as promotes public awareness. This will go a long way in ensuring stigmatization of HIV and AIDS is reduced as well as managed during the construction period.

4.3.3.21 Cities and Urban Areas Act 2012

This act identifies Mombasa as a city due to its integrated urban area. The city is under the jurisdiction of boards which carry out the duties of the County Government. The various boards within the city are charged with: a) exercise executive authority as delegated by the county executive; b) ensure provision of services to its residents; c) impose such fees, levies and charges as may be authorized by the county government for delivery of services by the municipality or the city; d) promote constitutional values and principles; e) ensure the implementation and compliance with policies formulated by both the national and county government; f) make by-laws or make recommendations for issues to be included in by-laws; g) ensure participation of the residents in decision making, its activities and programmed in accordance with the Schedule to the Act; and h) exercise such other powers as may be delegated by the county executive committee.

Application: This Act identifies the importance of consulting with the county council and its departments for the proposed project in order to get opinions and recommendations for

the successful implementation of the project. In addition, the County Council will be part of the operation of the proposed project, as well as being a key stakeholder in the resettlement of PAPs.

4.3.3.22 Public Roads and Roads of Access Act, Revised 2012 (Cap 399)

Sections 8 and 9 of the Act provides for the dedication, conservation or alignment of public travel lines including construction of access roads adjacent to lands from the nearest part of a public road. Sections 10 and 11 allows for notices to be served on the adjacent landowners seeking permission to construct the respective roads.

4.3.3.23 The Kenya Roads Act, 2007

The Act provides for the establishment of three independent Road Authorities, namely: Kenya National Highways Authority (KENHA), Kenya Rural Roads Authority (KERRA), and Kenya Urban Roads Authority (KURA).

4.3.3.24 Children Act No. 8 of 2001

States that every child shall be protected from economic exploitation and any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development.

4.3.3.25 Lands Act, 2012 No. 6 of 2012

Part II Section 8 provides guidelines on management of public land by National Land Commission on behalf of both National and County Governments. This law in Section 8(b) stipulates that the Commission shall evaluate all parcels of public land based on land capability classification, land resources mapping consideration, overall potential for use, and resource evaluation data for land use planning. Section 8(d) stipulates that The Commission may require the land to be used for specified purposes subject to such conditions, covenants, encumbrances or reservations as are specified in the relevant order or other instrument.

In managing public land, the Commission is further required in Section 10(1) to prescribe guidelines for the management of public land by all public agencies, statutory bodies and state corporations in actual occupation or use. In these guidelines management priorities and operational principles for the management of public land resources for identified uses shall be stated. This in essence means that the Commission shall take appropriate action to maintain public land that has endangered or endemic species of flora and fauna, critical habitats or protected areas. As well the Commission shall identify ecologically sensitive areas that are within public lands and demarcate or take any other justified action on those areas and act to prevent environmental degradation and climate change.

Part VIII of the Act provides procedures for compulsory acquisition of interest in land. Section III (1) states that if land is acquired compulsorily under this Act just compensation shall be paid in full to all persons whose interest in the land have been determined. The Act also provides for settlement programmes. Any dispute arising out of any matter provided for under this Act may be referred to the Land and Environment Court for determination.

The land on which the project is to be developed fully belongs to the proponent and has a valid land title deed as a proof of ownership.

4.3.4 Kenya Standards

Various Kenya Standards have been published for the safe and environmentally sound management of petroleum related installations. The vast majority of these standards have been adopted from other international oil and gas industry standards such as the American Petroleum Institute (API), British Standards Institute (BS), American Society of Testing Materials (ASTM), and American Society of Mechanical Engineers (ASME) among others. The Kenya Standards are mandatory for compliance and it is expected that all new and existing petroleum related facilities will comply with the requirements of these standards. The proponent is expected to adhere to all the petroleum standards applicable to the operations and management of the terminal plant. Below are some of the Kenya Standards applicable to the petroleum sub-sector.

Table 4.1: The Kenya Standards available for the petroleum sub-sector.

Standard	Description
KS1967: 2006	The Petroleum Industry – Storage and distribution of Petroleum Products in above ground bulk installations
KS1968: 2006	The Petroleum Industry – Electrical Installations in the distribution and marketing sector – Code of Practice
KS1969: 2006	The Petroleum Industry – The installation of underground storage tanks, pumps/dispensers and pipe work at the terminal plant and consumer installations – Code of Practice
KS200: Part 1: 2002	Specification for storage tanks for petroleum industry Part 1: Carbon steel welded horizontal cylindrical storage tanks (First Revision, 2002)
KS1938-1: 2006	The Handling, storage and distribution of liquefied petroleum gas in domestic, commercial, and industrial installations – Code of Practice Part 1: Liquefied petroleum gas installations involving gas storage containers of individual water capacity not exceeding 500L and a combined water capacity not exceeding 3000L per installation
KS1938-2: 2005	Handling, storage and distribution of liquefied petroleum gas in domestic, commercial and industrial installations – Code of Practice – Part 2: Transportation of LPG in bulk by road
KS1938-3:2006	The handling, storage and distribution of liquefied petroleum gas in domestic, commercial and industrial installations – Code of Practice – Part 3: Liquefied petroleum gas installations involving storage vessels of individual water capacity exceeding 500L
KS1938-4: 2005	The handling, storage and distribution of liquefied petroleum gas in domestic, commercial and industrial installations – Code of Practice – Part 4: Storage and filling sites for refillable liquefied petroleum gas (LPG) containers of capacity not exceeding 15Kg
KS ISO 4706: 1989	Refillable welded steel gas cylinders
KS ISO 11625: 1998	Gas cylinders – Safe handling
KS06-09: Part 3: 2001	Specification for welded low carbon steel gas cylinders exceeding 5liters water capacity for low pressure liquefiable gas Part 3: Code of practice for filling, distribution and retailing of liquefied petroleum gas in cylinders (First Revision, 2001)

KS09: Part 4: 2002	Gas cylinders – Refillable welded steel cylinders for liquefied petroleum gas (LPG) Part 4: Requalification and inspection
KS 9-2: 2006	Liquefied petroleum gas cylinders Part 2: Safe use of liquefied petroleum gas (LPG) in domestic dwellings – Code of Practice
KS 2024: 2006	Gas cylinders – refillable welded steel cylinders for liquefied petroleum gas (LPG) – Procedure for checking before, during and after filling

4.4 International Environmental and Social Impact Provisions and Safeguards

4.4.1 International Environmental Guidelines

Kenya has ratified or acceded to numerous International treaties and conventions, as described below:

- The Basel Convention: Sets an ultimate objective of stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system.

- Kyoto Protocol: Drawn up in 1997, pursuant to the objectives of the United Nations Framework Convention on Climate Change, in which the developed nations agreed to limit their greenhouse gas emissions, relative to the levels emitted in 1990.

This ESIA study is also based on internationally respected procedures recommended by the World Bank, covering environmental guidelines. Reference has been made to the Environmental Assessment Operational Policy (OP) 4.01, and Environmental Assessment

Source Book Volume II, which provides the relevant sectoral guidelines as discussed below;

4.4.2 International Conventions, Treaties and Agreements

Kenya has ratified and domesticated several international conventions and treaties for the protection of the environment. The proposed project will comply with the requirements of the various conventions, treaties and agreements that Kenya has ratified. Table 3 gives the status of environmental treaties ratified by Kenya.

4.4.3 World Bank's Safeguard Policies

The objective of the World Bank's environmental and social safeguard policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for bank and borrower staffs in the identification, preparation, and implementation of programs and projects. Safeguard policies have often provided a

platform for the participation of stakeholders in project design, and have been an important instrument for building ownership among local populations, (World Bank, 1999-2006).

Table 4.2: Summary of the applicable International Conventions and Treaties

Topic	Treaty	Date Treaty entered into force	Date of ratification/ accession in Kenya
Climate change and the ozone layer	United Nations Framework Convention on Climate Change (UNFCCC)	21/03/1994	30/08/1994
	Kyoto Protocol to the United Nations Framework Convention on Climate Change	16/02/2005	25/02/2005
	Vienna Convention for the Protection of the Ozone Layer	22/09/1988	09/11/1988
	Montreal Protocol on Substances that Deplete the Ozone Layer	01/01/1989	09/11/1988
Energy	Statute of the International Renewable Energy Agency (IRENA)	26/01/2009	08/07/2010
	Convention of the African Energy Commission	11/06/2001	13/12/2006
Waste management and pollution	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	05/05/1992	01/06/2000
	Convention on Persistent Organic Pollutants (POPs)	17/05/2005	24/09/2004

4.4.3 World Bank Safeguard Policy 4.01-Environmental Assessment

The environmental assessment process provides insights to ascertain the applicability of other World Bank safeguard policies to specific projects. This is especially the case for the policies on natural habitats, pest management, and physical cultural resources that are typically considered within the EA process. The policy describes an environmental assessment process for the proposed project. The breadth, depth, and type of analysis of the EA process depend on the nature, scale, and potential environmental impact of the proposed project. The policy favours preventive measures over mitigatory or compensatory measures, whenever feasible. The operational principles of the policy require the environmental assessment process to undertake the following:

1. Evaluate adequacy of existing legal and institution framework including applicable international environmental agreements. This policy aims to ensure that projects contravening the agreements are not financed.
2. Stakeholder consultation before and during project implementation.
3. Engage service of independent experts to undertake the environmental assessment.
4. Provide measures to link the environmental process and findings with studies of economics, financial, institutional, social and technical analysis of the proposed project.
5. Develop programmes for strengthening of institutional capacity in environmental management.

The requirements of the policy are similar to those of EMCA which aims to ensure sustainable project implementation. Most of the requirements of this safeguard policy have been responded to in this report by evaluating the impact of the project, its alternatives, existing legislative framework and public consultation.

4.4.4 Petroleum Industry Guidelines

Many environmental management systems have been designed to improve the environmental performance of organizations. Globally recognized and accepted EHS international standards, best practices and guidelines can be successfully used by industries to achieve a successful systems-based approach to EHS management. Guidelines based on information from the International Association of Oil and Gas Producers (OGP), the International Organization for Standardizations (ISO) and the International Electro-Technical Commission (IEC) have become widely accepted as providing a strong basis for preparing regulations, policies and programmes to minimize the impact that these operations have on the environment. The E&P Forum (Oil Industry International Exploration and Production Forum), jointly with UNEP, published a document on the best approaches to achieving high environmental performance and standards worldwide. Within the framework provided, various technical reviews and guidelines already available from other relevant sources can be applied. It developed a general management system to deal with health, safety and environmental (HSE) issues.

4.4.5 Identified Applicable Performance Standards, January 2012

While all Performance Standards (PS) are applicable to this investment project, based on our current information, IFC„s environmental and social due diligence indicates that the construction of the LPG storage depot will have significant impacts which must be managed in a manner consistent with the following Performance Standards; PS 1: Social & Environmental Assessment and Management Systems; PS 2: Labour& Working Conditions; PS 3: Pollution Prevention & Abatement; PS 4: Community Health, Safety and Security; and PS6: Biodiversity Conservation & Sustainable Natural Resource Management.

4.4.6 The International Code for the Security of Ships and Of Port Facilities

This part of the International Code for the Security of Ships and Port Facilities contains mandatory provisions to which reference is made in chapter XI-2 of the International Convention for the Safety of Life at Sea, 1974 as amended.

The objective of this code is to establish an international framework involving cooperation between Contracting Governments, Government agencies, local administrations and the shipping and port industries to detect security threats and take preventive measures against security incidents affecting ships or port facilities used in international trade; establish the respective roles and responsibilities of the Contracting Governments, Government agencies, local administrations and the shipping and port industries, at the national and international level for ensuring maritime security; ensure for an early and efficient collection and exchange of security-related information; provide a methodology for security assessments so as to have in place plans and procedures to react to changing security levels; and ensure confidence that adequate and proportionate maritime security measures are in place.

4.4.7 The World Bank Group's Environmental, Health and Safety (EHS) Guidelines

The World Bank's 2007 Environment, Health and Safety Guidelines are technical reference documents containing both general and industry specific examples of good international industry practices. The general EHS Guidelines cover environmental, health and safety issues that are applicable by all industry sectors. The Guidelines contain the measures and performance levels that are generally accepted by the International Finance Corporation. Where host country regulations differ from the measures and the levels contained in the EHS Guidelines, projects will be required to adopt the more stringent ones. Management will thus adopt the World Bank Group's Environmental, Health and Safety Guidelines and other best environmental practices.

4.4.8 Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, 1991

Waste generation should be to the minimum in terms of quantity and/or hazard potential. Whenever it does generate such wastes, the proponent should transport and dispose of them in a manner consistent with the protection of human health and the environment. Hazardous wastes should as far as is compatible with environmentally sound and efficient management, be disposed of where they were generated, in this case, in Kenya.

4.4.9 World Bank Safeguard Policy BP 17.50- Public Disclosure

This BP encourages Public Disclosure (PD) or Involvement as a means of improving the planning and implementation process of projects. This procedure gives governmental agencies responsibility of monitoring and managing the environmental and social impacts of development projects particularly those impacting on natural resources and local communities. The policy provides information that ensures that effective public disclosure is carried out by project proponents and their representatives. The BP requires that Public Involvement should be integrated with resettlement, compensation and indigenous peoples" studies. Monitoring and grievances redress mechanism should also be incorporated in the project plan. The proposed project incorporated Public Participation and stakeholders" consultation as part of the Environmental and Social Impact Assessment study in order to collect the views of the local communities and their leaders for incorporation in the project mitigation plan. The consultation was successful and the community members gave a number of views that have been considered in the mitigation plan.

4.5 IFC Performance Standards

IFC's Sustainability Framework articulates the strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The Performance Standards provide standard guidance on how to identify risks and impacts and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the developer in relation to project-level activities.

In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the Performance Standards to manage environmental and social risks and impacts so that development opportunities are enhanced. IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation in order to achieve its overall development objectives. Other financial institutions may also apply the Performance Standards.

For the proposed project, the applicable IFC performance standards include:

4.5.1 Performance Standard 1(PS 1): Assessment and Management of Environmental and Social Risks and Impacts.

PS 1 highlights the importance of managing environmental and social performance throughout the life of a project by developing and implementing an effective Environmental and Social Management System (ESMS). It provides guidelines on the contents and process of developing an effective ESMS.

Requirement: Policy

The proponent will develop an EHS policy which will demonstrate the commitment to comply with the Kenyan laws and other international applicable standards like IFC's during all the phases of the project. All the contractors engaged by the proponent during

construction, operation and decommissioning will be required, through contractual agreements to adhere to the proponent's EHS policy.

Requirement: Identification of Risks and Impacts

This study report is part of the environmental and social impacts assessment that will be used to identify, assess and propose mitigation measures for the environmental and social impacts in accordance with Kenyan requirements and IFC standards during construction, operation and decommissioning of the proposed project.

The ESIA study will include the following specialized studies in order to comprehensively capture all the relevant issues and benefits associated with the project.

- Quantitative Risk Assessment (QRA)- A QRA will be undertaken to determine the acceptability of risks in relation to the proposed LPG terminal. As part of the QRA, the Consultant will calculate the annualized societal risk to neighboring populations resulting from significant events emanating from, demolition of existing structures and construction and operation of the proposed LPG terminal. The Consultant will endeavor to gather information of the surrounding business establishments and KPA residential estate to calculate the societal risk. The Consultant will conduct a comprehensive review and analysis of the existing Fossil Supplies Limited's EHS policies, procedures and work instructions related to risk and disaster management and business continuity
- The Noise Quality Study will be undertaken in order to identify, categorize and analyze noise associated with the proposed Project and the resulting impacts to the project environment. All sensitive receptor points, with regards to the proposed project will be identified and mapped. The study will evaluate the potential impact of the project activities on the local noise climate from construction noise associated with the Project, normal power plant operating conditions and, emergency operating conditions associated with the project.
- A Hydrological impact assessment will be undertaken to identify potential hydrological issues associated with project on the area
- A Geophysical impacts assessment will be undertaken to identify potential impacts associated with the project activities
- A Social Impact Assessment study will be undertaken to identify potential social risks and benefits and recommend mitigation measures for the former. Impacts as identified during construction and operation phase of the project have been highlighted in chapter 10 of this SR.

Chapter 11 defines the framework for the Social Management Plan for the proposed project with the following plans to be formulated:

- ❖ Stakeholder Engagement Plan
- ❖ Grievance Redress Mechanism

This ESIA has an ESMP that contains a comprehensive plan on how to mitigate or enhance the identified negative and positive impacts. Additionally, the proponent will be required to

maintain a formal process of identifying additional project related E&S risks in accordance with Kenyan regulations and good international industry practice (GIIP) for all phases of the projects.

Requirements: Management Programs

The proponent will develop specific Environmental and Social management programs and standards to ensure complete planning and implementation of all aspects related to EHS. Some of the management plans will include:

- ❖ Emergency Response plan
- ❖ Construction safety plan
- ❖ Electrical safety plan
- ❖ Fire and explosion safety plan
- ❖ Transport management plan
- ❖ Waste management plan
- ❖ Soil erosion control plan
- ❖ Stakeholder's engagement plan

Requirements: Organizational Capacity and competency

The Proponent, in collaboration with appropriate and relevant third parties, will establish maintain, and strengthen as necessary an organizational structure that defines roles, responsibilities in association with the project. EHS and social manager(s) should be part of the line managers responsible for offering Environmental and social support. Subsequently the proponent will be required to engage competent supervisors.

Requirements: Emergency preparedness and response

The proponent will be required to develop an emergency preparedness and response plan and procedures for the proposed project construction and operation based on the identified risks and impacts. The plan will take into consideration all the applicable emergency scenarios i.e., medical, road transport accidents, landslides, Fire and explosion, community protest and security incidents. The Emergency Preparedness and response plant will have detailed emergency response and incident management plans to be implemented to mitigate, control and recover from credible emergency scenarios.

Requirements: Monitoring and review

The proponent will be required to develop and maintain a dynamic mechanism of monitoring the performance of the EHS monitoring system. The mechanisms will include: -

- Statutory Environmental Audits
- Internal inspections
- Regular management review meetings;
- Review of the aspects and impacts register;
- Legal compliance audits and updating of the legal register;

- Incident and accident reporting;
- Addressing external complaints

Requirements: Stakeholder Analysis and Engagement Plan

The Proponent will develop and implement a Stakeholder Engagement Plan that is scaled to the project risks and impacts and will be tailored to the characteristics and interests of the affected communities.

A Stakeholder Engagement Plan (SEP) will be prepared to illustrate how stakeholder identification and analysis was carried out, the engagement activities that were carried out during the scoping and ESIA phases and those that are to be carried out throughout the construction and operations phase and communication mediums and strategy for those engagements.

The SEP will be an attachment to the Social Impact Assessment report.

Requirements: Consultation and Participation

For projects with potentially significant adverse impacts on affected communities, the client will conduct an Informed Consultation and Participation (ICP) process that will build upon the steps outlined below in Consultation with the Affected Communities to ensure their informed participation.

Effective consultation is a two-way process that should:

- begin early in the process of identification of environmental and social risks and impacts and continue on an ongoing basis as risks and impacts arise;
- be based on the prior disclosure and dissemination of relevant, transparent, objective, meaningful and easily accessible information which is in a culturally appropriate local language(s) and format and is understandable to affected communities;
- focus inclusive engagement on those directly affected as opposed to those not directly affected;
- be free of external manipulation, interference, coercion, or intimidation;
- enable meaningful participation, where applicable; and be documented.

Application: Formal and informal consultations were carried out with the neighboring community through a baraza set up which was conducted in Kiswahili language. The members of the community were provided with information on the proposed project and the ESIA study and were given an opportunity to give their comments, concerns/issues and ask project related questions which were responded to by the local Project Developer and the ESIA consultants in attendance. The discussions of the baraza meeting were minuted and are an attachment to this report.

Additionally, other individuals and organizations with an influence, interest or expertise to offer to the project, though not directly involved or affected by the Project (secondary stakeholders) were consulted through one-on-one meetings i.e., Local administration,

NEMA, Department of Gender, Youth and Social Services, Department of Land and Physical Planning etc.

During the ESIA phase more consultations will be undertaken by the proponent with the affected person/communities and other stakeholder groups through one-on-one meetings and barazas.

A project Communication plan which contains a database of stakeholders to be consulted and the communication strategies and frequency to be used based on their level of influence and interest has been developed. The communication plan was used and will continue being used to guide the consultation process during the ESIA phase.

Requirements: Disclosure of Information

The client will provide affected communities with access to relevant information on:

(i) the purpose, nature, and scale of the project;
(ii) the duration of proposed project activities;
(iii) any risks to and potential impacts on such communities and relevant mitigation measures;
(iv) the envisaged stakeholder engagement process; and
(v) the grievance redress mechanism.

Application: Before commencing the stakeholder dialogue, pertinent project information was prepared for disclosure. The following information was disclosed to the stakeholders:

• Project Description (Details on the project site, project components, project activities and project duration)

• The ESIA Process;

• Environmental and Social legislative framework;

• The Public Participation processes

• Potential environmental and social impacts for the different phases of the project

Requirements: Grievance Redress Mechanism

Where there are affected communities, the Proponent will establish a grievance redress mechanism to receive and facilitate resolution of affected communities' concerns and grievances about the client's environmental and social performance.

Application: A Community Grievance Redress Mechanism procedure will be prepared that will allow stakeholders to raise questions or concerns with the Company on project related issues and have them addressed in a prompt and respectful manner. The Grievance Redress Mechanism will be independent of employee related grievances.

Requirements: On-Going Reporting to Affected Communities

The proponent will provide periodic reports to the affected communities that describe progress with implementation of the project action plans on issues that involve ongoing risk to or impacts on affected communities and on issues that the consultation process or grievance redress mechanism have identified as a concern to those communities.

Through the Stakeholder Engagement Plan (SEP) and the Grievance Redress Mechanism (GRM), the proponent will continuously engage the affected communities and disclose pertinent project information.

Applicability- PS 1 is APPLICABLE for the project

4.5.2 Performance Standard 2: Labour and Working Conditions.

PS 2 stresses on labour management as a key component in any project. It offers guidelines in relation to employment creation and income generation in a manner that protects the rights of the workers.

The following are the applicable requirements of PS 2:

Requirements: Working Conditions and Management of Worker Relationship

The EPC will develop and implement Human Resource Policies and Procedures that will be used to guide labour recruitment and management. These policies and procedures include but are not limited to:

- Employee Handbook
- Recruitment Procedures
- Job Procedures
- Worker Grievance Mechanism Procedure
- Termination and Retrenchment Policies
- Harassment Policy
- Disciplinary Policy
- Health and Safety Policy
- The EPC will provide workers with documented information that is clear and understandable, regarding their rights under the Kenyan Employment Act, 2007.
- The Proponent shall put in place measures to ensure:
- Prevention of child labour, forced labour, and discrimination.
- Freedom of association and collective bargaining are provided.
- Wages, work hours and other benefits shall be as per the National labour and employment laws.

The EPC will be required to provide reasonable working conditions and terms of employment for both direct and contracted workers through contractor agreements which are to be provided. Construction Contractor should ensure that Terms of employment include wages and benefits, wage deductions, hours of work, breaks, rest days, overtime

arrangements, and overtime compensation, medical insurance, pension, and leave for illness, vacation, maternity, or holiday are to be communicated to workers clearly.

Requirements: Workers' Organizations

Fossil Supplies Limited and by extension the EPC will not restrict workers from developing alternative mechanisms to express their grievances and protect their rights regarding working conditions and terms of employment. The proponent will not discourage workers from forming or joining a workers' organization or discriminate or retaliate against workers who attempt to form or join workers' organizations.

Requirements: Non-Discrimination and Equal Opportunity

The proponent will not discriminate with respect to any aspects of the employment relationship, such as recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, and promotion, termination of employment or retirement, and disciplinary practices.

The proponent should take appropriate measures to prevent any discriminatory treatment of migrant workers. Measures to prevent and not endorse any harassment, including sexual harassment or psychological mistreatment within the workplace will also be undertaken.

Requirements: Retrenchment

The proponent should make certain that all workers receive notice of dismissal and severance payments mandated by law and collective agreements in a timely manner.

The proponent should conduct proper consultations with the workers before the retrenchment, if any. Selection criteria for those to be laid off should be objective, fair, and transparent. The retrenchment should not be based on personal characteristics unrelated to inherent job requirements.

Requirements: Grievance Mechanism

The proponent will provide a grievance mechanism for workers (and their organizations, where they exist) to raise workplace concerns.

In providing a grievance mechanism through which workers may raise workplace concerns. The proponent should ensure that matters are brought to management's attention and addressed expeditiously. The Proponent needs to also document all grievances and follow up on any corrective actions.

Requirements: Protecting the Work Force

The Proponent/Contractor will not employ children in any manner that is economically exploitative or is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.

The proponent should ensure that the Contractor employs no child labour (as defined in IFC PS2) or forced labour during construction and operation phase of the project. The developers

should also exercise diligence with regard to key contractors and subcontractors so that they do not knowingly benefit from practices that lead to bonded or indentured status of workers.

Requirements: Occupational Health and Safety

The proposed project will engage approximately 100 unskilled workers from the neighborhood and approximately 50 semi-skilled and skilled workers from within and outside the country. The developer will provide a safe and healthy work environment, taking into account inherent risks associated with weir construction in big rivers, tunneling, working on steep areas, transportation of abnormal loads, hot works, installation of high voltage equipment, erection of transmission line and operation of the power station. The proponent will take steps to prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, as far as reasonably practicable, the causes of hazards. In a manner consistent with good international industry practice, as reflected in various internationally recognized sources including the World Bank Group Environmental, Health and Safety Guidelines, the developer will address areas that include the (i) identification of potential hazards to workers, particularly those that may be life threatening; (ii) provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) training of workers; (iv) documentation and reporting of occupational accidents, diseases, and incidents; and (v) emergency prevention, preparedness, and response arrangements.

Requirements: Workers Engaged by Third Parties

The Proponent will establish policies and procedures for managing and monitoring the performance of such third-party employers in relation to the requirements of this Performance Standard.

It is envisaged local, national and international contractors will be engaged by the proponent. These Contractors will be required to formally align their EHS systems with proponents. In regard to this, the Proponent should develop and implement procedures to manage and monitor performance of third parties.

Applicability- PS 2 is APPLICABLE for the project

4.5.3 Performance Standard 3: Resource Efficiency and Pollution Prevention

Performance Standard 3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels.

It is envisaged that the construction of the proposed project will potentially lead to the following

- Significant use of water, energy and local construction materials
- Increased air pollution (from stationary and vehicular emissions and particulate matter generation),

• Generation of Green House Gases from construction equipment

• Generation of excavated spoil, sanitary waste, some hazardous waste and other general wastes

• Exposure to Hazardous cementing chemicals and used oil

• Increased environmental noise and ground vibration

The proponent will be required to develop and ensure implementation of the following project and site-specific plans in accordance to Kenyan laws and IFC requirements;

• Energy, water and natural resources (local construction materials) conservation

• Environmental and occupational air quality monitoring and pollution control

• GHG monitoring and control

• Waste management plans

• Hazardous materials management

• Excess noise and vibration control

Applicability- PS 3 is APPLICABLE for the project

4.5.4 Performance Standard 4: Community Health, Safety, and Security.

This performance standard stresses the protection of the affected people from the project activities. Any developer should identify the risks the project poses to the community and mitigate them.

Application: The Proposed Project will involve importation, storage and truck loading of LPG gas which poses fire safety risks to the neighboring Oil facilities and KPA estate. The potential occupational hazards arising from the project activities and the impacts on health & safety of the affected community has been identified and assessed in the SIA study report.

Requirements: Community Health and Safety and Community Exposure to Disease

Community health and safety considerations should be addressed through a process of environmental and social risks and impacts identification resulting in an Action Plan for disclosure to project Affected Communities.

The proponent is required to address Community health and safety associated with the construction and operation phases of the project.

The Proponent should ensure that the surface water drainage system during operation phase is not poorly designed and there is no creation of construction pits and depressions that can have potentially adverse impacts on adjacent local communities.

Requirements: Infrastructure and Equipment Design and Safety

For all projects with risks to workers and the public, the client should also build its internal capacity to monitor engineering and fire safety of its operations, including periodic monitoring and internal audits.

The proponent will ensure that the recommended safety requirements for bulk storage of LPG are factored in the design.

Requirements: Hazardous Materials Management and Safety

The proposed project will involve handling and storage of LPG which is a Highly flammable material. The Proponent will use approved engineering designs to ensure safe receiving, storage, and truck loading of the LPG. Mounded tanks will be constructed to minimize potential explosion, fire detectors and leak detectors will be installed and LPG approved pipe network will be put in place.

Requirements: Emergency Preparedness and Response

The Proponent will develop an Emergency Response Plan to respond effectively to emergency situations. This shall be in collaboration with the other Shimanzi Oil Terminal Users, Kenya Ports Authority, Kenya Navy and the County Council of Mombasa.

Applicability- PS 4 is APPLICABLE for the project

PS 1, 2, 3 4, have been considered applicable to this ESIA Study based on the environmental and social issues that are likely to arise from the proposed project. The above performance standards while not being mandatory provide the proponent with guidance on how to identify risks and impacts and, how to avoid, mitigate, and manage risks in all phases of the project implementation.

4.6 National Institutional Framework

4.6.1 National Environment and Management Authority

The responsibility of the National Environmental Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principle instrument of government in the implementation of all policies relating to the environment. In addition to NEMA, the Act provides for the establishment and enforcement of environmental quality standards to be set by a technical committee of NEMA known as the Standards and Enforcement Review Committee.

CHAPTER FIVE: PUBLIC CONSULTATION AND PARTICIPATION

5.1 Objectives of Public Consultation and Participation

Public consultation and participation was achieved through questionnaire administration, observation, interview, focused group discussions, and meeting which provided important information on key impacts, baseline information, project negative impacts and their potential mitigation measures. Interviews and discussions with key personnel necessitated the acquisition of vital information for the successful Environmental and Social Impact Assessment study process. This ensured for an open and transparent process as it took into consideration the views of the project affected people and those meant to benefit from the project around the area. Advertisements on dailies and radios will as well be done to ensure all the public are aware of the proposed project public consultation and participation aimed at:

- Facilitate consideration of project alternatives, mitigation measures and trade-offs.
- Ensure that important impacts are not overlooked and benefits are maximized.
- Reduce conflict through early identification of contentious issues.
- Provide an opportunity for the public to influence project activities in a positive manner.
- Improve transparency and accountability through decision-making, and increase public confidence in the Environmental and Social Impact Assessment process and the proposed project's undertaking process.
- Build the public confidence and create a sense of project ownership by the surrounding communities for a successful project implementation process.
- Give back to the Community through corporate Social Investment on Emergency preparedness, Education and Health.

5.2 Methodology

5.2.1 Site Reconnaissance

Site reconnaissance was conducted at the proposed site in Changamwe in order to identify and gather information on the biophysical and socio-economic environmental characteristics of the area. Questionnaires were administered during a public Baraza at the chief's office to the neighbouring residents, businesses, and workstations in the area which are likely to be affected by the proposed project activities.

5.2.2 Findings

Site survey showed that the proposed project site neighbours mainly Mabati, Bahati, Birikani, Changamwe, National Housing and Bangladesh residential estates as the immediate neighbour. It also neighbours businesses premises like Mombasa Cement, APM Terminus Limited, Transpares and KPRL, which might be affected by the project implementation activities. The expected project negative impacts to the nearby residential

estates and businesses are negligible and mitigatable through proper implementation of the provided Environmental and Social Management and Monitoring Plan.

5.3 Questionnaire Administration

Open and closed ended Questionnaires were administered and filled by Changamwe area residents and businesses that are likely to be affected by the proposed project activities. Interviews and consultations were conducted and involved mainly the project proponent's proposed project details.

5.4 Requirements of Stakeholder Consultation

Stakeholder consultation is required by the Kenyan environmental legislation as well as the International Finance Corporation's (IFC) Performance Standard 1. Each of these requirements is discussed below. 5.3.1 National Requirements At a national level, stakeholder consultation on ESIA studies is embedded within section 58 of Environmental Management Coordination Act of 1999. Rule 17 of Legal Notice 101 titled Environment (Impact Assessment and Audit) Regulations, 2003 calls for Public Participation and consultation throughout the impact assessment study. It requires the Proponent to:

- Seek the views of persons who may be affected by the project in consultation with the Authority (NEMA);
- Publicize the project and its anticipated effects and benefits by erecting posters in strategic public places informing the affected parties and communities of the proposed project;
- Publish a notice on the proposed project for two successive weeks in a newspaper that has a nation-wide circulation and make announcement in both official and local languages in a radio with a nation-wide coverage at least once a week for two consecutive weeks;
- Hold public meetings with the affected parties and communities to explain the project and its effects, and to receive their oral or written comments. Ensure that appropriate notices are sent out at least one week prior to the meetings and that the venue and times of the meetings are convenient for the affected communities and the other concerned parties; and
- Ensure, in consultation with the NEMA that a suitably qualified coordinator is appointed to receive and record both oral and written comments and any translations thereof received during all public meetings for onward transmission to NEMA.

Following the submission of the ESIA report to the NEMA, the Authority shall, within fourteen days of receiving the environmental impact assessment study report, invite the public to make oral or written comments on the report upon which, if deemed necessary, the Authority may hold a public hearing. Additionally, Kenyan Court require that Public Participation in environmental issues, at a minimum, which includes but not limited to

i. Programme of Public Participation that accords with the nature of the subject matter. The Public Participation programme must take into account both the quantity and quality of the governed to participate in their own governance;

ii. Innovation and malleability depending on the nature of the subject matter, culture, logistical constraints, and other related factors that ensure that the Public Participation is effective;
iii. The Public Participation programme must include access to and dissemination of relevant information;
iv. Those most affected by a policy, legislation or action must have a bigger say in that policy, legislation or action and their views must be more deliberately sought and taken into account; and any clear and intentional attempts to keep out bona fide stakeholders would render the Public Participation programme ineffective and illegal by definition;
v. Public Participation should be conducted while going through the motions or engaging in democratic theatre so as to tick the Constitutional box. All the views received as part of Public Participation programme should be taken into consideration, in good faith; and
vi. The right of Public Participation is not meant to usurp the technical or democratic role of the office holders but to cross-fertilize and enrich their views with the views of those who will be most affected by the decision or policy at hand. The Proponent will adhere to the above principals in the Public Participation process.

5.4.1 International Requirements

The Kenyan legislation on Public Participation is aligned with the IFC's information disclosure and public consultation requirements as specified under Performance Standard 1 on Assessment and Management Assessment and Management of Environmental and Social Risks and Impacts.

This requirement calls for FSL to conduct and provide evidence of meaningful, free, prior and informed consultation with the communities likely to be affected by environmental and potential social impacts, and with all identified local stakeholders. Stakeholder engagement is an ongoing process that may involve, in varying degrees, the following elements: stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism, and ongoing reporting to Affected Communities. The nature, frequency, and level of effort of stakeholder engagement may vary considerably and will be commensurate with the project's risks and adverse impacts, and the project's phase of development

5.4.1.1 Stakeholder Analysis and Engagement Plan

According to IFC performance standard 1, the Proponent is required to develop and implement a Stakeholder Engagement Plan that is scaled to the project risks and impacts and development stage and be tailored to the characteristics and interests of the Affected Communities. The standard requires the proponent to identify individuals and groups that may be directly and differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status and put in measures so that adverse impacts do not fall disproportionately on them.

A Stakeholder Engagement Plan for this project has been prepared illustrating the engagement activities that were carried out during the ESIA phases and those that will be carried during the construction and operations phase

5.4.1.2 Consultation and Participation

According to IFC performance standard 1, the proponent is required to conduct an Informed Consultation and Participation Process that will result in the Affected Communities' informed participation. The key principles of effective stakeholder engagement that have been undertaken by FSL are summarized as follows:

- Providing meaningful information in a format and language that is readily understandable and tailored to the needs of the target stakeholder group(s)
- Providing information in ways and locations that make it easy for stakeholders to access it and that are culturally appropriate
- Two-way dialogue that gives both sides the opportunity to exchange the views and information, to listen and to have their issues heard and addressed
- Inclusiveness in representation of views, including ages, women, and men, vulnerable and/or minority groups
- Processes free of intimidation and coercion
- Clear mechanisms for responding to people's concerns, suggestions, and grievances; and
- Incorporating where appropriate and feasible, feedback into project or program design, and reporting back to stakeholders

5.4.1.3 Grievance Redress Mechanism

According to IFC PS 1, where there are affected communities, FSL is required to establish a grievance redress mechanism to receive and facilitate resolution of affected communities' concerns and grievances about the client's environmental and social performance. A Grievance Redress Mechanism procedure has been prepared to allow stakeholders to raise questions or concerns with the proponent and have them addressed in a prompt and respectful manner.

5.4.1.4 Ongoing Reporting to Affected Communities

IFC PS 1 requires FSL to provide periodic reports to the affected communities that describe progress with implementation of the project action plans on issues that involve ongoing risk to or impacts on affected communities and on issues that the consultation process or grievance redress mechanism have identified as a concern to those communities. Through the Stakeholder Engagement Plan and the Grievance Redress Mechanism, FSL will continuously engage the affected communities and disclose pertinent project information.

5.4.2 Stakeholder Identification and Mapping

A comprehensive stakeholder identification and analysis process was conducted where stakeholders were identified and mapped. This formed the foundation for planning and

designing of successive stakeholder engagement activities. The stakeholder mapping was done based on the identification of individuals, communities, groups, and institutions who:

- Have the mandate over the various elements of the project's activities (such as Government ministries and agencies);
- Are considered vulnerable members of the society within the proposed project area; and
- Are considered the projects main supporters and opponents
- Are most likely to experience at significant levels, the positive and/or negative impacts of the proposed project;

The stakeholder analysis process sought to prioritize identified stakeholder based on: interest and expectations in relation to the proposed project; required levels of participation for each stakeholder throughout the project lifecycle; degree of influence of each stakeholder group to the direction and success of the proposed project; interrelationships between different stakeholders and the convergence/divergence between their interests and expectations. For the proposed project, project stakeholders include the following categories of persons or institutions:

a) Those directly impacted by the project such as people living in villages within the project area. This includes residents of the Kenya Ports Authority and Kenya Railways Estates adjacent to the project site.
b) Stakeholders that will be affected by the project activities thereby requiring consent to utilize their resources included institutions such as, Kenya National Highways Authority (KENHA), Kenya Railways Corporation, and Mombasa Water and Sewerage Company (MOWASCO).
c) Mombasa County Administration at the county, sub county, ward, location, and village level.
d) Specifically, the region affected by this project is Mikindani Sub-Location in Mikindani Location, Changamwe Sub-Location in Changamwe Location, Changamwe Ward - Changamwe Constituency.
e) Government parastatals such as Energy and Petroleum Regulatory Authority, Kenya Ports Authority, National Environment Management Authority (NEMA), Kenya Forest Service e) Community based organizations operating in the project area and its environs
f) Private sector businesses in the vicinity of the proposed project.
g) The project proponent-FSL

5.5 Public Consultations

Public engagement and stakeholder consultation are fundamental to an effective environmental and social impact assessment process and for the successful implementation of the proposed expansion of the LPG Facility. It serves to promote mutual confidence and trust between the proponent and project stakeholders

Public engagement is an on-going process; for the proposed expansion of the LPG Facility, stakeholder consultation was initiated during the scoping phase and will continue throughout the detailed ESIA process, construction, operational phases of the project respectively. The

approach to public engagement has been designed to promote meaningful, two-way communications between FSL and the stakeholders

The public consultation was focused on engaging community residents, estate residents, businesses, local/public authorities, community leaders, as well as other individuals or groups that express interest in the project.

FSL is committed to effective and open consultation to ensure that potentially affected members of the public are fully aware of the project and have the opportunity to make their views known. The concerns will help ensure that all the important issues are considered in the environmental assessment.

The public consultation program included: -

- Preliminary consultations;
- One on One meetings;
- Public baraza meeting; and
- Focus Group Discussions

It is important to note that stakeholder consultation is an ongoing process and further stakeholder engagement will be conducted as the project progresses. Minutes of the meetings held during the public consultation and digital photographs taken during the meeting are appended the end of this report.

5.6 Stakeholder Engagement Activities

5.6.1 Preliminary Consultations

The ESIA Team made a reconnaissance visit to the proposed site on 22nd July 2022. The consultants were able to establish the general project site and specifically made a transect walk to the bush tank area, railway line, neighbouring industries, other oil terminals and the proposed administration building site. The Team was accompanied by the FSL strategy officer and KRC Operations officer who had a good knowledge and understanding of the proposed project.

Later, the consultants had a meeting with the County Commissioner of Mombasa, Chief and Assistant Chief of Changamwe and Mikindani Locations and informed them of the proposed project and the ESIA studies to be undertaken.

The ESIA team also expressed their intention to conduct public baraza meetings with communities in the project area. The Assistant Chief was well informed on the proposed project site. This involved project site familiarization and identification of potentially affected businesses.

In July 25th, 2022, the ESIA Team conducted a meeting with the Mikindani and Changamwe Chiefs and 3 village elders in charge of the potentially affected villages. Later on, 27th July 2022 there was a meeting at the Deputy County Commissioner's office.

The agenda of the meeting was to discuss on:

- Social organization of the local community (demographics of the people they represent).
- Identification of other stakeholder representatives in the Community i.e., NGOs, CBOs
- Areas of challenge within the community.
- Solicitation and guidance on how to carry out community engagement i.e., methods of mobilization and project information dissemination

5.6.2 Public Baraza Meetings

Three public baraza meetings were held at the Changamwe Social Hall under the chairmanship of Changamwe Chief. The first meeting was held on ***14th September 2022***. The second meeting was held on ***26th October 2022*** while the third meeting was held on ***10th November 2022.*** The Changamwe social hall was an ideal venue for the baraza meeting because it was a convenient to control crowds and was also a common point for majority of the targeted stakeholders. The public baraza meetings were held with residents from Mabati, Bahati, Birikani, Changamwe, National Housing and Bangladesh residential estates as the immediate neighbour. Residents from these areas are the ones that live within the vicinity of the proposed site for the LPG plant and are likely to be impacted most by the project and its activities. The meeting was also attended by the National Government Authority Officers in charge of the area i.e. Deputy County Commissioner, Changamwe, Changamwe Chief, Mikindani Chief, Assistant Chief Changamwe, Assistant Chief Mikindani with the village elders. The Consultants (a Sociologist and Environmentalist) together with the proponents Engineer were in attendance to provide information to the public and to receive and address comments. The barazas were presented with information on:

• Description of the project (project design and location);

• The requirements of the EMCA for new projects in Kenya;

• The Environmental Assessment Process;

• Baseline environmental studies being undertaken as part of the ESIA; and

• Potential environmental and social impacts associated with the proposed project.

After giving presentations on the proposed project, the stakeholders were provided with an opportunity to comment and give views on their perceptions of the proposed project. The verbal discussions were done in Swahili language as it had been established through the local leaders that the audience would be most comfortable with the Swahili language. The respondents were able to comment on the project, highlight the potential positive and negative impacts of the project and if they are for or against the project. All substantive

issues raised with the Firm of Experts during the baraza were noted and responded to. The issues were then recorded in stakeholder Engagement Plan

5.6.2 Overview of the Stakeholder Engagement Plan during the ESIA

Table 5.1: Summary of issues of concern that arose during Public Participation.

Subject	Stakeholder	Issue	Response
Public Health and Safety	EPRA, Mikindani Chief	Whether the mounded LPG bullet storage tanks will ensure that residents are safe from inhaled gas and in the event of an explosion	-PIEA had been engaged to sensitize the community on LPG Safety on continuous basis -The mounded technology proposed by FSL is one of the safest and has been used in developed countries - The bullet tanks holding LPG will be encased in a concrete wall with sand surrounding the immediate metallic tank. - In the event of fire, the bullet tanks, being protected by 1m of sand and armored concrete sarcophagus eliminate any risk of implosion or fire, thereby limiting any possibility of fire outbreaks to the nearest tanks, communities, and business establishments - The mounding technology allows for reduced safety distance (the distance between 2 tanks) hence the proponent is able to utilize a small piece of land to construct tanks with larger storage capacities as compared to the bullet technology.
Employment	Women, youth, PWD leaders, MCAs	Whether the Proponent will employ locals.	• The proponent is committed in ensuring effective local content in terms of sourcing of skilled, semiskilled and unskilled labour throughout all the project phases.

Subject	Stakeholder	Issue	Response
Corporate Social Responsibility (CSR)	Deputy County commissioners Office Women, youth, PWD leaders,	Request for water, Health Centre and education facility for Changamwe residents	• CSR activities will be determined in consultation with community members and will take into account the greatest area of challenge to the people.
Traffic and movement patterns	KR, EPRA, County Administration	Whether there is a plan to manage traffic that will result from construction activities	-The contractors will undertake public awareness programs in consultations with the community to identify areas of particular risk and approaches to reduce risk. This is expected to include awareness programs along roads leading to the site targeting frequent users on traffic dangers. • The Project Contractor will develop a Traffic management plan for the construction phase of the project • The contractor will prepare a detailed plan for signage along the Construction Area to facilitate traffic movement, provide directions to various components of the Works, and provide safety signages
Skill Enhancement	MCAs, Changamwe Chief	Whether there will be skill enhancement at the LPG facility to enable the employees secure jobs in similar developments once the plant has been decommissioned	-The setting up of the LPG plant will require highly skilled, skilled semi-skilled and unskilled labour. The unskilled have to be supervised by the skilled personnel, however, the unskilled will be presented with an opportunity to learn from the skilled as they work together. • The proponent will train LPG operators on plant operation and safety as outlined in their program
Contractor Management	Community leaders	How the proponent will manage the Contractor and ensure they honour the agreements especially with the local communities and residents	• The Construction activities will be managed by a HSE Officer to ensure recommendations made in the ESIA are implemented by the EPC Contractor. • Additionally, the Proponent will hire a Community Liaison Officer from the community who will handle grievances related to the project and ensure that they are addressed appropriately.

Subject	Stakeholder	Issue	Response
Impact on Air Quality	Community leaders	How the dust generated from construction will be managed	• The contractor will implement dust suppression measures including, sprinkling water, undertaking excavation works when its less windy, use of road signage, dust traps and speed reduction as appropriate and applicable. • The contractor will regularly engage the neighbouring business establishments whenever activities that are likely to cause nuisance or disturbance are planned.
Noise Pollution	Community leaders	Whether the noise generated by construction machines shall be maintained at minimal levels	-Provision of personal protective equipment like earmuffs to workers to protect them from excessive noise pollution that is very harmful to their health. -Conduction of regular noise monitoring and evaluation tests to ascertain the levels of noise produced at the site. -Awareness creation among workers on the risks of noise pollution on their health and importance of using personal protective equipment like earmuffs regularly. -Conduction of regular medical check-ups for workers at the site to ensure that workers don't suffer in silence. -Proper and regular servicing and maintenance of construction machineries, vehicles, trucks, equipment, and tractors. -Keeping records of maintenance services and inspection to the machineries, vehicles, trucks, equipment, and tractors for future reference and use.

Subject	Stakeholder	Issue	Response
Water Pollution	WRA, Community Leaders, EPRA	Whether water shall be safe for community use	-Ensuring that the construction machines have suitable central dust collectors and filters. -Re-using of the waste water from construction activities. -Channeling of the waste water from the construction site to the storm water channels for safe disposal. -Recycling of the waste water for use again in the construction activities. -Conduction of monitoring and evaluation for water quality and pollution levels at the site. -Awareness creation on the importance of conserving and managing water, using water sparingly and recycling or re-using water at the site. -Use of water tarpaulins for trapping dusts entering water.
Toxic chemical emissions (Sulphur, nitrogen, carbon dioxide, Carbo Monoxide, etc.) from the proposed liquefied Petroleum Gas facility.	KR, Community Leaders, EPRA	Whether the chemicals shall negatively impact the community	-Conduction of regular medical check-ups among workers to ensure that they are not affected by the toxic gaseous emissions from the factory. -A shift to green and ecologically friendly technologies -Reusing of the toxic chemicals within the site to ensure that none is released to the atmosphere. -Use of highly electrified magnetic inductors to trap the toxic air before release of the cleaner air into the environment. -Regular air pollution monitoring to be conducted to ensure that the air samples being released into the atmospheric air is clean and habitable.

Table 5.2 Summary of project benefits

Summary of project benefits	
Benefit	**Impact**
Increased Employment Opportunities	• Improved livelihood standards of the local people. • Opportunities for specialized skill development.
Availability of Affordable Liquefied Petroleum Gas	• Improved livelihoods. • Improved business activities. • Availability of cleaner energy and positive impact on climate
Business Growth	• Economic growth – mushrooming of small-scale businesses in the vicinity • Opportunities for self-employment
Improved Security	• Improved business environment. • Improved individual and business safety and low crime rates
Revenue Generation	• Expansion of business and promote new developments • Improved infrastructure (roads, water, hospitals, etc.)
Improved Local Community Member's Living Standards	• Improved health. • National and county economic growth.
Improved Environmental Management and Conservation	• Clean source of energy. • Environmentally friendly source of energy (an alternative to environmentally destructive ones like charcoal).

Neighbours when consulted pledged their full support for the project citing such benefits like access to clean and environmentally friendly energy (liquefied petroleum gas), employment opportunities, easy and convenient access to goods and services, improved economic and business growth, revenue generation to the national and county governments, modern infrastructural facilities provision, and business opportunities and growth, among others. A few project neighbours who had concerns were consulted and assured that all their concerns will be properly addressed and where possible, their involvement will be required for a transparent and accountable project implementation process.

Public Participation meetings notes are attached in the appendices of this report

5.6.3 Focus Group Discussion

Focus Group Discussions with Business Operators in consultation with key informants from the community i.e., the Chief, Village elders and members of the public (during the public baraza meeting), business operators were identified. The FGD was focused on determining

how the proposed project would impact on them. The key views, concerns and requests collated during these consultations are aggregated in the Stakeholder Engagement Plan

Fossil Supplies Limited prepared a Project Brief which was shared with Key Stakeholders namely: -

- Ministry of Energy and Petroleum
- Mombasa County Government
- Member of Parliament Changamwe
- Kenya Pipeline Company
- Petroleum Institute of East Africa
- Energy Petroleum Regulatory Authority
- Kenya Petroleum Refinery Limited
- Kenya Civil Aviation Authority
- Kenya Maritime Authority
- Kenya Railways

5.6.4 One on One Meetings

One on One Meetings with relevant organizations / Lead Agencies and Government departments During the SR Phase, the following organizations and government departments relevant to the project were identified and consulted:

- Changamwe - Deputy County Commissioner (DCC)
- Jomvu - Deputy County Commissioner (DCC)
- Member of Parliament for Changamwe
- Member of Parliament for Jomvu
- Kenya Airports Authority
- Kenya Civil Aviation Authority
- Members of County Assembly Changamwe and Jomvu
- Speaker of Mombasa County Assembly
- National Environmental Management Authority (NEMA)
- Kenya Ports Authority (KPA)
- Energy &Petroleum Regulatory Authority (EPRA), Mombasa
- Kenya Railways Corporation (KRC), Mombasa
- Transpares limited
- APM Limited
- Multiple Hauliers Limited
- CMC Motor Group
- Kingorani EPZ
- Water Regulatory Authority (WRA)
- Kenya Petroleum and Refineries Limited (KPRL)
- Kenya Pipeline Company Limited, Mombasa Office
- Mombasa Fire Brigade

During the One-on-One meeting the ESIA team and the Proponent discussion included but not limited to: -

- Project introduction
- Obtain information on policies and plans relevant to the project.
- Developmental activities in the area.
- Facilitation and coordination of Public Participation in the proposed project.
- Get their views and concerns on the proposed project.

Public Participation 1 Photos of 14th September 2022





Public Participation 2 Photos of 26th October 2022

Public Participation 3 Photos of 10th November 2022

CHAPTER SIX: ENVIRONMENTAL AND SOCIAL IMPACTS AND THEIR MITIGATIONS

6.1 Introduction

This chapter presents the potential impacts associated with the project, perceived impacts by consulted stakeholders, as well as the proposed assessment methodology and any potential mitigation options that have been identified at this stage of scoping.

6.2 Construction Phase Impacts

The proposed project is anticipated to generate the following impacts on the biophysical environment. It is expected that the significance of these impacts will reduce with the proposed mitigation measures as outlined.

6.2.1 Geology and Physiographic Impacts

The geology and physiography of the project area will be affected by activities that will include; mobilization of equipment, earthworks and civil related works and erection during facility construction. The risk of subsidence due to passage of heavy vehicles is negligible due to the geology, but localised compaction of surface soils may occur in some places due to vehicular movement. There might be scarring and displacement of sediments from quarries and borrow pits while extracting materials for civil work activities.

6.2.1.1 Mitigation Measures

The proposed project site is localized in coverage thus no major alterations to geomorphology, geology and physiography. However, to prevent the localized impacts:

- The proponent should strive to confine heavy equipment and vehicular movement to existing road access.
- Defined vehicular access routes will be in place onsite and within the project area.
- In case a borrow pit is established to acquire materials for civil work then the pit/ quarry should be reclaimed afterwards.
- The construction activities should not alter or in any way interfere with any natural or manmade watercourses.

6.2.2 Soil Erosion and Pollution

There is a possibility of soil erosion and pollution to occur during construction phase of the project. There will be vegetation clearance which would lead to soil erosion when bare-land is exposed to natural agents such as wind and surface run-off. Removal of top soil after site clearance by agents such as wind, rain water, and surface run off is a likely action to occur. Similarly, accidental oil spills from construction equipment and discharge of wastewater from equipment washing to the environment might accelerate soil pollution to some extent. Oil spills may infiltrate into soil causing soil pollution and later water/marine pollution.

However, this impact is localized around machinery maintenance areas or garage and areas of concentrated activities.

6.2.2.1 Mitigation measures

1. Minimal vegetation clearance on the site and where necessary stumps left intact to bind soil together.
2. A safety data sheet should be maintained for all potentially hazardous materials, as well as supporting documentation for the transport, use and disposal of such materials used in construction.
3. Used motor oil and filters from vehicles and generators should be removed from the area for proper disposal.
4. Used motor oil should not be used for dust suppression on access roads.
5. Disposal of chemicals and motor oil should be documented, including quantities involved and disposal locations.
6. A plan should be prepared to prevent and contain accidental oil discharges or fuel spillages.
7. A licensed waste oil handler should collect used oil from the site for safe disposal.
8. Re-vegetate disturbed areas once construction and demolition works are completed during construction and decommissioning phases respectively, and
9. Carrying out site audits and surveys to identify any contaminated areas and remediate them accordingly.

6.2.3 Delivery of LPG Vessels by Sea

The LPG Vessels shall be imported by barge/ship in complete units, received at the management sites private berth, driven to receiving rails by Self Propelled Modular Trailer (SPMT) and skidded into final position. This method of transportation and installation is well tested for fabricated units of this scale. It is anticipated that the entire delivery and installation process should take a short time for all vessels, with fully supervised shifts working 24 hours.

6.2.3.1 Mitigation measures

- A full offloading and installation methodology should be developed, with supporting engineering design and checks, to ensure the safety of the offloading, delivery and installation operation.
- The offloading, delivery and installation operation should be undertaken during favourable weather conditions with close attention paid to weather forecasts and wind conditions it the project site.

6.2.4 Noise and vibration

Construction techniques will involve:

1. Driving of piles into the ground extending to the basalt formation. Methods may include driven, percussive or auger installed piling techniques.
2. Noise generated through excavation and tipping of fill material.
3. Noise generated from power generator.
4. Noise generated through the operation of heavy construction plant.

Impact receptors will be the construction workers within the site and the personnel on adjacent property closest to the noise source. Adjacent properties are located a significant distance from the construction site and this will provide a good level of attenuation from the noise sources. These properties are of largely an industrial nature and may therefore be considered less sensitive, especially where heavy plant or noisy processes are in operation. In addition, the prevailing wind is from an easterly direction. Which may also have a noticeable effect in reducing the noise levels on adjacent property.

6.2.4.1 Mitigation Measures

The following mitigation measures are proposed to reduce the impacts:

1. Construction workers will be provided with appropriate ear protection.
2. Use of vibratory hand operated equipment will be minimized
3. Noisy operations will be restricted to daytime operation.
4. Power generator and other equipment should be state-of-the-art and equipped with silencers/mufflers where the option is available.
5. Effect a noise regulation policy for all operations in accordance with the Environmental management and Coordination (Noise and Excessive vibration pollution) Regulation.
6. Construction plant will be maintained in good running order; all vehicles should comply with the requirements of Road Traffic Act.

6.2.5 Air quality

The main issues with regard to air quality during construction are:

1. Dust generated during the earthworks, mud on roads.
2. Exhaust gases from the operation of heavy plant can be a potent source of NOx, CO, PM and other pollutant.

Impact receptors will be.

1. Construction workers within the site
2. Personnel on adjacent properties closest to the noise source.

Adjacent properties are located a significant distance from the construction site and this will provide a significant buffer to the proliferation of dust nuisance. In addition, the prevailing winds will tend to also reduce the impact, however, it is noted that when the wind turns from the south or the west this could exacerbate any nuisance.

6.2.5.1 Mitigation Measures

The following mitigation measures are proposed to reduce the air quality impacts.

1. For potentially dusty earth works operations, construction workers to be enclosed within ventilated cabs or provided with facemasks for potentially dusty earth works operations.
2. Where appropriate water damping to be used to control dust. Particular attention to be paid when the wind is from the south or west.
3. Limit traffic speed and restrict movement of vehicles as to minimize dust generation.
4. Construction plant will be maintained in good running order; all vehicles should comply with the requirements of Traffic Act Cap 403 and its subsequent regulations for emission control.

6.2.6 Water Usage

It is assumed that potable/fresh water requirements during the construction stage will be met through bowsers provided by licenced water vendors, or a temporary CWSB connection to feed the site compound. Potable and fresh water will be provided for the welfare of construction workers, for wash-down of equipment and for damping down of earthworks to reduce dust. These requirements will be commensurate with efficient construction practices. A considerable volume of water will be required for the hydro-testing of the pressure vessels. It is proposed that this will be pumped directly from the sea into the clean vessels. Following testing, the uncontaminated water will be discharged to the sea. Seawater may also be used for damping down during earthworks operations.

6.2.6.1 Mitigation Measures

1. Install and properly manage site sanitation facilities.
2. Ensure that all taps are well fit and leaking.
3. Ensure that portable water is not used in ablution or sanitary facilities.

6.2.7 Energy Usage

It is assumed that all electrical requirements during the construction stage will be met through on-site generators or a temporary Kenya Power and Lighting Company connection to feed a site office. It is in the contractor's interests to ensure that fuel consumption is reduced to a minimum and commensurate with efficient construction practices.

6.2.7.1 Mitigation Measures

1. Ensure that all lighting system are switched off when not in use.
2. Install energy saving bulbs.
3. Design the office infrastructure to maximise the use of natural light.
4. Install metering system for energy monitoring.

6.2.8 Road Traffic

Road traffic will be generated to and from site during the construction stage due to: -

1. Transportation of construction workers using the existing road network.
2. Transportation of imported construction materials using the existing road network; i.e. imported mound fill, ready mixed concrete, reinforcement, road materials, other building materials.
3. Transportation of exported fill to an agreed reclamation site or other licensed dumping ground.

Impact receptors will be:

- ❖ Users of the entrance roads and the connecting public access.

The likely increase in movements during peak construction will therefore amount to minimal impact compared to the existing situation. This impact is therefore assessed as negligible and it is proposed that a full Traffic Impact Assessment is not necessary. The site activities themselves will be well confined and it is proposed that close liaison with the affected parties will avoid any significant nuisance.

6.2.8.1 Mitigation Measures

In order to minimise the impact of additional road traffic during construction stage the following measures will be adopted:

1. Deliveries will be made to site outside of the periods of high congestion on the public road system (i.e. early morning, late afternoon).
2. Materials haulage companies to use competent drivers and ensure that shift patterns do not result in excessive working hours resulting in compromised road safety.
3. All haulage vehicles shall be maintained in good running order and should comply with the requirements of Road Traffic Act.
4. Should the surface materials at site generated by preliminary earthworks and piling be of suitable quality these materials shall be deployed and the volume of imported materials diminished.
5. Where feasible, and to limit the number of movements of haulage vehicles to and from the port area, it is anticipated that bulk materials will be shipped to port and moved directly to site (i.e. steel reinforcement, geogrid, etc. subject to appropriate port clearance).

6.2.9 Impacts on Terrestrial Biodiversity

Construction activities at the project site will require stripping of top soils and clearance of few trees, shrubs and vegetation where the facilities will be located. Although minimal, few floral species mainly Azadirachtaindica and Mangiferaindica as well as leuceanaspp species

will be cut to pave way for new facilities. The project site has no rare or scarce plant species, the vegetation consists mainly of grasses and common shrubs. It is therefore determined that, there is negligible impact to terrestrial biodiversity.

6.2.9.1 Mitigation Measures

1. Plant more ornamental trees/flowers to stabilize stripped top soil.
2. Clear vegetation only in construction areas and demarcate areas where no clearing will happen.
3. Educate contractors on the importance of flora and fauna in the area, including the appropriate regulatory requirements to preserve fauna and flora.
4. Avoid/minimize paved surfaces on the site.

6.2.10 Water Quality

During construction poor maintenance and operation of heavy trucks and equipment might lead to oil and fuel spills at the construction site which may contaminate land and surface water resources in the area. Other sources include; silt load run-off due to surface erosion particularly during earthworks activities and fuel storage and re-fueling of vehicles, liquid bitumen from asphalt surfacing. The Site is also located centrally within the main industrial area of Mombasa County. The immediate marine ecosystem is not considered to be of a sensitive nature. However, in order to minimise the risk of reduced water quality during construction stage the following measures will be adopted.

6.2.10.1 Mitigation measures

1. Earthworks activities shall be halted when rain conditions are such that excessive erosion and silt loaded run-off noticed.
2. The construction programme will avoid excessive exposure of bare earth surfaces which may be more prone to erosion.
3. If appropriate, settlement lagoons can be used to allow silts to be retained prior to discharge of run-off to the existing drainage channels or direct to sea.
4. Care will be taken to avoid excessive mud being transferred by construction plant to the access roads and public highway. Where this is likely to become a nuisance, it will be cleared by the contractor.
5. Consideration will be given to undertaking routine maintenance of plant and vehicles off-site in a properly equipped workshop.
6. All haulage vehicles shall be maintained in good running condition and should comply with the requirements of Road Traffic Act.
7. Existing drainage channels to be cleared of silt / debris and trash screens installed if appropriate.
8. Used oil interceptors shall be installed to trap any accidental leakages.
9. All effluent shall be treated before discharge to any sewer line.

6.2.11 Solid Waste

Construction activities will lead to solid waste generation mainly from non-degradable and non-toxic materials: Such as Plastic and metal packaging materials, excess concrete from ready-mix deliveries, Metal off-cuts from trimming reinforcing bars and pipes to length. Whereas degradable and non-toxic: shall be generated from food wastes, papers, cardboard and timber packaging materials and this will lead to an increased load on the municipal/county waste authority. All options will be considered in avoiding or minimising transporting any unsuitable excavated materials from site, as this is undesirable from both an ecological and economic perspective. The quantity of material for disposal will be determined by further soils investigation and testing. The identification of a suitable reclamation area or dumping ground will be through further discussions with the KPA in consultation with the county government of Mombasa and will of course be subject to appropriate licensing. A location close to the Site will be preferred.

In order to minimise the impacts due to the generation of solid wastes during construction stage the following measures will be adopted.

6.2.11.1 Mitigation Measures

1. The contractor shall put in place a waste management plan aimed at minimising the production of all wastes.
2. Where possible measures will be put in place to recycle materials such as metal offcuts, some plastics and clean paper/cardboard utilising existing specialist recycling firms in Kenya.
3. A suitable location within site for placing excess concrete and washing down equipment will be agreed with no discernible impact.
4. Non-recyclable materials will be segregated and stored in plastic bins, collected and disposed of through the municipal waste system.
5. Provide disposal bins at designated areas at the project site to help in waste segregation to encourage recycling.
6. Enforce regular collection and disposal of garbage by the project contractor through licensed NEMA waste handler
7. Clean storm water drains to minimize clogging

6.2.12 Foul Smell

There shall be effluents from the civil works, workers and storm water drainage. It is envisaged that during construction stage, effluents that shall be discharged will be domestic effluent generated by the construction workers which will peak at an estimated 100 people per day. Essentially from toilets, showers and mess facilities. No construction process related effluents will be generated.

6.2.12.1 Mitigation measures

1. Firm measures will be enforced to ensure that construction workers do not foul areas surrounding the site.

2. The sewerage will be collected and treated via an on-site septic tank and leaching field, with arrangements in place for periodic de-sludging and disposal using a licensed carrier by County Government of Mombasa and NEMA.

6.2.13 Landscape and Visual Environment

Construction activities such as clearing of top soil and few shrubs, transportation of earth moving materials/equipment to the site and construction of the storage mounds will have insignificant impact on aesthetic values of the area. In addition, the size of the liquefied petroleum gas mound is considerable. This is considered in the context of the adjacent port facilities and an extensive number of large industrial sheds, buildings and other structures. Whilst the proportions of the mound are large, they are not dissimilar to many of the industrial buildings within the port. As the sides of the mound will be concrete clad, this may from a distance appear building like. It is considered that existing port structures will continue to dominate the skyline.

An appropriate level of external lighting will be installed for operational and security purposes. In the context of the adjacent port facilities, which also utilise external lighting this is not considered to be significantly visually detrimental. Despite the facility posing no major visual impact consider the following mitigation measures where appropriate.

6.2.13.1 Mitigation measures

1. Consider suitable paint colour for large structures that can blend with the background minimise visual impact to adjacent areas.
2. Ensure good housekeeping of the site in order to create a positive image in the eyes of the public.
3. Consolidating facilities within the boundaries of the project area.
4. Designing fencing to follow the contour of natural and planned vegetation to maximum visual screening to the extent practicable.
5. Use of directional lighting to limit light spill (i.e. spread of light outwards from where it is needed into adjacent areas).

6.2.14 Occupational Accidents

Construction workers are prone to accidents resulting from construction activities. These accidents may have acute or chronic impacts depending on nature, severity and intensity. In this regard, construction and mobilization activities of the proposed LPG storage facility would result into accidental injuries and hazards which can negatively impact the workforce. Because of the intensive engineering and construction activities including erection and fastening of roofing materials, metal grinding and cutting, concrete work, steel erection and welding among others, construction workers will be exposed to risks of accidents and injuries. At times, such injuries may be from accidental falls from high elevations, injuries from hand tools and construction equipment cuts from sharp edges of metal sheets and collapse of building sections among others.

6.2.14.1 Mitigation Measures

The proponent should provide and maintain a working environment in which employees are not exposed to hazards through:

1. Maintaining safe workplaces, plant and work systems.
2. Providing information, instruction and trainings.
3. Consulting with employee-elected health and safety representatives and/ or other employees about occupational health, safety and welfare.
4. Providing adequate personal protective clothing and equipment.
5. Ensuring all work procedures are undertaken without exposing workers to hazards.
6. Staff needs to be educated on preventing infection by thorough hand washing after work and before eating and also by ensuring all PPE are in good condition.
7. Adequate respiratory protection including properly fitted masks equipped with filters especially designed to capture dust and micro-organisms shall be provided.
8. Ensuring chemicals are stored in a designated enclosed area, and material safety data sheets (MSDS) that provide advice on storage, emergency and first aid of these chemicals are within easy reach.
9. Install and operationalize effective Fire-fighting and Emergency Evacuation Plans;
10. Ensuring that there is basic first aid facilities for staff and clean up equipment for any spills that occur, and
11. Training should be provided for all staff to ensure adequate knowledge of safe manual handling and correct use of equipment and vehicles by covering all safety procedures to ensure that general work safety exists on the project.

6.2.15 Employment opportunities

Construction of the storage terminal will have substantial labour benefits to the county. Labour required from the local workforce is estimated to be high. It is therefore concluded that the provision of employment opportunities during construction will therefore provide a positive socio-economic impact.

6.2.16 Impacts on Security

The presence of labourers and expensive construction equipment, machinery and materials in the sites could potentially pose a security risk at the project site. Furthermore, offenders may capitalize on the increased movement during construction and anonymity created by the construction activities to carry out criminal activities in the site and surrounding areas. The impacts on the area's security is considered to be of medium significance. Therefore, appropriate security measures should be provided at the site through fencing, security checks/screening of workers and their guests and 24 hours security watch by expert security men to prevent such criminal activities from happening at the site.

6.2.17 Income Generation among Suppliers

During construction phase, the proposed project plan to import construction materials from overseas countries and also source locally available materials such as cement, iron sheets,

steel bars, pipes, etc. from the local market. This demand therefore, will create market for local people in Mombasa and/or elsewhere in the country engaged in supplying construction materials leading to significant positive economic benefits to suppliers in Mombasa.

6.2.18 Increased STDs and HIV/AIDS Cases

The project is expected to employ or contract a significant number of staffs and casual labourers during construction and operation phases. Social interactions among staffs and with locals cannot be avoided. Considering the nature with which HIV/AIDS is contracted and spread, this number is significant to make a serious contribution to the pandemic. Also, presence of monetary strength will act as catalyst and thus enhance such social interactions between the project workers and the local people. The extent of this impact is localized with a medium intensity. It is likely that the impact might occur. The impact can be highly improved/eliminated with mitigation. Therefore, the impact is negative and of high significance.

6.2.18.1 Mitigation Measures

The proponent should provide and maintain a working environment in which employees are save through:

1. Advocacy on safe life practices through signages
2. Peer education to all

6.2.19 Informal Business Growth

During construction period the informal sector will benefit from the operations. This will involve different local entrepreneurs such as local food vending operators who will be selling their products and services to be used on site. Such a move for instance, shall promote these local entrepreneurs in the local areas as most of the workers working on the proposed project site will be buying food from them.

6.2.20 Impact on Surrounding Social Facilities

The impact on the surrounding social facilities and services will be detrimental. A study of the area suggests that the existing social facilities are not sufficient to sustain and accommodate the people who currently live in the area hence the pressure that will be placed on the resources. This is very significant and the proponent needs to make plans on how basic needs will be met by his work force. Such social facilities include water supply and healthcare facilities.

6.3 Operational Phase Impacts

The impacts of potential increases to future production of downstream liquefied petroleum gas bottling plants are outside the scope of this assessment. The global impacts of increased local consumption of liquefied petroleum gas are also outside the scope of this assessment.

6.3.1 Soil Erosion

Environmental baseline data of soils is documented to provide a baseline against which possible impacts were to be assessed. Soil erosion would occur during the operational phase activities involving earthworks during maintenance and rehabilitation activities. Paved surfaces and compacted soil could decrease soil absorptive capacity and result to increased surface run-off. The surface run-off could result to adverse effects such as erosion of the topsoil layer and blockage of surface drainage.

6.3.1.1 Mitigation Measures

1. Minimal earthworks to be undertaken during rehabilitation.
2. Restore all the sites that were damaged during rehabilitation.
3. All storm water should be drained separately and not allowed into the pits.

6.3.2 Marine and Aquatic Environment

The impact sources from the project operations will include mobilization of equipment and machinery, construction wastes, oil leakages and storm water. These potential sources might have detrimental effects to coastal and marine sources / habitats if poorly implemented. Therefore, owing to the geomorphological and drainage nature and pattern on the site, the aquatic/marine environments will be susceptible to changes in surface hydrology and contamination of surface water and the marine environment especially during rainy seasons as a result of increased storm run-off. Contaminations of the water sources through sedimentation as a result of surface run-off refuse/ garbage disposal /septic systems, and fuel/ oil-based products. These processes might then lead to a change in the ecology of the marine/ aquatic environments and also the socio-economic well-being of the local communities as a consequence of related possible reduced productivity of the aquatic habitats in the adjacent areas. This can be through disturbance to benthic habitats, marine pollution from accidental discharges and introduction of invasive marine species.

6.3.2.1 Mitigations Measures

1. Liquefied petroleum gas Vessels/storage tanks utilized for the activity are not allowed to leak or discharge content.
2. All equipment, vehicles and machinery should be sanitized prior to mobilization to the project site to avoid transfer of invasive/alien species and remove bio fouling.
3. All project activities should be located away from shores of the Indian Ocean, sea grass beds, coral reef areas, productive shallow water areas and any other environmentally sensitive area.
4. All sewage and putrescible wastes should be handled and disposed-off in accordance with EMCA Waste management regulation, 2006.
5. All harmful packaged substances should be handled and disposed of in accordance with MARPOL.

6. A Garbage Management Plan should be put in place detailing wastes generated and disposal requirements. There should be no discharge of plastics or plastic products of any kind from vessels to the aquatic environment.
7. All storage facilities and handling equipment will be in good working order and designed in such a way as to prevent and contain any spillage as far as practicable.
8. All solid, liquid and hazardous wastes (other than sewage, grey water and putrescible wastes) should be compacted and stored in designated areas and sent onshore for recycling, disposal, treatment or appropriate final disposal.
9. There should be correct segregation of solid and hazardous wastes.
10. Used motor oil and filters from vehicles and generators should be properly disposed of, and
11. A log of any chemicals and motor oil disposed should be maintained. This should include the quantity disposed and the disposal location.

6.3.3 Noise

The normal operation and maintenance of the proposed facility will generate little, if any noise.

Noise from the operations of the Kenya Railways is significant. Adjacent properties are of an industrial nature and may therefore be considered of limited sensitivity, especially where heavy plant or noisy processes are in operation (i.e. tipping of coal, fabrication etc.).

6.3.3.1 Mitigation Measures

1. Ensure the affected workers are provided with appropriate ear protection equipment
2. Isolated noisy operations will be restricted to daytime operation.
3. Power generator and other equipment should be state-of-the-art and equipped with silencers/mufflers where the option is available.
4. Effect a noise regulation policy for all operations in accordance with the
5. Environmental management and Coordination (Noise and Excessive vibration pollution) Regulation.
6. Ensure that all vehicles are compliant with the requirements of Road Traffic Act.

6.3.4 Air Quality

There are no venting scenarios anticipated during normal operation of the proposed facility, including offloading of LPG carriers. Vapour displaced from the storage tanks of the LPG carriers is fed back to the mound (and vice-versa) as a closed system to prevent major pressure changes between the LPG in storage at the mound and ship. There are no venting scenarios anticipated during normal maintenance. The facility utilises LPG compressors to recover liquids and vapours from the LPG Terminal between valve isolation. Vapours are compressed and liquefied and then returned to any remaining active storage or export to a ship if necessary. Stenching (or odorising) of the LPG product does not take place at the

proposed facility, therefore the risk of odour nuisance from spills is eliminated. In the unlikely event of LPG release to Lower Explosive Limit will neither be toxic nor polluting.

6.3.4.1 Mitigation Measures

1. The following mitigation measures are proposed to reduce the air quality impacts.
2. Carry out baseline air quality and periodic air quality checks
3. Where appropriate water damping to be used to control dust. Particular attention to be paid when the wind is from the south or west.
4. Limit traffic speed and restrict movement of vehicles as to minimize dust generation
5. Ensure all vehicles have complied with the requirements of Road Traffic Act and its subsequent regulations for emission control.

6.3.5 Water Usage

A potable water connection shall be provided by the CWSB supply. Based on a daily consumption estimate of 50 litres per person per day the water supply required shall be no more than 5,000 litres per day. This increased demand in the local CWSB network may be considered negligible; however, commitment of supply must still be sought from CWSB and any improvements to offsite infrastructure agreed.

6.3.5.1 Mitigation Measures

In order to minimise the impacts during operation due to increased water usage the following measures will be adopted:

1. The site distribution network and connection to the CWSB supply will be designed and constructed to industry standard specifications to ensure losses within the new network are reduced to a minimum.
2. Where appropriate, water efficient fittings will be used, i.e., wash hand basins, showers etc.
3. The firewater distribution system will connect to a Fossil Supplies Limited Station owned and maintained dedicated firewater pump house located at the facility.
4. Evaluate the need to tap the infinite sea water for fire fighting
5. Construction of 2,500 cubic meter water tank for fire cover

6.3.6 Energy usage

An electrical power connection shall be provided by the Kenya Power and Lighting Company. The electrical power requirements for the facility during normal background operations are estimated to be average. This increased demand in the local Kenya Power network may be considered negligible; however, commitment of supply must still be sought from Kenya Power and any improvements to offsite infrastructure agreed.

6.3.6.1 Mitigation Measures

In order to minimise the impacts during operation due to increased energy usage the following measures will be adopted:

1. The facility will be provided with generators to provide operational backup should the Kenya Power supply be interrupted.
2. Where appropriate, energy efficient fittings will be used, i.e. lighting, controls etc.
3. Implement Energy saving technology such as Variable Frequency Drive (VFD)
4. Carry out periodic energy audits for the facility

6.3.7 Road Traffic

Road traffic to the site will comprise staff vehicles and the occasional delivery vehicle for maintenance or domestic goods as well as trucks loading LPG for wider distribution.

6.3.7.1 Mitigation Measures

In order to minimise the impact of additional road traffic during operational phase, the following measures will be adopted:

1. Ensure that outward distributions are made outside of the periods of high congestion on the public road system (i.e. early morning, late afternoon).
2. Materials haulage companies to use competent drivers and ensure that shift patterns do not result in excessive working hours resulting in compromised road safety
3. All haulage vehicles shall be maintained in good running order and should comply with the requirements of Road Traffic Act.
4. The Proponent to implement a Traffic Management Plan

6.3.8 Marine Traffic

LPG carriers will use the existing Shimazi Oil Terminal (SOT) berthing facility. The new KOT facility is expected be ready by 2023. The number of LPG ship calls is anticipated to be two per month at peak of operations. This increase should be considered within the overall context of the port. The size of the import LPG carriers will increase up to approximately 25,000 DTW. The container ships, which currently operate out of the Port Reitz Container Terminal are often significantly larger than the maximum anticipated size of LPG carrier, and will outnumber the large LPG significantly. Increased LPG import through the private berth shall allow some congestion from the current import position at Kipevu Oil Terminal to be alleviated.

Impact receptors will be:

1. Other shipping operating within the vicinity harbour.
2. The marine environment and ecosystems.
3. Existing port infrastructure, berthing and offloading facilities.

The anticipated increase in number of LPG carrier movements is non-negligible but is understood to be well within the capacity of the port.

6.3.8.1 Mitigation measures

1. KPA to control and regulate shipping movements within the port area.
2. KPA to have adequate controls enforced to ensure the safety of ship manoeuvres and berthing operations, and that this includes the avoidance and mitigation of potential negative environmental impacts.
3. Put in place good marine traffic plan.
4. Work in collaboration with KPA to ensure the safety of ship movement and berthing operations.
5. On the assumption that adequate controls are in place regarding port shipping movements, the potential impacts due to the overall increase in movements and size of LPG Carriers are assessed as low.

6.3.9 Water Quality

The main issue with regard to water quality during operation is the potential for hydrocarbon spills from vehicles or equipment during maintenance‖ discharging into the marine receiving waters immediate West and South of the site. Another major source of risk to water quality is storm water run-off from the mound being contaminated by oil or other pollutants by virtue of any release of product being gas which will vapourise if released.

NB – there is no venting of gas during normal operations or maintenance.

In order to minimise the hazard from storm water run-off from the car park the following mitigation measures shall be employed.

6.3.9.1 Mitigation Measures

1. The proponent to ensure that oil water separator (OWS) or interceptor is installed in all drainage system of the site to enable safe disposal of storm drain prior to discharge from site.
2. A maintenance regime will be in place to ensure the correct functioning of the oil interceptor. The storm water drainage system within the site will, if appropriate, include trash screens and silt traps prior to discharge to the sea. These will be maintained by the operator, particularly after cyclonic conditions when the system may be put under stress.

For LPG carriers the ballast water is understood to be clean discharge, and therefore poses no pollution threat to marine or terrestrial ecosystem. Potential water quality impacts during operation are therefore assessed as low.

6.3.10 Generation of Solid Waste

During normal operation and maintenance of the facility no residues are expected to be produced which will require disposal. Solid wastes produced during the operation of the

facility are expected to be of a domestic nature comprising; Non-degradable and non-toxic: Plastic wrappings, miscellaneous office wastes such as printer cartridges and compact disks (CDs) amongst others while degradable and non-toxic: Food wastes, Paper and cardboards. It is anticipated that not more than 10kilogram of wastes will be produced per day; this will be stored in plastic bins, collected and disposed of through the municipal waste system.

Other feasible measures include;

6.3.10.1 Mitigation Measures

1. The wastes should be properly segregated and separated to encourage recycling of recyclable materials using NEMA accredited Kenyan firms.
2. Provide dustbin cubicles at designated locations for collection point.
3. Place waste receptacles at strategic points to discourage littering.
4. The proponent to work hand in hand with private refuse handlers and the County Government of Mombasa to facilitate waste handling, and disposal from the site.

6.3.11 Generation of Foul Effluents

There shall be effluents generation from administration staff and other workers/employees and it is envisaged that during operation stage, effluents that shall be discharged will be domestic effluent essentially from toilets, showers and mess facilities. The sludge will be channeled to on-site septic tank and leaching field, with arrangements in place for periodic de-sludging and disposal using a licensed carrier from either private or county government waste handlers. Other measures are as outlined below;

6.3.11.1 Mitigation Measures

1. Conduct regular inspections for sewer pipe blockages or damages and fix them before any leakage to terrestrial or aquatic environment;
2. All drain pipes passing under the building, driveway or parking should be of heavy-duty PVC pipe tube encased in 150mm concrete all round. All manholes on drive ways and parking areas should have heavy duty covers.
3. Ensure no undue interference with the laid drainage system.

6.3.12 Terrestrial Biodiversity

There is a little vegetation on the site at the moment which will be cleared to pave way for the project construction. However, during operation activities, fauna such as small bird life and Monkeys will have to find new nesting and homes. It was also observed that there is no terrestrial biodiversity of significance within the project site as most of birdlife observed are migratory.

6.3.12.1 Mitigation Measures

1. Landscaping should be done within the site to improve site appearance after project completion.
2. Minimize vegetation clearance and preserve few trees within the project site to provide nesting ground for birdlife and monkeys home.
3. All vehicles coming into the site must use designated roads.
4. Work areas should be clearly defined and demarcated, where necessary to avoid unnecessary disturbance on areas outside the development footprint.
5. Develop a plan for control of harmful weeds and invasive plants that could occur as a result of new surface disturbance activities at the site.

6.3.13 Occupational Health and Safety

The calculated individual risk levels for all categories of staff do not exceed the acceptability criteria for broadly acceptable risk, and are one order of magnitude lower than the benchmark used by the major oil and gas companies (including Shell, Total, Esso, and BP). The mounding minimises the risks present to the adjacent neighbours to a position where additional risk imposed on their operation is insignificant. The mound effectively eradicates jet fire and flash fire risk modes from propagating towards the adjacent neighbours. Pumps, compressors, liquid and vapour lines are planned to be located in a way that any potential leaks and subsequent potential jet fire from the equipment is deemed unlikely to impact the operations, maintenance and administration building. The orientation of the mound and position of the import and export pipework have been chosen to ensure that the predominant risk faces out towards the sea channel which is currently unoccupied. For this case, future development in this area will need to consider the mitigation of these risks either through the construction of a firewall, appropriate set-back and / or other measures.

6.3.13.1 Mitigation Measures for Site safety

1. The number of mechanical joints should be kept to minimum, replace mechanical joints by welded joints where practicable. This shall be of help in reducing the leaks from flanges.
2. Deployment of a local firewall around the equipment found on top of the mound to eradicate any potential fire radiation impact onto the roof of the building.
3. Flammable gas detection system should be fitted across the site, including in the vicinity of the building.
4. Ensure that upon flammable gas detection local to the HVAC intake duct, the building air HVAC is tripped to prevent gas ingress into the building
5. Building should be constructed in-line with International standards, guided by the purpose of its usage.
6. Hazardous Area Classification should be conducted and findings to be implemented.

7. Active fire protection system should be designed in line with relevant international codes/ standards.
8. Suitable standard operating procedures and Preventative maintenance programmes should be prepared and implemented.
9. Site specific Emergency Response Plan shall be prepared.
10. Any inspection and maintenance undertaken within the pressure vessels should be undertaken by personnel trained in confined spaces.
11. All LPG liquids and vapours will be removed from the system using the dedicated compressors / recovery system, prior to entry.
12. Public access to the undeveloped areas immediately adjacent to the facility shall continue to be controlled and monitored in liaison with the operational staff, and kept to a minimum.
13. Implement HSEMS integrated Management System.

In the event of a cyclone the facility will be placed in Shutdown Mode with all ESD valves isolated. The control room will remain manned by CCTV and a security guard. Appropriate freeboard and slopes will be afforded around the building to avoid potential flooding due to surface water run-off. The building structure will be designed to resist wind gusts imposed during severe cyclones. Therefore, the risk to the security guard during the cyclone will be similar to any well-designed modern building. Applicable Occupational Health and Safety mitigation measures as outlined in construction phase will be implemented

6.3.14 Fire Prevention and Management

The proponent has developed fire procedures and guidance information that will be implemented on the project site to help in the prevention and management of fire. The document helps highlight fire hazards, precautions and suppression facilities necessary to prevent fires from occurring or spreading to prevent loss of life, serious injuries and damage to plant, equipment and structures. The major source of fire is likely to be caused by gas leakage which when it will come into contact with naked flames then there is the possibility of fire occurring on the site.

The following general instructions should be followed and adhered to by the proponent:

1. Materials and equipment should be maintained in an orderly manner that reduces or prevents the possibility of fire spread.
2. Materials should not be stored in a manner that obstructs fire points, sprinkler heads, alarms, emergency exits, electrical panels and walkways.
3. Materials should not be stored close to, or in a manner that conceals, floor openings or hoist ways.
4. Consideration should be given to the fire loading imposed in an area by the placement of materials.
5. Doors provided for emergency escape should open outwards in the direction of travel.
6. Equipment should not be fueled while the engine is running.

7. Smoking is prohibited whilst refueling activities are taking place.
8. Incompatible materials will not be stored in proximity to each other.
9. No smoking policy will be applied. Provide smoking areas away from the work site. The fire detection, suppression and suppression systems to be installed will meet the highest international standards and are listed again below for convenience:

6.3.14.1 Safety Instrumented System (SIS)

A central dual mode redundant Safety Instrumented System (SIS) shall be deployed on the platform with approximately 200 I/O (input/output). The Safety System shall be housed in a separate area of the cabinet suite with field cabling for safety loops segregated from the general wiring. The SIS system will communicate with the Supervisory Control and Data Acquisition (SCADA) system via Ethernet using safety protocol. The Safety Instrumented System consolidates a number of systems together and provides real time information graphically for the following function groups.

- Point Gas Detectors.
- Open Path Gas Detectors.
- Fire Detectors.
- Emergency Shutdown Devices.
- ESD Valves.
- CCTV System.
- Lighting.
- Nitrogen System.
- Firewater System.

6.3.15 Fire Fighting

Process unit fires should be extinguished principally by fuel removal. This will depend upon operational changes to reduce pressure, introducing steam to the systems and the depressurising of part or the entire unit involved. Small fires will be combated with dry chemical or steam. Foam will be used where it can blanket an ignited pool of liquid. Water in the form of spray or high-pressure fog will be most effective on large area or intensive fires that threaten damage to supporting structures and adjacent equipment. However, the use of water on hot equipment may cause flanges and joints to leak, thereby adding to the fire hence the same will not be utilized. In case of electrical machinery fires, machine operators will switch to spare machine and no use of water or foam or de-energization allowed and only the use of dry chemical equipment or carbon dioxide extinguishers promoted.

6.3.16 Portable Fire Fighting Equipment

There should be portable fire-fighting equipment on the site and the proponent has committed to the provision of the same. Appropriate fire extinguishers, e.g. Carbon Dioxide or Dry Powder; must be provided close to electrical distribution panels and other major items

of electrical equipment. An adequate number of portable fire extinguishers will also be made available throughout the project site, located in conspicuous positions close to exits on each floor, mounted off the floor at a height of approximately 1.0 metre and clearly signed fire point. Training will also be undertaken for an adequate number of personnel in the use of these equipment and regular reviews be undertaken to make improvements of the short-falls.

6.3.17 Maintenance and Inspection

Fire extinguishers, hydrants and other fire protection equipment must be maintained and inspected on a regular basis. This will include weekly checks to ensure that all fire hydrants are clear of any obstruction and clearly marked, suitable fire extinguishers are in place adjacent to the fire risks and they are fully charged, undamaged, no signs of visible corrosion, clean from dirt and hoses are in good condition

6.3.18 Evacuation Routes

Focus Freight Container Station will setup defined evacuation routes for vehicles and personnel. If a fire breaks out, all vehicles will quickly be moved from the area. Personnel not involved in fire-fighting fire must also leave. Evacuation routes should be the most direct route out of the fuel facility and the same routes should be clearly be displayed and shown on maps for all personnel to be aware. Fire drills will be to train personnel to react quickly to fires. Fire drills should be as realistic as possible. Evacuation routes should be used and fire extinguishers manned. Fire drills should be conducted at least once a month or when there is personnel turnover. In the event of a fire, major plant failure, explosion, bomb threat or the need to evacuate the plant, the actions listed below should be followed:

1. On the continuous sound of the alarm siren (bells), STOP all activities and vacate the building or area without delay, by the nearest exit.
2. Plant operators to initiate appropriate Emergency Management Procedures, and where possible, confirm plant is in safe state prior to vacating buildings.
3. Move quickly, but do not run.
4. Do not return to a work area to collect belongings.
5. Keep left in corridors and stairs.
6. Do not overtake others along the route.
7. Assemble in the designated Assembly Point.
8. At Assembly Point report to the responsible warden,
9. Do not enter the building or work area under any circumstances until the all clear is given.
10. During staff induction, all visitors and contractors admitted to the site should be advised of the Site Evacuation Procedure and the location of Assembly Point.

6.3.19 Emergency Preparedness and Response

Focus Freight Container Station shall establish and implement an emergency response plan to respond effectively to emergency situations on the site which include, but not limited to, fire, flooding, major incident occurrence and security alert.

The emergency plan should:

1. Establish evacuation procedures
2. Assign responsibilities to specific individuals
3. Provide notification to the Authority and outside agencies such as fire station, hospital, etc.
4. Establish means of communications.
5. Assign locations for emergency centres.
6. Provide in-house emergency responses.
7. Include site security and controlled access.

The information developed as part of the emergency plan should be documented and communicated as appropriate within the site to ensure that the site organization can respond to emergency situations. The Contractor should establish a program of training, drills and exercises to test and evaluate the effectiveness of the plan.

The Contractor should at least once every six months, organize and table top emergency exercises based on likely site scenarios in which the key site personnel work through their emergency response roles and appropriate measures are adopted and implemented on the site.

6.3.19.1 Emergency Planning

Fossil Supplies Limited Station has prepared a site-specific Emergency Response Plan which shall be agreed with the KRC and KPA to corresponds with their overall Emergency Plan. All members of staff will need to receive appropriate training on the implementation of the Emergency Response Plan. The Emergency Response Plan forms part of the Environmental Monitoring Plan. Fossil Supplies Limited Station will have a dedicated HSE officer and team to ensure the highest safety standards are maintained at all times.

The Risk Assessment to be undertaken such that;

1. The calculated Individual Risk levels for all categories of staff do not exceed the acceptability criteria.
2. The mound minimises the risks present to the adjacent neighbours to a position where additional risk imposed on their operation is insignificant.
3. Pumps, compressors, liquid and vapour lines are planned to be located in such a way that any potential leaks and subsequent potential jet fire from the equipment is deemed unlikely to impact the operations, maintenance and administration building.
4. The orientation of the mound and position of the import and export pipe work have been chosen to ensure that the predominant risk faces out towards the channel which is currently unoccupied.

The following additional measures will be implemented to mitigate health and safety risks;

1. The number of mechanical joints should be kept to a minimum, consider replacing mechanical joints by welded joints where practicable. This shall be of help in reducing the leaks from flanges.
2. Deployment of a local firewall around the equipment found on top of the mound to eradicate any potential fire radiation impact onto the roof of the building.
3. Flammable gas detection system shall be fitted across the site, including in the vicinity of the building.
4. Ensure that upon flammable gas detection local to the HVAC intake duct, the building air HVAC is tripped to prevent gas ingress into the building.
5. Buildings shall be constructed in line with International Standards, guided by the purpose of its usage.
6. Hazardous Area Classification shall be conducted and findings shall be implemented.
7. Active fire protection system shall be designed in line with relevant international codes/standards.
8. Suitable standard operating procedures shall be prepared.
9. Preventative maintenance programme shall be implemented.
10. Site specific Emergency Response Plan has been prepared.
11. Any inspection and maintenance undertaken within the pressure vessels will be undertaken by personnel trained in confined spaces. All LPG liquids and vapours will be removed from the system using the dedicated compressors / recovery system, prior to entry.
12. Public access to areas immediately adjacent to the facility shall continue to be controlled and monitored by the KRC (in liaison with the operational staff), and kept to a minimum.

6.3.20 Cultural and Historical Heritage

The proposed facility is on a leased land within Kenya Railways Marshalling Yard and therefore no impacts to cultural of historical impacts are anticipated during normal operation.

6.3.21 Socio-Economic

The commissioning of this facility will provide the following positive impacts;

1. Enhance the provision of the projected bulk storage requirements for Kenya up to 2025, as determined by the 2014 Petroleum Master Plan for Kenya.
2. Allows larger delivery of LPG cargo sizes, thus achieve economies of scale in the terminal build costs. These factor combine with others lead to lower delivered cost of gas.
3. The commissioning of this facility will provide the additional storage capacity to permit the bulk storage facilities within the centre of the port area to be potentially

decommissioned, in line with the KPA's strategic plan. This will result in a positive impact to safety risk in the centre of the Port.

4. The proposed project has the potential of improving the living standards of the local people through employment, cleaner and cheaper source of energy.
5. In addition, Fossil Supplies Limited through their CSR policy may initiate projects that have cumulative benefits to the residents of the project area.

6.4 Impacts During Decommissioning

The life of the facility is expected to be a minimum of 30 years but it is anticipated that this can be extended provided a thorough Pressure Systems Written Scheme of Examination is adhered to. The decommissioning of the facility will involve the pumping of sea-water into the pressure vessels to displace residual LPG. Nearly all of the LPG will be recovered and it is estimated that negligible quantity of LPG will be released to the atmosphere in a controlled manner by cyclic purge using Nitrogen dilution.

Demolition is the reverse of construction; however, the following assumptions are made;

1. The foundations and base slab for the mound will be rehabilitated for future alternative use, or left in-situ. Breaking up and removal should be avoided if possible.
2. The precast components of the retaining wall should be examined as suitable for stockpiling and reuse, or sent to a local crusher plant for recycling.
3. The piping components will be examined as suitable for recycling.
4. It is anticipated that the mound fill, following removal and disposal of the geogrid, will be stockpiled on site for alternative re-use as a construction material locally. An alternative may be to raise the level of the site by spreading evenly.
5. Vessels are unlikely to be scrapped. Upon examination the LPG vessels may be exported elsewhere for re-use.

6.4.1 Loss of Aesthetics Due to Abandoned Project Facilities

In closure of the project, the proponent may decide to demolish the facilities including all other temporary structures. Loss of aesthetics may result from the demolished waste remaining on site for a long time to the extent of becoming an eyesore. The proponent shall ensure that demolished waste is removed from the site and properly disposed of in designated and licensed dumpsites.

6.4.2 Loss of Employment

If for whatever reason the project is closed down, the people employed by the project will lose their jobs. This will have significant impact to these people and their families. Other groups of people who are dependent on the project, such as suppliers of various services (e.g. Security Company) will also lose the market. There is need for workers to have saving schemes that will cushion them in the event of losing employment.

6.4.3 Abandoned Infrastructure

When it happens that operation should be halted there will remain behind machinery which will need proper disposal. Fossil Supplies Limited should undertake proper decommissioning process of all its facility activities.

Therefore, the potential impacts during decommissioning and demolition are summarised as follows:

- Noise and vibration - low
- Air quality - low
- Water usage - low
- Energy usage - low
- Road Traffic – low or moderate
- Export of LPG vessels by Sea - low
- Water quality - low
- Generation of solid wastes - low
- Generation of foul effluents - low
- Employment opportunities - medium

6.4.4 Fire Prevention and Management

Fire prevention and management measures developed during operation phase shall be implemented by management and contractors.

CHAPTER SEVEN: PROJECT ALTERNATIVES

7.1 Location Alternatives

The project site was selected based on the following

- The land is already leased to FSL by Kenya Railways Therefore, there will be no land acquisition processes leading to displacement of people and livelihood
- The available land is prime for such projects and under utilized
- The location is zoned as an industrial area with established petroleum oil facilities and the operation of the proposed project can mutually benefit from the existence of the other facilities.
- The location is served by a nearby LPG pipeline from existing KPRL/KPC pipeline.

7.2 Technology Alternatives

The Feasibility study considered the following alternatives

- Bullet tanks alternative - the alternative would have resulted to terminal with less than 60% of the planned capacity. The option also posed greater fire and explosion risk with potential of affecting other neighbouring facilities.
- Mounded Bullet tanks - The alternative had less fire and explosion risk and required less safety distance, hence this was preferred

7.3 Design and Layout Alternative

Design alternatives for the proposed project were considered in the decision analysis where various layouts for the mounded bullet tanks and loading facilities were considered. FSL engaged an experienced consortium of engineers to undertake the front-end engineering design (FEED) for the proposed project. FSL settled for a layout with a storage capacity of 12,000 MT comprising of 4 mounded bullet tanks and Rail Wagon and Trucks loading facilities.

7.4 Delivery Pipeline Alternative

The following pipe alternatives were considered

- Pipeline route from SOT manifold utilizing Port Road reserve to Changamwe round about to KPRL then to the project site was dropped because it was longer, unsafe and there was no existing ROW.
- Route from KPRL to the project site abandoned due to its longer and also the ROW acquisition challenges
- Direct tie in from an existing KPRL/KPC LPG pipeline was considered. The alternative consists of an existing ROW with an LPG and multi product pipeline.

7.5 Do Nothing Alternative

The ‘do-nothing’ alternative is the option of not establishing the proposed LPG Facility project at the identified site at Changamwe in Mombasa. This alternative would result in no environmental and social impacts in the project area. The ‘do-nothing’ alternative will not

assist the Kenyan Government in reaching its targets for use of LPG as a source of Energy. Subsequently, the do-nothing alternative is not a preferred alternative and has not been assessed in this ESIA

7.6 Alternative Construction Materials

There is no alternative construction materials to the proposed materials of steel metal, water, rocks, gravel, hardcore, ballast and cement, etc., given that they are the recommended and required standard materials for the implementation of the proposed development project.

7.7 Waste Management Alternatives

Solid wastes will be generated from construction and rehabilitation activities at the project site. There will also be solid and effluent wastes generated during the operational phase. The Fossil Supplies Limited will give priority to reduction at source of the materials or containment of wastes where possible. Sewage/effluents should be connected to a reticulated sewage waste management system. Any reusable/recyclable materials must be disposed accordingly. This will call for a source reduction and waste segregation systems of waste management being implemented on the site. Sanitary land filling or collection by a licenced waste collector will be the last option for the proponent. It is to the interest of the proponent and the community that the waste is effectively managed so as to maintain a safe and healthy environment to the worker and the community at large.

CHAPTER EIGHT: CUMULATIVE IMPACT ASSESSMENT(CIA)

According to IFC, Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones. Additionally, IFC Performance Standard 1, Assessment and Management of Environmental and Social Risks and Impacts, recognizes that in some instances, developers need to consider cumulative effects in their identification and management of environmental and social impacts and risks.

8.1 Cumulative Impacts Assessment Approach

As per IFC Performance Standard 1, CIA is based on where the development impact identification process is conducted. CIA is limited to the cumulative impacts to be addressed to "those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities". For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important based on scientific concerns and/or concerns of affected communities. Examples of cumulative impacts include but not limited to the following:

- Effects on ambient conditions such as the incremental contribution of pollutant emissions in an air shed.
- Increases in pollutant concentrations in a water body or in the soil or sediments, or their bioaccumulation.
- Reduction of water flow in a watershed due to multiple withdrawals.
- Increases in sediment loads on a watershed or increased erosion.
- Interference with migratory routes or wildlife movement.
- Increased pressure on the carrying capacity or the survival of indicator species in an ecosystem.
- Wildlife population reduction caused by increased hunting, road kills, and forestry operations.
- Depletion of a forest as a result of multiple logging concessions.

Secondary or induced social impacts, such as in-migration, or more traffic congestion and accidents along community roadways owing to increases in transport activity in a project's area of influence.

8.2 Cumulative Impacts for the proposed project

8.2.1 Increased LPG trucks in Mombasa and along Highways

Kenya has approximately 1,342 Km of white oil pipeline from Mombasa to Kisumu and Eldoret. However, the country lacks a similar LPG pipeline connecting Mombasa with other towns and cities. Additionally, and interview with Kenya Railways Cooperation staff during stakeholder's consultation established that the Meter Gauge Railway (which has a better network within the country) does transport LPG. It was also confirmed that SGR is yet to start transportation of the LPG. LPG in Kenya is currently transported via road and operation of the various Bulk terminals including the proposed project in Mombasa will lead to increased LPG trucks in Mombasa and along the roads connecting to the port city especially

A109 Road a single carriageway to Nairobi. In order to meet the projected demand of the LPG in the country and in the region, sizable number of trucks will use the already busy road to Mombasa leading to potential congestion along the roads and traffic related incidents.

8.2.2 Fire and Explosion Hazards

In order to meet the projected demand of LPG in the Country and the East Africa Region. It is envisaged that in the next 10 years Mombasa will have an LPG capacity of close to 100,000 MT with storage terminals concentrated within Shimanzi, Kipevu, Changamwe and Miritini areas. These areas are the main industrial zones with important facilities like Moi International Airport, Kenya Ports Authority, Kenya Pipeline and various Oil & Gas Terminal. The operation of these projects will potentially expose Mombasa town to more fire and explosion hazards through the following ways:-

- Presence of large amount of LPG which could potentially lead to huge fire and explosion as a result of product release due to overfill, tank or pipes failure. This could lead to multiple fatalities, loss of property and disruption of airport and port activities.
- Increased LPG pipeline network within Mombasa which can lead to increased risk of fire and explosion as a result of pipe failure or accidental interference of the pipes leading to release of the LPG.
- It is envisaged that, the proposed LPG Facility in Mombasa will be served by huge LPG vessels which will use the Port of Mombasa. The increase in number of LPG vessels visit to Mombasa will lead to potentially increased risk of fire and explosion at the Port of Mombasa.

8.2.3 Depletion of The Local Construction Materials

The Vision 2030 blueprint of Kenya recommended an increase in LPG storage capacity at Mombasa to ensure stable supply of the commodity within the country. Several other studies by the GOK and International Organizations has emphasized on the need to have more LPG storage facilities

Construction materials for use in the proposed project shall deplete resources within Mombasa and the neighbouring environs.

Other similar projects are bound to use the construction materials in the construction phase.

The ESIA study established the following regarding other similar projects in Mombasa

- There is an operational 20,000 MT mounded bullet tanks terminal at Miritini (8Km from the project site) and a proposed 10,000 MT within the same site
- There is a proposed 30,000MT mounded bullet tanks LPG terminal at Kipevu area near the KenGen’s Kipevu 2 thermal power plant
- There is a proposed 22,000 MT mounded storage LPG terminal at Liwatoni area
- There are other proposed large-scale establishments within Mombasa

The impact includes potential depletion of the ballast at Mazeras area

8.2.4 Large Scale Influx of People

A large number of labour and jobseekers shall be attracted to FSL site. If the labour force cannot be sourced locally or the local labour pool is inadequate for the LPG storage project, labour will likely be sourced from outside the area to fill the gap. The area may experience an influx of new residents who may move to the area looking for job opportunities which will have effects on the existing population during the construction periods that could entail problems of housing, sanitation, water usage and solid waste disposal. Employment at an LPG storage facility peaks during construction and significantly declines during operation; since LPG storage facilities need relatively few workers while in operation, the LPG storage facilities will not create long-term booms. Though there may be an influx of workers during construction, these workers are largely temporary. Towns/areas with larger populations and with impact the current communities and increase the pressure on locals to meet the basic needs of these potential new communities. The poor communities are likely to be the most vulnerable to loss of service provision and suffer the negative impact of largescale influx. There is potential for the influx of migrants to significantly change the local receiving environment and this is likely to have a permanent impact in the region. However, not all the potential projects in the area will be developed at the same time or on the same timeframe, which will reduce this impact. However, it is very difficult to control an influx of people into an area (particularly jobseekers), especially in a country where unemployment rates are high.

CHAPTER NINE: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN(ESMP)

9.1 Introduction

An Environmental & Social Management and Monitoring Plan translate the recommended mitigation and monitoring measures into specific actions that will be carried out by the proponent. Regular monitoring of environmental parameters is of immense importance to assess the status of environment during project operations. With the knowledge of baseline conditions, the monitoring programme will serve as an indicator for any deterioration in environmental conditions due to operation of the project, to enable taking up suitable mitigation steps in time to safeguard the environment. Monitoring is as important as that of pollution since the efficiency of control measures can only be determined by monitoring.

9.2 Objectives of the ESMP

The objectives of the ESMP are to: -

- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- To identify measures that could optimize beneficial impacts;
- To create management structures that address the concerns and complaints of stakeholders with regards to the development;
- To establish a method of monitoring and auditing environmental management practices during all phases of development;
- Ensure that the construction and operational phases of the project continues within the principles of Integrated Environmental Management;
- Detail specific actions deemed necessary to assist in mitigating the environmental and social impact of the project;
- Ensure that the safety recommendations are complied with;
- Propose mechanisms for monitoring compliance with the ESMP and reporting thereon; and
- To ensure that the legal requirements applicable to the project are complied with

9.3 ESMP Roles and Responsibilities

Several professionals will form part of the construction team. The most important from an environmental perspective is the Project Manager, the Project EHS Officer and the Contractors that will engage.

The Project Manager is responsible for ensuring that the ESMP is implemented during the construction phases of the project.

The Project EHS Officer is responsible for monitoring the implementation of the ESMP during the construction phases of the project. Each of the proponent appointed Contractors

is responsible for abiding by the mitigation measures of the ESMP which are implemented by the Project Manager during the construction phase.

FSL Project Manager is responsible for ensuring that each of the Contractors complies with the mitigation measures and ESMP requirements during the design, pre-construction and construction phases of the project. The proponent will be responsible for implementation of the ESMP during the operational and decommissioning phases of the project. Decommissioning will however entail the appointment of a new professional team and responsibilities will be similar to those during the design, pre-construction and construction phases. It is unlikely that the LPG Facility will be decommissioned for several years.

9.3.1 Project Manager

The Project Manager is responsible for overall management of the project and ESMP implementation.

The following tasks will fall within his/her responsibilities: -

- Be aware of the findings and conclusions of the Environmental and Social Impact Assessment and the conditions stated within the EIA License issued by NEMA;
- Be familiar with the recommendations and mitigation measures of this ESMP, and implement these measures;
- Monitor site activities on a daily basis for compliance;
- Conduct internal audits of the construction site against the ESMP;
- Confine the construction site to the demarcated area; and
- Rectify transgressions through the implementation of corrective action(s)

9.3.2 Environmental Manager

The Environmental Manager will be responsible for the implementation of the ESMP during the construction phase as well as liaison and reporting to the client, appointed Contractors and Authorities. The following tasks will fall within his/her responsibilities: -

- Be aware of the findings and conclusions of the Environmental and Social Impact Assessment and the conditions stated within the EIA License;
- Be familiar with the recommendations and mitigation measures of this ESMP;
- Conduct periodic (e.g., monthly) audits of the construction site according to the ESMP and EIA License conditions;
- Educate the contractors about the management measures of the ESMP and ESIA License conditions;
- Regularly liaise with the Contractors and the Project Manager on the ESMP implementation;

- Recommend corrective action for any environmental non-compliance incidents on the construction site; and
- Compile a regular report highlighting any non-compliance issues as well as good compliance with the ESMP.

9.3.3 Contractor

The Contractors are responsible for the implementation and compliance with recommendations and conditions of the ESMP. The Contractor will:

- Ensure compliance with the ESMP at all times during construction;
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction.

Examples of such incidents include: -

- Public Involvement/Complaints;
- Health And Safety Incidents;
- Incidents On Site; And
- Non-Compliance Incidents.

9.3.4 Environmental Management Responsibilities

The following are the environmental management responsibilities of the various parties during construction and operational phases. Unless otherwise stated the ESMP will be adhered to as follows:

- The Contractor's EHS Officer will be accountable for compliance with this ESMP during the construction phase as it applies to their work area;
- The monitoring party will be led by FSL Environmental Manager;
- The method of record keeping will be regular inspections depending on the stage of the project;
- The inspection technique will include a review of records that will be kept on site by the Contractor EHS Officer and/or site inspections;
- FSL will bear ultimate responsibility for environmental management.

9.4 Environmental Monitoring

A monitoring program will be implemented for the duration of the construction phase of the project. This program will include: -

- Monthly environmental inspections to confirm compliance with the ESMP and EIA License conditions. These inspections can be conducted randomly and do not require prior arrangement with the Project Manager;

- Compilation of an inspection report complete with corrective actions for implementation;
- Monthly EHS committee meetings to be held to ensure compliance with the OSHA and its subsidiary legislation.

The EHS Officer shall keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. During the pre-construction, construction and operational phases, FSL will implement its Grievance Redress Mechanism. Each FSL appointed Contractor shall be responsible for acquiring all necessary permits during the construction phase of the project. Such licenses include any abstraction of water permits, local authority approvals and operations, extraction of aggregates from borrow pits and their rehabilitation,

9.4.1 Compliance With The ESMP And Associated Documentation

A copy of the ESMP must be kept on site during the construction period at all times. The ESMP will be made binding on all contractors operating on the site and must be included within the Contractual Clauses. It should be noted that in terms of the principles of environmental management espoused through the EMCA, *those responsible for environmental damage must pay the repair costs both to the environment and human health measures to reduce or prevent further pollution and/or environmental damage (the polluter pays principle)*

9.4.1.1 Training and Awareness of Construction Workers

The construction workers must receive basic training in environmental awareness, including the storage and handling of construction materials and substances, minimization of disturbance to sensitive areas, management of waste, and prevention of water pollution. They must also be appraised of the ESMP's requirements.

9.4.1.2 Contractor Performance

The appointed Contractors must ensure that the conditions of the ESMP are adhered to. Should the Contractor require clarity on any aspect of the ESMP, the Contractor must contact the Project Manager for advice.

9.5 ESMP requirements for the construction phase

The requirements that need to be fulfilled during the construction phase of the project are as follows:

- There should be continuous liaison between FSL, its appointed Contractor and the community to ensure all parties are appropriately informed of construction phase activities at all times;

- The community should be informed of the starting date of construction as well as the phases in which the construction will take place;
- The FSL appointed Contractor must adhere to all conditions of contract including the ESMP;
- The FSL appointed Contractor should plan its construction program taking cognizance of climatic conditions especially wet seasons and disruptions that can be caused by heavy rains;
- The Community Liaison Officer must keep a proper record of all complaints received and actions taken to resolve the complaints;
- The Environmental Manager and Contractor's EHS officer should implement this ESMP;
- Internal environmental inspections and audits should be undertaken during and upon completion of construction. The frequency of these audits should be quarterly;

A formal communications protocol should be set up during this phase. The aim of the protocol should be to ensure that effective communication on key issues that may arise during construction be maintained between key parties such as the Project Manager, Environmental Manager, Social Performance Manager and the contractors. The protocol should ensure that concerns/issues raised by stakeholders are formally recorded and considered and where necessary acted upon. If necessary, a forum for communicating with key stakeholders on a regular basis may need to be set up. The communications protocol should be maintained throughout the construction phase

9.5.1 Site Preparation

Site clearing will be limited to the area required by each contractor allocated work area. Site clearing must take place in a phased manner, as and when required. Areas which are not to be constructed on within say one month of time must not be cleared to reduce erosion risks. The area to be cleared must be clearly demarcated and this footprint strictly maintained.

9.5.2 Establishment of construction materials yards

The EPC will establish their work area in an orderly manner and all required amenities shall be installed at its work area before the main workforce move onto site. The area shall have the necessary ablution facilities with chemical toilets at commencement of construction. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities. The Contractor shall supply waste collection bins and all solid waste collected shall be disposed of using NEMA approved waste handlers. A Waste Tracking Sheet required by Legal Notice 121: Waste Management Regulations, 2006 will be obtained by the Contractor and kept on file. The disposal of waste shall be in accordance with the Waste Management Regulations, 2006. Under no circumstances may any form of waste be burnt on site.

9.6 Waste Management Plan

All project generated wastes will need to be managed and disposed of in a manner to prevent potential impacts on the environment and risks to human health.

9.6.1 Objectives

The construction, operation and demolition, of the proposed project will generate various type of waste which will need appropriate collection, transportation, primary treatment and disposal.
Hence, to serve the purpose, a Waste Management Plan has been formulated to demonstrate: -

- Characterization of waste in different type of categories like garbage, rubbish, hazardous, waste etc.;
- Maintain the site in a clean and tidy state to reduce the attraction of pest species, impacts on the local environment and negative impacts on visual amenity; and
- Suggestion of options for waste handling and disposal during construction and operation phase of the project.

9.6.2 Scope

This plan shall be applicable to the Contractors engaged by FSL during the construction phase of the proposed project. The elements of the plan will be directly implemented by the contractors hired by the Developers while overall management and responsibility will lie with FSL.

The Plan also identifies the individuals currently assigned to the various roles designated in this Plan. Applicable Standards and Legislations.

The L.N 121 Environment Management and Coordination (Waste Management) Regulation applicable. The salient features are:

- Section 4 Any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed of such waste in the manner provided for under these Regulations
- Section 5 Segregate such waste by separating hazardous waste from non-hazardous waste.
- Section 6 minimize the waste generated by adopting cleaner production principles
- Section 7 No person shall be granted a license under the Act to transport waste unless such person operates a transportation vehicle approved by the Authority
- Section 8 Transportation of waste shall be in such a state that shall not cause the scattering of, escaping of, or flowing out of the waste or emitting of noxious smells from the waste;

- Section 17 Installation of anti-pollution technology for the treatment of waste emanating from such trade or industrial undertaking
- Section 18 No discharge or dispose of any waste in any state into the environment, unless the waste has been treated
- IFC PS 3
- Pollution Prevention - FSL will be required to avoid the release of pollutants or, when avoidance is not feasible, minimize and/or control the intensity and mass flow of their release.
- Waste and Hazardous Materials Management-FSL should avoid the generation of hazardous and non-hazardous waste materials. Where waste generation cannot be avoided, the client will ensure that the developers reduce the generation of waste and recover and reuse waste in a manner that is safe for human health and the environment.
- The developers should investigate options for waste avoidance, waste recovery and/or waste disposal during the design and operational stage of the project. Material Safety Data Sheet (MSDS) for all the hazard chemicals to be used during construction and operation phase should be readily available.

9.6.3 Roles and Responsibilities

9.6.3.1 Site Supervisor of Developer

Site Supervisor will be responsible for the following activities: Management of onsite waste generation associated with construction works to help avoid excessive generation where practicable; Maintaining of all records of waste type which are construction waste and debris, hazardous waste; and to have authorization for hazardous waste generation and storage granted

9.6.3.2 EHS Manager of Developer

The following responsibilities are entrusted to the EHS Manager: Demarcation of area within the construction area for keeping of segregated wastes; Labelling of the drums containing hazardous wastes like used oil. Maintaining of receipts for hazardous waste management records; Notifying the Site Supervisor of any activity that may generate a large amount of waste to allow appropriate controls to be put in place to manage waste generated; and

9.6.4 Waste Types and Quantities Generated

All wastes generated from the project will be categorized as either non-hazardous or hazardous following an assessment of the hazard potentials of the material, in line with local and national requirements.

9.6.4.1 Construction and Decommissioning Phase

The construction and decommissioning phases will require the use of hazardous materials such as diesel or petrol to cater the fuel equipment and vehicles and maintain equipment. The following hazardous wastes will also be produced from construction activities. –

- Dismantled tanks waste consisting of iron sheets and tank fittings
- Demolition waste which includes concrete, reinforcement steel rods, masonry, stones, pipe fittings and roofing materials
- Cleared vegetation
- Spoil materials from site preparations
- Steel and timber offcuts
- Oily rags, Used oil and oil filters - from generators or vehicle maintenance; and
- packaging material especially paint cans.
- Grey and black water
- Domestic waste including food waste, food packaging material and water bottles
- Office waste including empty printer cartridges, papers and packaging materials

9.6.4.2 Operation Phase

Operations and maintenance of the terminal is not expected to generate significant amount of waste. The minimal waste produced will include: -

- Sanitary waste from approximately 20 workers
- Oily rags from workshop and pumps maintenance
- Used oil from pumps and generator sets
- Food waste
- Office waste
- Paint cans during maintenance activities

9.6.5 Waste Handling, Management and Disposal

9.6.5.1 Construction Phase

All wastes produced from the project activities on site will be temporarily stored in designated waste storage areas. All wastes that cannot be reused or recycled will be collected by approved waste contractors and transferred to an appropriately licensed waste management facility for treatment and disposal. Following steps will be taken to manage the waste generation during construction phase: -

- Fuel will be stored on site in temporary aboveground storage tanks and will be stored in a locked container within a fenced and secure temporary staging area;
- Trucks and construction vehicles will be serviced off site;

- All concrete mixing be undertaken on impermeable plastic lining to prevent contamination of the soils and surrounding areas;
- Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently;
- The use, storage, transport and disposal of hazardous materials used for the project will be carried out in accordance with all applicable regulations;
- All hazardous waste to be disposed through NEMA approved waste handlers;
- Material Safety Data Sheets for all applicable materials present on site will be readily available to on-site personnel;
- All construction debris will be placed in appropriate on-site storage containers and periodically disposed of by a licensed waste contractor;
- The construction contractor will remove refuse collected from the designated waste storage areas at the site at least once a week;
- It is proposed that the Contractors will supply the required temporary ablution facilities and be responsible for the removal and treatment thereof. Portable toilets would be provided for onsite sewage handling during construction. Sewage would be pumped out and removed regularly and disposed of in compliance with waste regulations in Kenya (Legal Notice 121: Environment Management and Coordination (Waste Management) Regulations, 2006).
- Empty fuel containers will also be stored at a secured area designated for scrap and sold to authorized vendors. All packaging material will also be collected at the storage area and sold to scrap dealers.
- Tree from the site will be cut into small pieces and sold out as firewood within Mombasa, grass and shrubs will be dumped at approved dumping sites within Mombasa.
- Top soil and other spoil will be gathered and temporary stored within the site for reuse. The excess will be dumped at the approved dumping sites within Mombasa

9.6.6 Construction EHS Management Plan

9.6.6.1 Purpose of A Construction EHS Plan

A construction HSE plan is a management tool used to manage HSE activities associated with the construction of a project. It is a prerequisite for satisfying the Proponent that the successful contractor has implemented a management system for the safe operation of construction related activities in a project.

The construction HSE plan sets out the HSE management system as well as the resources required to implement it. It includes the minimum requirements for compliance with local HSE laws and regulations in order to prevent injuries to workers, damage to property or the environment. In the absence of relevant legislation, the main contractor and nominated sub-

contractors will ensure compliance with international standards, guidelines and best practices in the safe operation of construction activities associated with the project.

9.6.6.2 Objectives of a Construction EHS Plan

The principal objectives of a construction HSE plan include:

- Prevention or limitation of injuries to workers, damage of property or the environment through an emergency preparedness and response plan;
- Prevention of recurring accidents or incidents through a program of root cause analysis;
- Ensuring that safe work practices and procedures are issued and understood by all construction workers;
- Verification through planned audits and reviews those procedures and instructions are complied with fully; and
- Counselling construction workers involved in near misses on better safe work practices.
- In order to implement the construction HSE plan, the main contractor and nominated subcontractors will implement the following strategy:
- The HSE goals/objectives of the project will be verified and commented upon in each HSE meeting
- A monthly HSE theme relevant to the planned objectives will be issued;
- Monitoring and control of unsafe practices;
- Initiate an unsafe act/condition report system for conveying accountability to affected employees including a disciplinary action system for non-compliance;
- Initiate an HSE recognition and rewards program for good HSE behaviour among construction workers;
- Organize HSE competitions to promote interaction of construction workers through direct involvement in routine HSE objectives.

9.6.6.3 HSE Performance Measurement

The main contractor will be required to develop, rollout and implement an HSE performance measurement system. The measurement system will be used to recalibrate the HSE performance of the project during the construction phase to ensure that there are no injuries to people, damage to property or the environment. Some of the performance measurement metrics that should be considered for tracking include the following lagging and leading indicators: -

- No. of fatalities;
- Lost time incident rate (LTIR);
- No. of fire incidents;
- No. of environmental incidents;

- Equipment damage/minor injuries;
- No. of health and hygiene reports;
- No. of HSE meetings conducted;
- No. of HSE inspections undertaken;
- No. of HSE training courses conducted

9.6.6.4 HSE Interface Between Contractor and Proponent

Throughout the construction phase, there will be an interface between the proponent and the main contractor on HSE management. The objectives of this activity are to ensure that: -

- The main contractor achieves the same or higher HSE standards than those stipulated by the Proponent
- All HSE related hazards of the construction phase are identified, evaluated and appropriate control measures implemented;
- The main contractor understands their obligations with respect to HSE associated with the project;
- HSE performance management arrangements are in place by mutual definition.
- The interface on HSE management may be achieved by the proponent and main contractor through meetings, reviews and audits during the design and construction phases of the project respectively. Some of the meetings may be defined as follows:
- HSE kick-off meeting;
- Weekly HSE progress meetings;
- Ad-hoc HSE meetings called by either the proponent or the main contractor to discuss specific HSE issues; and
- HSE reviews/inspections undertaken by either the proponent or the main contractor or both.

9.6.7 Construction And Fabrication Phase

9.6.7.1 Safety Hazards and Critical Areas

Prior to commencing construction, the main contractor will identify potential hazards to the safety of personnel associated with construction phase of the project. The main contractor and nominated sub -contractors shall also comply with relevant requirements of L.N. 40: Building Operations and Works of Engineering Construction Rules, 1984. The list of potential hazards will be updated on-site at regular intervals. For each hazard identified the main contractor will ensure that there is a safe work procedure that is developed, rolled-out and implemented for the project.

9.6.7.2 Safety procedures

As a petroleum experienced contractor will be engaged for this project, it is envisaged that they will already have safe work procedures developed for similar types of projects. These procedures will be customized for the proposed project and used throughout the construction phase. Examples of construction activities for which safe work procedures are required include: -

- Cranes and lifting equipment operations;
- Electrical work;
- Confined space entry;
- Fire protection and prevention;
- Emergency response;
- Permit-to-work;
- Job safety analysis (JSA);
- Risk analysis;
- Root cause analysis;
- Safety incentive program; and
- Disciplinary system

9.6.7.3 Safety Training

Health and safety training of workers is required by Kenyan legislation under the Occupational Health and Safety Act, 2007 (OSHA). Additionally, the main contractor will be required to train their subcontractors on the safe work procedures some of which are identified above. Health and safety training needs will be identified by the contractor prior to commencement of the construction phase of the project. Health and safety training associated with the project will be extended to all levels of management and workers who may potentially be exposed to health and safety risks during the construction phase of the project. Health and safety training records will be maintained on site by the main contractor for review by appropriate lead agencies and the Proponent.

9.6.7.4 Safety Guidelines and Rules of Operation

The proposed project will be put up in an area with numerous depots and terminal storing highly flammable petroleum and vegetable oil products. An existing LPG plant will be decommissioned and dismantled and the two Bush tanks will be dismantled using oxyacetylene open flames. Welding, cutting, brazing, and grinding create a significant risk of fires and explosions. This type of work generates hot sparks and slag. Those can then come into contact with nearby combustibles and flammable gases. FSL and the contractors will have the following in place to prevent hot-work fire incidents at the project area: -

- FSL will inform the other Shimanzi Terminal Users through their monthly meetings of the proposed construction work and keep them updated of the construction plans.

The team will be in a position to activate mutual ERP in case of any emergency during construction.

- The LPG plant will be completely cleared off the LPG gas and gas testing done before dismantling.
- All the potential fire risk associated with the proposed hot works will be identified by the contractor in consultation with FSL and all safety precautions measures will be collectively put in place.
- All combustible materials will be removed from the hot works area and whenever possible hot works will be performed away from other activities.
- Using fire blankets to protect nearby equipment from sparks and slag.
- Having fire extinguishers nearby and ready to use.
- Assigning a fire watch for all hot-work activities.
- The contractor will be required to have a formal PPE program that can be implemented for the proposed project.

The PPE program will in the main include instructions for:

- Selection of correct type of PPE based on the hazards at the job site;
- Issuance of PPE;
- Correct use of PPE;
- Inspection and maintenance of PPE
- Replacement of worn-out PPE.

In addition to the PPE program, the contractor will evaluate all risks associated with working at heights (1.8m above grade level). For such work, the construction workers will be provided with appropriate safety harnesses or safety nets. All construction vehicles will be fitted with seat belts that operators must wear while working.

The construction site will contain appropriate signs, signals and barricades that are visible to the workers to protect them from potential hazards. Trenches and other excavation will also be provided with appropriate barricades, signs and signals. Where it is necessary to perform work at night, the main contractor will ensure that their sub-contractors provide artificial lighting sufficient to permit work to be carried out safely, efficiently and satisfactorily.

All tools and equipment deployed by the main contractor and their sub-contractors shall be free from defects, be in good operating condition and maintained in a safe condition. Any equipment that falls under the Examination of Plant Order under the OSHA shall be inspected by a DOHSS approved person and a certificate issued prior to its use at the construction site. Some of the tools, equipment and plant expected to be used for the proposed project include:

• Hand and portable power tools;

- Compressed gas cylinders;
- Scaffolds;
- Cranes and lifting equipment;
- Motor vehicles;
- Ladders.

In addition to the above, the main contractor will develop, rollout and implement the following health and safety rules for the construction site:

- Job site transportation;
- Daily construction plant inspection;
- Electrical operation;
- Floor and wall openings and stairways;
- Excavation and trenching;
- Steel erection;
- Confined space entry;
- Work near pressurized pipelines;
- Medical services;
- Alcohol and drug abuse.

9.6.8 Occupational Health Action Plan

An occupational health plan is primarily concerned with identification, evaluation and control of environmental health exposure that result from construction processes. The stresses can be physical, chemical, biological and physiological and may cause sickness, impaired health or discomfort to employees. An occupational health plan therefore addresses the above concerns as they apply to the project and to provide cost effective solutions to assure the health and well-being of project employees.

9.6.8.1 Medical and Health Program

The medical and health plan provides the necessary and important parts of a construction project medical and health program. The objectives of this program are to: -

- Protect employees against occupational health hazards at the construction worksite.
- Facilitate placement of workers according to their physical, mental and emotional capabilities without endangering their own health and safety or that of others; and
- Ensure adequate medical care and rehabilitation of the occupationally injured or ill person.

The contractors will engage the services of a DOHSS approved Designated Health Practitioner (DHP) for undertaking medical examinations in accordance with the Second Schedule of the OSHA and Legal Notice No. 24: Medical Examination Rules, 2005. For

those occupations defined in the Second Schedule of the OSHA, the main contractor will avail their employees to a DHP for medical examinations throughout the construction phase of the project during the following occasions: -

- Pre-assignment;
- Periodic;
- Post illness or injury; and
- Termination.

An occupational injury or illness will be diagnosed as promptly as practical and treated as appropriate within the capabilities of the workplace medical facility. The main contractor's occupational health program should include treatment of emergency conditions at the work site which may occur during the construction phase of the project. Construction workers and other employees will be inducted to the potential occupational health hazards that they may encounter in their specific roles. The induction will include methods of recognizing and preventing adverse health and safety effects at the workplace.

The occupational health program will also include training of construction workers on the correct use and maintenance of PPE issued to them. The site HSE Manager will periodically inspect and evaluate the workplace for potential adverse occupational health hazards. Occupational health record keeping will be maintained by the site HSE Manager for all employees that are medically examined. The records will contain sufficient data to reproduce a chronology of an employee's medical occurrences, illnesses and injuries. All employee medical records will be maintained confidentially.

If the main contractor engages catering personnel for their staff, it will be mandatory for each food handler to be immunized every six months as required by the Local Government Act and comply with the requirements of the Public Health Act.

9.6.8.2 Record Keeping Requirements

Medical records will provide data for use in job placement, establishing health standards, health maintenance, treatment and rehabilitation, worker's compensation cases and assisting project management with program evaluation and management. The record keeping requirements will comply with Kenyan laws and regulations as well as the Proponent's insurance requirements.

The contractor and their appointed DHP will maintain occupational health records of workers as required by Kenyan legislation (OSHA, WIBA and L.N. 24). The DHP will confidentially maintain health examination records of all employees that visit him/her. Examples of records that need to be maintained include:

- Physical examination reports.
- Clinical reports.
- Chest x-rays,
- Audiograms, etc.

The medical records shall be maintained in locked files and only authorized persons shall have access to them. In certain situations, requests for specified medical information may be sought by authorized Government officials. Additionally, an employee or his/her designated representative may seek information about themselves or their environmental exposure. These requests shall be turned over to the project manager for handling.

9.6.8.3 Inspection Program

The site HSE Manager will conduct sanitation and health inspections at the job site to ensure compliance with the Public Health Act. The sanitation inspections will cover the following areas:

- Drinking water
- Control of vermin and pests
- Toilet facilities
- Waste disposal
- Lunch areas.

Written reports will be issued having target dates for corrective actions to be taken by responsible supervisory personnel.

9.6.8.4 Training

During the construction phase, the contractor will be required to arrange for training on first aid, health and safety, security and fire safety communications system. The main contractor will be required to develop, rollout and implement a rapid communications system to ensure fast and reliable emergency communications between the project site and crews at the scene of an accident.

9.6.8.5 Procurement and Material Control

The contractor's HSE Manager will develop a master listing of all medical and first aid materials, supplies and equipment that will be needed during the construction phase of the project. First Aid boxes will be stocked in accordance with L.N. 160: First Aid Rules, 1977.

9.6.9 Environment Action Plan

The purpose of a construction environment management plan (CEMP) is to specify environmentally sound working methods in order to minimize environmental impact of the construction works associated with the proposed project. The CEMP identifies key

environmental aspects and the related impacts which may occur and specifies methods, measures and controls that the main contractor will comply with during the construction phase of the project.

9.6.9.1 Key Environmental Positions

The beginning of this section identified the key HSE positions that will be used to manage health, safety and environmental aspects during the construction phase of the project. The primary persons from the main contractor's organization responsible for implementing the CEMP include: -

- Construction Manager; and
- HSE Manager.

The Construction Manager will have overall responsibility for all aspects related to environmental issues and to ensure that the main contractor's environmental policy statement and objectives are complied with.

The Construction Manager will be responsible for developing, rolling out and implementing environmental procedures and work instructions in conjunction with the HSE Manager. The HSE Manager will be responsible for several environmental functions such as:

- Co-ordinating environmental inputs to the project and advising the Construction Manager on environmental matters.
- Co-ordinating the development, rollout and implementation of the main contractor's environment management system (EMS) for the project;
- Routine monitoring of implementation of the main contractor's EMS at the project site
- Authority to halt any works where actions are found to be in contravention of particular environmental procedures, work instructions or legal requirements;
- Authority to amend work instructions and procedures as required by sound environmental management including amendments to the EMS as identified by audits.

9.6.9.2 Environmental Training

The main contractor's management and their sub-contractors will receive environmental induction training prior to commencement of the construction phase of the project. The training will cover the contractor's EMS and environment work instructions relevant to the construction activities.

9.6.9.3 Environmental Objectives

The contractor will develop an environment management system (EMS) in order to comply with basic environmental objectives and targets set for the project. Environmental objectives for the construction phase will be discussed and agreed between the Proponent and the main

contractor. The EMS will detail the environmental standards for the project and will include a number of environmental work instructions. The EMS will be implemented in conjunction with the main contractor's health, safety and environment action plan. Environmental activities will be audited regularly to ensure continued compliance with predetermined environmental objectives.

Environmental work instructions will be developed to comply with all legislative and regulatory requirements as a minimum. The objective is to endeavour to minimize and prevent where possible adverse environmental impacts. The environment work instructions will apply equally to all the main contractor's workers, sub-contractors, project consultants and suppliers.

The main contractor will provide environmental training for their workers in order to minimize the likelihood of environmentally damaging incidents occurring.

9.6.9.4 Environmental Procedures

The contractor will develop, rollout and implement environmental procedures for the construction phase of the project. The procedures will be organized under two categories namely: -

- Management and Organization procedures; and
- Environmental Management Procedures.

The above types of environmental procedures will be developed jointly by the HSE Manager and construction team. Once drafted, the procedures will be discussed with the Construction Manager to ensure operability.

9.6.10 Environmental Performance Meetings

The contractors will schedule regular meetings to discuss environmental performance of the project during the construction phase. The meetings will be attended by the Construction Manager, HSE Manager and the Proponent. Minutes of the meetings will be circulated to all employees and posted on construction site notice boards.

9.6.10.1 Environmental Reviews

Environmental reviews include both inspections and audits to be conducted by the contractor. Audits will be conducted by the HSE Manager and will include monitoring of construction phase environmental effects against identified performance targets. Findings and recommendations will be shared with the Construction Manager and the Proponent. Inspections of working areas will be performed periodically using appropriate checklists. Inspections will be undertaken by construction supervisors and findings/corrective actions discussed in daily construction meetings. A tracking system shall be employed for

monitoring status of implementation of corrective actions. Records of inspections will be filed on-site and made available to relevant lead agencies and the Proponent.

9.6.10.2 Soil Conservation and Erosion Mitigation

The civil contractor will develop a soil conservation and erosion mitigation plan which will include details on how to perform clearing, grading, excavation, trenching and backfilling work at the project site.

During the construction phase, the main contractor will take adequate measures to prevent soil erosion especially during the rainy season. The integrity of soil erosion mitigation shall be sufficient to provide continued protection against erosion until the site soils have stabilized and added protection is no longer necessary.

9.6.10.3 Site Restoration

Prior to handover of the completed project to the Proponent, the civil contractor will undertake a final clean-up of the entire project site including removal of all non-hazardous and hazardous waste or excess materials. Surface restoration and stabilization will be performed in accordance with environmentally sound practices

9.7 Traffic Control Management Plan

9.7.1 Introduction

The purpose of this management plan is to ensure that construction of the project components and operational phase does not adversely affect nearby road users and other sensitive receptors. This Traffic Control Management Plan (TCMP) therefore identifies the potential impacts and appropriate measures to mitigate them.

Prior to the commencement of construction and operational phases of the project, the contractor and the proponent shall use the TCMP as the basis for undertaking a detailed Traffic Assessment (TA) and preparing a detailed TCMP that will identify specific measures to mitigate any predicted impacts. The contractor's and proponents TCMP shall include detailed procedures that demonstrate how the impacts of traffic on communities have been taken into consideration. The contractor and proponent shall develop and submit:

- procedures within 30 days of the start of the construction and operational phases; and
- detailed project-specific procedures that specify how the requirements of their TCMP will be implemented to the satisfaction of the appropriate traffic authorities.

The contractor and proponent shall regularly update their TCMP as the construction and operations method/activities are developed and vehicle and tankers movement and timing requirements are identified in detail.

9.7.2 Roles and Responsibilities

FSL will provide all necessary supervisory staff to ensure that the TMP is implemented and adhered to during all aspects of the Project. The TMP will be monitored to ensure compliance by all site personnel, including management, supervisory staff, and contractors. All site personnel will be responsible for the identification, reporting and correction of areas found to be in non-compliance to the TMP, and adapt the plan where required, to encompass operational change during the phases of construction.

The contractor/proponent will: -

- identify those responsible for carrying out and managing the procedures.
- reference the procedures and activities they will develop and implement.
- identify work to be undertaken on the roads prior to construction activities to upgrade or stabilise the roads if necessary.
- identify the routes that will be used with the estimated numbers of traffic movements, speeds and times of travel.

- justify if and where a route has to pass through residential areas and the measures that will be used to ensure the safety of the community and minimise the nuisance impact of traffic movements.
- identify how existing road development plans have been taken into account in the identification of routes and road restoration measures.
- identify the programme of road restoration measures that are likely to be required post construction.
- address how the Contractor can reduce the exposure of vehicle drivers, their passengers and other road users from the hazards of road-related accidents.
- identify (and adopt to the maximum extent feasible) all reasonably practicable alternatives to road transportation (rail) in order to reduce the number of trucks on the roads; and
- Identify tankers parking and inspection bays to ensure no parking on public roads that may result in other road user's obstructions.
- Institute Mombasa Road Protective Area management with access control at the entrance and exit to the facility. This will ensure that any vehicle/tankers entering the zone are not idling but heading to the parking(waiting) bay to minimize traffic on the road.

9.7.3 Regulations and Standards

The TMP should comply with the requirements of following regulations and standards

The Traffic Act of 2012 and its subsidiary legislations

The Occupation Safety and Health Act of 2007 and subsidiary legislations

The Petroleum Act, 2019

The Energy (LIQUEFIED PETROLEUM GAS) Regulations, 2009

KS 1938 on Handling, Storage and Distribution of Liquefied Petroleum Gas in Domestic, Commercial and Industrial Installation

9.7.4 Traffic Activities

During construction, the traffic activities can be broken down into: -

- Transportation of equipment and machinery to and from the construction site;
- Transportation of raw materials to the construction site.
- Transportation of people working at the construction site;
- During Operation, the traffic activities can be broken down into.
- Transportation of LPG from the terminal by road
- Transportation of LPG from the terminal by rail
- Transportation of the LPG by vessel to SOT or KOT

- Transportation of workers to the facility
- Transportation of equipment and machinery during maintenance.

Table 9.1: Traffic Control Management Plan

Issue	Mitigating/Monitoring Activity	Responsibility	Cost	Timing
Access to Construction Site	The following environmental aspects shall be considered in finalizing the location of the access road that will be constructed specifically for the Scheme: • Environmentally sensitive areas; • Other neighbouring facilities concerns, • Pedestrians, and • Other vehicles	Contractor/ FSL Project Engineer	No separate cost. Included in design fees.	To be developed during Project planning and implemented during construction.

Issue	Mitigating/Monitoring Activity	Responsibility	Cost	Timing
	Other measures for mitigating the impact of access roads are as follows: • Access will be via specified routes and times, which will be agreed with the relevant authorities to minimize traffic congestion, • Use existing, upgradeable roads where practicable, • Suitable measures will be implemented to avoid damage to public roads and any damage will be repaired to an equal or better standard in a timely manner. • Access routes to be used by construction traffic will be properly signposted. This shall be sufficient to prevent vehicles from leaving the designated routes and ensure that the appropriate speed limits are enforced particularly through residential areas. • Access and site roads will be maintained in good condition. • Temporary roads will be removed when no longer needed and will be reinstated. All damage to existing roads will also be reinstated.			
Routing of Construction Traffic	• Precautions will be taken by the Contractor to avoid damage to the public roads used by vehicles or other items of equipment. Timber mats, tyres or steel plates will be laid as necessary, in particular under tracked equipment. Any road damage will be repaired. • Advance warning will be given of any proposed road diversions and closures. • The Contractor should consider whether to use buses to transport workers to the construction site. • The Contractor will comply with all statutory vehicle limits (width, height, loading, gross weight) and any other statutory requirement.	Contractor/ FSL Project Engineer	No separate cost. Included in design fees.	To be developed during Project planning and implemented during construction.

Issue	Mitigating/Monitoring Activity	Responsibility	Cost	Timing
Temporary Traffic Control and Management	• Traffic flows will be timed, wherever practicable, to avoid periods of heavy traffic flow along main road. Consider material delivery and disposal from site for off-peak hours. • In terms of traffic control, vehicles will be prohibited from reversing unattended into the construction site. Vehicles and plant shall enter and exit the site in a forward direction, as far as possible. In addition, the Contractor will ensure that all heavy goods vehicles are equipped with audible reversing alarms. • Clear signs, flagmen and signals will be set up where necessary. Where temporary traffic signals are required, the details and locations of the signs shall be discussed with the relevant authorities. • Appropriate supervision will be provided by the Contractor to control the flow of traffic when machinery needs to cross roads. • Liaison with the police and other authorities will occur prior to the movement of any abnormal loads. In particular, liaison with KENHA, the relevant Highway Authority will occur prior to transportation on major highways and motorways. • The speed limit on the motorways and highways for construction vehicles shall not exceed 80km/hr. • A 10km/h speed limit shall be established and enforced within the Construction site project site	Contractor/ FSL Project Engineer	No separate cost. Included in design fees.	To be developed during Project planning and implemented during construction.
Parking Facilities	• Signposted, parking facilities shall be provided within the project site. The parking of construction vehicles on footways, and double parking, shall be prohibited on public highways. • The Contractor will ensure that part of the Construction Site is set aside for the parking of emergency service vehicles. The Contractor is expected to make provision for a dedicated parking area on the construction base for the private vehicles of construction personnel.	Contractor/ FSL Project Engineer	No separate cost. Included in design fees.	To be developed during Project planning and implemented during construction.

Issue	Mitigating/Monitoring Activity	Responsibility	Cost	Timing
Maintaining Highways	The Contractor is expected to keep the highway free from mud and dust and to ensure that no vehicle or other items of equipment leaving the construction base or working width, deposit soil, debris or rock on public highways or public right of ways. Measures will be implemented to ensure that the transport of mud and dust from the site onto public highway and roads is limited. Such measures may include: • Frequent watering of the site working areas and accesses to reduce dust • The use of hard core surfaces on site access roads; • The provision of an easily cleaned hard standing area within the construction site for vehicles entering, parking and leaving; • The appointment of site personnel to clean the construction hard standing area and to remove any mud or debris deposited on the public highway; • The provision to clean hard standing areas and to clean any mud or debris deposited by work vehicles on roads or footways in the vicinity of the construction site; • Fully sheeting all works vehicles carrying potentially dusty material or likely to deposit loose materials on the public highway during transit;	Contractor/ FSL Project Engineer	No separate cost. Included in design fees.	Developed during Project planning, implemented during construction.

Road Related Accidents	Hazards to personnel associated with vehicle transportation, both on- and off-road, will present one of the most significant risk exposures of the Project. Accordingly, the Contractor shall be expected to develop and implement management systems and procedures that will provide the highest level of control over these hazards. Accordingly, the Contractor's procedures shall specifically cover arrangements for the following important aspects: • The source of and number of qualified drivers and equipment operators required; • Training and approval requirements for drivers; • Hours of driving and rest periods; • Security arrangements for drivers, vehicles and loads; • Arrangements for driver communication with control points and vehicle equipment; • Language/communication issues; • The source of suitable vehicles (e.g. quality and specification); • The number of vehicles required; • The programme for preventative vehicle maintenance; • Vehicle routes, route planning and alternative routes; • Overall vehicle movements; • Procedures for the emergency recovery of vehicles; • An appraisal of the social impact of vehicles in the local community; • Procedures for spot checks and audits of the transport system and for reporting problems. The contractors Journey Management Plan shall include the following provisions: • Pre-use vehicle inspections shall be completed and recorded on the approved form; • Passengers shall comply with the 'Safe Passenger's Code' and drivers shall comply with the 'Safe Driver's Code'; and • No unauthorized passengers shall be carried.	Contractor	No separate cost. Included in design fees.	To be developed during Project planning and implemented during construction.

Issue	Mitigating/Monitoring Activity	Responsibility	Cost	Timing
Vehicle Standards and Maintenance	The Contractor shall comply with all other aspects of the Construction Health and Safety Management Plan, which include requirements for vehicle standards and maintenance. The contractor shall also ensure that: • All vehicles and construction equipment shall be maintained so that their noise and emissions do not cause nuisance to workers or other people within the vicinity of the site. • New vehicles: vehicles/equipment purchased 'as new' after contract award shall comply with the appropriate emission standards in force on the purchase date. • Older vehicles: vehicles/equipment not purchased 'as new' after contract award shall be maintained so that noise and emissions levels are no greater than when the vehicle/ equipment was new. The contractor shall produce method statements, as part of their TCMP, to cover routine maintenance and to minimize equipment emissions. Routine maintenance shall be to a high standard to ensure that vehicles are safe and that emissions and noise are minimised. Method statements shall require regular maintenance of diesel engines to ensure that emissions are minimised, for example, by cleaning fuel injectors. All vehicles shall be inspected by FSL before they access the premises to ensure they comply with acceptable standards and with noise and emission levels	Contractor FSL Project Engineer	No separate cost. Included in design fees.	To be developed during Project planning and implemented during construction.

Issue	Mitigating/Monitoring Activity	Responsibility	Cost	Timing
Operational Phase Traffic Management	Proponent shall ensure Protective Area Regulations of 2011 that Gazetted Kenya Railways yard shall be enforced. • As such, only authorized vehicles/tankers shall access the area • All vehicles/tankers shall park on the waiting/parking bay only • No vehicles/tankers shall park on the roadside awaiting loading • Transporters shall inspect and clear tankers into their waiting bay away outside the area to minimize traffic. • Vehicles once cleared by proponent shall ensure they leave the area immediately to their destination. • No tanker/vehicles shall wait on the public areas along the Highway after loading and clearance from the Terminal.	FSL Terminal Manager		

9.8 Emergency Planning During Operation

There are usually three levels of emergency response to be considered during the operation of the proposed project: -

Installation emergencies - These are normally of a small nature, e.g., leaks, small fires and can in almost all cases be dealt with by the operator. It is included as part of the operating procedures, which are simple and straightforward. Therefore, they will not be considered in this ESMP.

Site emergencies- These are emergencies that result from a fire or explosion which usually only has an effect on the installation itself and on any other surrounding installations within the boundaries of the site. An emergency response plan must be drawn up for the Fossil Supplies Limited LPG Common User Facility.

Off-site Emergencies -These are Emergencies that involve the outside public and local authorities. An off-site emergency plan or procedure is the responsibility of the local emergency services and needs to be prepared, reviewed and updated with the assistance of the Fossil Supplies Limited LPG Common User Facility personnel.

9.8.1 Administration

The plan should be readily available on site for all persons to use when needed (i.e., it should not only be a document on the computer system, there should be summary copies at key locations) The plan, or at least the parts readily available for use, should be simple and concise. The plan should be part of a quality management system, which includes means to control the document. Ensure revision and updating every 3 years, require witnessing and inclusion of the relevant authorities in reviewing the plan, etc.

All personnel, visitors, contractors, etc. should be trained in the relevant aspects of the emergency plan. Commitment to annual emergency drills. The plan should indicate the need to inform the relevant authorities of every occurrence, which has brought the MHI aspects of the plan into action, of actual MHI incidents as well as of near misses. Commitment to communicate all necessary emergency planning information to potentially affected neighbours.

Emergency plan signed by Chief executive Officer

9.8.2 Roles and Responsibilities

The procedures should address all different groups of persons on site, e.g., person who discovers the emergency situation, visitors, staff, first response team, emergency coordinator, etc.

All personnel should be able to easily determine which group of people they fit into. An organogram is particularly useful. The actions of the person discovering the emergency situation need to be clearly spelled out. The person who has over-all responsibility during an emergency clearly designated, e.g., the emergency controller, his/her name and normal job title. Contact names and numbers for key role players should be clearly indicated.

9.8.3 Raising the Alarm and Evacuation

There should be means of raising the alarm. Clear indication of who is responsible for raising the alarm (or the various levels of alarm if there are more than one) and the method of doing so.

The procedures must clearly describe what actions all personnel are to take in the event that the alarm is raised. If specific groups are to take different actions, this must be clear. Procedures for testing the alarm must be indicated.

The circumstances under which evacuations are undertaken must be clear. The details of muster/assembly points should be available in the procedures. A map showing the location should be included.

The responsibilities of the different persons at the muster points must be clearly defined.

Depending on the site and the nature of the risks, there may need to be an indication that the nature of the emergency may require changes in the location of assembly points or actions to be taken, once there.

9.8.4 Type of Emergencies

The plan should cover the major risks assessed, i.e., fire, explosion and toxic releases.

- The plan must be easy to interpret, i.e., the sections dealing with fire, explosions and toxic gas events must be clearly identifiable on the first or second page and the written layout of the plan should be logical and systematic.
- Ideally the plan should differentiate between potential fire and explosion situations and the situation after an initial fire or explosion.
- The plan must indicate the location of emergency equipment such as Breathing Apparatus (BA) sets, foam supplies, etc.
- Persons responsible for ensuring the maintenance of such equipment must be clear.
- The actions of First Response Teams or emergency controllers may need to be specified in more details, e.g., go to assembly point, don suitable PPE, approach the location of the emergency, is FSL Facility releases, activate firefighting systems, etc.
- The location of the designated emergency control centre should be indicated.
- The facilities to be available at this location and the persons responsible for maintenance thereof must be indicated.

9.8.5 Contact with Outside

There must be an indication of who is responsible for notifying the external emergency services and which services must be contacted under what circumstances.

There must be an indication of which external neighbouring facilities need to be notified and who is responsible for this.

Contact details for external services and neighbouring facilities must be in the procedures and readily available to the responsible persons. There must be a clear indication of what will be communicated to the emergency services, as well as to neighbour, as per a pre-agreed plan of action.

The manner in which roles and responsibilities change once external emergency services are on site needs to be clear.
Access to the site / area during an emergency should be controlled and the means of achieving this must be described.

If a specific offsite emergency plan exists, then this should be referred to by name/number.

Table 9.2 The proposed project Environmental and Social Management and Monitoring Plan

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
1	**Pre-Construction phase**				
A)	**Environmental Impacts**				
(i)	**Vegetation clearance**	i. Clearing should be limited to the areas required for construction. ii. Land scaping of disturbed areas should be undertaken after construction.	Contractor & Proponent	Vegetation cover	10,000
B)	**Socio-economic Impacts**				
(i)	**Change of land use** *(from industrial to petroleum storage depot)*	Application for Change of land use to the Mombasa County Physical Planning department.	Proponent	Change of user certificate / approval	60,000

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
2	**Construction Phase**				
A)	**Environmental Impacts**				
(i)	**Air pollution**	i. Conduct an air quality audit to collect baseline data that can be measured against. ii. Construction site and transportation routes to be water sprayed on dry and windy days, especially if near sensitive receptors. iii. Haulage trucks must be covered. iv. Particulate emissions will be controlled by the off-site disposal of construction debris. v. Vehicles and construction machinery should be properly maintained. vi. All diesel fuel in use should be ultra-low Sulphur diesel. vii. Staff working in dust generating activities e.g. site preparation, excavation, concrete mixing should be provided with dust masks.	Contractor / Engineer in charge	Air quality monitoring audits Dust settled on neighboring buildings & vegetation	80,000
(ii)	**Excess Noise and Vibrations**	1.Conduct a noise survey audit to provide baseline data to monitor against 2.Establish means for the public to contact the engineer-in- charge (i.e., provide telephone number, email, etc.) and methods to handle complaints.	Contractor & Engineer in charge	Noise survey audits	120,000

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
		3.The use of hearing protection gear by workers when exposed to noise levels above 85 dB (A). 4.It is recommended that the contractor ensures that noise & excessive vibration from construction activities are within permissible levels as per the provision of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. This includes among others adhering to permissible noise and vibration level. 5.Construction work should strictly be undertaken between 8:00am – 5pm or as per EIA license conditions. 6.Use of well-maintained machineries with minimal noise emissions		Complaints from neighbors	
(iii)	**Terrestrial (Flora and Fauna)**	1. Educate contractors on the importance of flora and fauna in the area, including the appropriate regulatory requirements to preserve fauna and flora. 2. Minimize vegetation clearance and demarcate areas construction. 3. Restrict foreign material export to and from the site to curtail spread of invasive species	Contractor	Properly landscaped compound. Absence of introduced invasive plant species.	50,000

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
(iv)	**Water Quality**	i. Earthworks shall be halted when rain conditions are such that excessive erosion and silt loaded run-off can be expected. ii. The construction programme will avoid excessive exposure of bare earth surfaces which may be more prone to erosion. iii. If appropriate, settlement lagoons to be used to allow silts to be retained prior to discharge of run-off to the existing drainage channels or direct to sea (through the rock revetment) iv. Consideration will be given to undertaking routine maintenance of plant and vehicles off-site in a properly equipped cabro workshop with oil interceptors. v. Avoidance of water accumulation and stagnation vi. Existing drainage channels to be cleared of silt / debris and trash screens installed if appropriate.	Contractor & proponent	Availability of NEMA effluent discharge license.	120,000
(v)	**Soil degradation**	i. Natural drainage to be maintained or improved. Stripped topsoil should be used for landscaping ii. Areas dedicated for hazardous material storage shall provide containment and facilitate clean up through measures such as dedicated spill response equipment. iii. Storage sites for petroleum products to be secured and signs to be posted which include hazard warnings, who to contact in case of a release (spill), access restrictions and under whose authority the access is restricted will be posted. iv. In case of soil pollution, subsurface investigations should be conducted which should involve the collection of subsurface soil and groundwater samples for laboratory analysis	Contractor & Engineer in charge	Stable soils in disturbed areas Soil test analysis in spill occurrence areas	90,000

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
(vi)	**Water Usage**	• Install and properly manage site sanitation facilities/ recycle waste water on site • Turn off taps when not in use • Install water conserving taps that turn off immediately when not in use • Install water meter to monitor water usage and bills.	Contractor & proponent	Water bill records	60,000
(vii)	**Energy Usage**	• Ensure that all lighting system are switched off when not in use • Install energy saving bulbs • Design the office infrastructure to maximize the use of natural light. • Install metering system for monitoring.	Contractor & proponent	Use of renewable energy sources Power bills	30,000
(viii)	**Generation Of Solid Waste**	• Construction waste should be recycled or reused to ensure that materials that would otherwise be disposed of as waste are diverted for productive uses: excavated soil and debris should be properly disposed of by backfilling and landscaping. • Contracted waste handlers should be licensed by NEMA to transport and dispose waste at approved dumpsites only.	Contractor & Engineer in charge	Contract of waste management services Provision of separate waste receptacles.	170,000

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
		• During transportation of waste, it should be covered to avert dispersion along the way. • Hazardous waste should not be mixed with other solid waste generated and should be managed by way of incineration or land-filling through a licensed hazardous waste handler.			
(ix)	**Alteration Of Natural Drainage System**	• Monitor the natural flow system during heavy rains; special attention should be given to the outflow of the natural drains collecting flood/rainwater from the areas under construction. • Improve on the existing natural drainage systems to avoid flooding.	Contractor & Engineer in charge	Functional drainage system	50,000
B)	**Socio-economic Impacts**				
(i)	**Safety And Health Risks**	• Conduct Regular drills shall be undertaken to test the response of the involved stakeholders; • Use signage to warn staff and/ or visitors that are not involved in construction activities. • Restrict non-essential staff from the construction sites. • Develop evacuation procedures to handle emergency situations.	Contractor & Engineer in charge	Presence of informative signage Safety and Health audits Provision of first aid boxes, firefighting equipment Maintenance of equipment and plants logs	120,000

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
		• Truck drivers should maintain a speed limit of not more than 20Km/hr. • Compliance to all international, national and local health and safety standards that may exist. • Clear marking of work site hazards and training in recognition of hazard symbols. • Training of all personnel in fire prevention and protection. • Provision of first aid boxes and a trained first aider available during all working hours • Regular inspection, testing and maintenance of equipment and machinery. • Use of water sprays to arrest dust. • Containment of hazardous materials. • Provide adequate protective gear to construction workers. • Adhere to provisions of Occupational Safety and Health Act of 2007 and the rules formulated under it. • Implement HSEMS Integrated Management System.			

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
(ii)	**Gender Inequality**	Equal employment opportunities for both men and women. 1. Expose and involve women in construction activities where possible in an effort to transfer required skills to them. 2. Involve women groups in activities that they are good at such as landscaping 3. Enhance gender sensitivity and reduce gender discrimination in construction activities.	Contractor, Proponent	Gender equality	N/A
(iii)	**Road Traffic**	1. Deliveries will be made to site outside of the periods of high congestion on the public road system (i.e. early morning, late afternoon). 2. Materials haulage companies to use competent drivers and ensure that shift patterns do not result in excessive working hours resulting in compromised road safety 3. All haulage vehicles shall be maintained in good running order and should comply with the requirements of Road Traffic Act. 4. Where feasible, and to limit the number of movements of haulage vehicles to and from the Port area, it is anticipated that bulk materials will be shipped to Port and moved directly to site (i.e. steel reinforcement, geogrid, etc. subject to appropriate port clearance).	Contractor & Proponent	Deployment of traffic marshals	20,000

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
3	**Operation Phase**				
A)	**Environmental Impacts**				
(i)	**Airborne Emissions**	i. Using low-Sulphur fuels for the vehicles & machines ii. Regular maintenance of machines & equipment to ensure good working condition iii. Encourage reduction in engine idling during on- and offloading activities. iv. Ensure Periodic Air quality monitoring	Proponent	Annual air quality monitoring audits Maintenance records of vehicles, machines & equipment	100,000
(ii)	**Excessive Noise**	1. Sensitize workers on unnecessary hooting of vehicles and shouting 2. Regular maintenance of vehicles and machines within the 3. project site	Proponent	Annual Noise Survey audits	30,000
(iii)	**Increased Water Demand**	i. Water abstractions from the borehole should be as per the WRMA permit; ii. Implement water saving devices for domestic water use e.g. dual flush toilets, automatic shut-off taps, etc.; iii. Practice rain water harvesting for non-potable uses such as irrigation, cleaning and flushing purposes;	Proponent	Monthly internal water used audits Rain water harvesting Water saving techniques	60,000

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
		iv. Landscapes must be designed to absorb rainwater run-off rather than having to carry it off-site in storm water drains; v. Maintenance of proper pressure within fire water systems to limit water use; vi. The closed-circuit cooling system will lead to reduced water use; vii. Conducting of regular audits of water systems to identify and rectify any possible water leakages; viii. Implementing a system for the proper metering and measurement of water use to enable proper performance review and management.			
(iv)	**Solid waste generation**	• Engagement of a licensed waste handler to collect the solid waste at regular intervals; • Oily rags, used saw dust or other material that is oil contaminated should be collected by a hazardous waste handler; • Provide separate colour coded and labelled bins to encourage waste segregation at source;	Proponent	Efficient solid waste management system Contracts of waste handlers	As per contracted solid waste handler's contract

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
		• Create wealth from wastes by selling recyclable wastes such as plastics; • Keep records of waste volumes/masses and types collected by the contracted entity; • Education and training for employees to help ensure that proper waste reduction, sorting, and disposal procedures are followed.		Up-to-date records of wastes collected	
(v)	**Waste water generation**	• The generator shed should be bunded to contain oil leaks / spills and should be connected to an interceptor to filter the oil before the waste water flows into the septic system; • Maintenance of the storm water management infrastructure to prevent blockages; • Separate storm water and sewerage systems; • Absorbent materials such as saw dust should be available at maintenance and repair areas and at storage areas, in order to clean up small spills from leaks or due to repairs; • Landscapes should be designed to absorb rain water run-off rather than having to carry it off-site in storm water drains.	Proponent	Efficient waste water management system	20,000

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
B)	**Socio-Economic Impacts**				
(i)	**Occupational Health and Safety Risks/Issues**	• Monthly fire drills shall be undertaken to test the response of the involved stakeholders; • Conduct statutory assessments i.e. risk assessments, fire safety audits and Occupational Safety and Health audits annually through licensed advisors and auditors • Conduct statutory trainings under OSHA, 2007 and Rules under it. i.e. basic first aid, fire safety training, and Occupational Safety and Health committee training through approved training institutions • Provide adequate lighting in all workrooms; • Provision of firefighting equipment in strategic and well labelled areas; • Train workers on safe work practices, and provide appropriate PPE; • Enforcement of use of PPE Restriction of access to high-risk areas to authorized personnel only Use signage to warn staff and/ or visitors of dangerous places. The signage must be visible and placed strategically; and • Develop evacuation procedures to handle emergency situations.	Proponent	-Annual Occupational Safety and Health audits -Annual Fire risk audits -OSH training records -Presence of informative signage -Provision of first aid boxes, firefighting equipment -Maintenance of equipment and plants logs	120,000

No.	Nature of Negative Environmental / Social Impacts	Mitigation Measures	Responsibility	Performance Indicators	Cost Estimates Per Year (Kshs.)
(ii)	**Marine Traffic**	• KPA to control and regulate shipping movements within the port area. • KPA to have adequate controls enforced to ensure the safety of ship movements and berthing operations, and that this includes the avoidance and mitigation of potential negative environmental impacts. • Put in place good marine traffic plan. • Work in collaboration with KPA to ensure the safety of ship movement and berthing operations.	Proponent & contractor	Records of docking, loading and offloading ships at the terminal berth.	50,000
(iii)	**Security and Public Safety**	i. Fossil Supplies Limited Station should liaise with Mombasa County Government and County Administrations during the mobilization phase. ii. Ensure that all workers can be identified by staff uniform and badges at the site. iii. Adequate security measures should be provided, e.g. perimeter fencing and security manning at the site. iv. Journey management policy and monitoring to be enforced. v. Smoking will only be permitted in designated areas; no litter will be left along the construction sites; there will be no collecting of vegetation or firewood. vi. Barriers and guards should be installed as necessary to protect employees and visitors from physical hazards and criminal activity.	Proponent & contractor	Presence of security officers	40,000

CHAPTER TEN: PROJECT DECOMMISSIONING

10.1 Introduction

Decommissioning is the final disposal of the project and associated materials at the expiry of the project. It mainly involves the proponent removing all materials resulting from the demolition from the site and restoring the site to the near original state. A complete decommissioning audit and plan should be submitted to the Authority (NEMA) at least 3 months prior to decommissioning.

Table 10.1: The proposed project decommissioning plan

No.	Activity / Issue	Action required	Responsibility	Estimated Cost (Kshs.)
1.	**Generation Of Solid Waste**	• All solid waste to be collected at a central location and be stored temporarily until removal by a licensed solid waste handler. • Contractor should adopt the method of selective demolition as far as practicable to enable the removal of wastes of the same category one at a time thus facilitating recycling of wastes for beneficial reuse and minimizing the burden on dumpsites. • No dumping within the surrounding area is to be permitted. Where potentially hazardous substances are being disposed of, a chain of custody document should be kept with the environmental register as proof of final disposal. General waste is to be collected either by the County Government or via a licensed waste disposal contractor. The frequency of collections should be such that waste containment receptacles do not overflow. • Waste generated at the site should be categorized by the contractor and disposed of in a suitable manner into different waste streams (including general and hazardous waste). Wherever possible recycling should be carried out. • Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly at registered waste disposal sites. • All rubble must be removed from the site to an approved disposal site as approved by the Engineer. Burying rubble on the site is prohibited. • Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises is placed, dumped or deposited on adjacent/surrounding properties during or after the decommissioning period of the project are disposed of at dumping site as approved by the County government.	Contractor & Project Environmental Officer	120,000

No.	Activity / Issue	Action required	Responsibility	Estimated Cost (Kshs.)
2.	**Soil erosion**	• Re-vegetate the site with grass and indigenous tree species.	Contractor & Project Environmental Officer	40,000
3.	**Air pollution**	• Active earth work areas, stockpiles and loads of soil being transported must be watered to reduce dust. • All areas disturbed during closure of the site that are not required for a specific activity must be re-vegetated. • Diesel exhaust emissions from heavy machinery on site (excavators, front end loaders and hauling trucks) must be controlled and minimized by regular checks and servicing of vehicles. Any construction vehicle found to be emitting excessive smoke should be stopped from the operations for some mechanical attention before it can continue.	Contractor & Project Environmental Officer	70,000
4.	**Noise and excess vibrations**	• The contractor should use modern equipment, which produces the least noise. Any unavoidably noisy equipment should be identified and located in an area where it has least impact. The use of noise shielding screens should be used and the operation of such machinery restricted to when it is actually required. • For mobile equipment fit efficient silencers and enclose engine compartments in plant vehicles. • For fixed plants, isolate source by enclosure in acoustic structure. • Carefully select fixed plant site for remoteness from sensitive areas. • Raise barriers around noisy equipment.	Contractor & Project Environmental Officer	70,000
5.	**Accidental leaks and spillages**	• The Contractor should ensure that his employees are aware of the procedure for dealing with spills and leaks. • The source of the spill should be isolated and the spillage contained using sand berms, sandbags, sawdust and/or absorbent material. • The area should be cordoned off and secured. • The Contractor should notify the relevant authorities of any spills that occur. • The Contractor should also ensure that the necessary materials and equipment for dealing with the spills and leaks is available on site at all times.	Contractor & Project Environmental Officer	100,000
6.	**Loss of income, health/medical benefits, quality life, & increased dependency rates.**	• The safety of the workers should surpass as a priority of all other objectives in the decommissioning project • Adapt a project – completion policy: identifying key issues to be considered. • Assist with re-employment and job seeking of the involved workforce. • Compensate and suitably recommend the workers to help in seeking opportunities elsewhere. • Offer advice and counseling on issues such as financial matters.	Contractor & proponent	20,000
7.	**Vegetation disturbance Land deformation: soil erosion & drainage problems**	• Implement an appropriate re-vegetation programme to restore the site to its original status. • During the re-vegetation period, appropriate surface water runoff controls will be taken to prevent surface erosion. • Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences. • Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas. • Comprehensive Landscaping.	Contractor & proponent	30,000.00

CHAPTER ELEVEN: EMERGENCY RESPONSE PLAN

11.1 Introduction

Emergencies and disasters can occur any time without warning. It is important for the proponent to prepare for them and to be in a good position to act to minimize panic and confusion when they occur. Emergency Response Plans (ERP) will have to be instituted throughout the project cycle. The following elements of a conventional emergency response plan are recommended as summarized in the table below.

Table 11.1 Proposed Emergency Response Plan

Emergency Response Plan Components	Actions/Requirements	Responsibility
Potential Emergency	Identification of all potential emergencies associated with the proposed project at the project site Include: Fires, Accidents & Incidents, Security, hazardous materials and oil spills, etc.	Contractor during construction and decommissioning phases. Proponent during operation phase
Emergency Operations Coordinator (EOC)	Designated Primary and Secondary Contact Person	Contractor during construction and Decommissioning phases. Proponent during operation phases.
Emergency contact Numbers	Give & display contact for Fire Station, Ambulance, Police, Hospitals and First Aider on duty, including those of the Kenya Red Cross.	Contractor during construction and decommissioning phases. Proponent during operation phase
Installation of emergency equipment	• Fire sensors • Fire alarms, • Fire extinguishers, • Fire hose, • Panic alarm button, • Provision and enforcement of use of PPEs, • Emergency Communication equipment, such as Phone & alarm bells	Contractor during construction and decommissioning phases. Proponent during operation phase

Emergency Response Plan Components	Actions/Requirements	Responsibility
Training for emergency response	• Regular Training for Emergency Response	Contractor during construction and decommissioning phases. Proponent during operation phase
Trained In the Use of Emergency Equipment	• Employees training in the use of emergency equipment	Contractor during construction and decommissioning phases. Proponent during operation phase
First Aid	• Provision Of First Aid Kits, • First Aid Management Training	Contractor during construction and decommissioning phases. Proponent during operation phase
Signage	• Fire sensors • Signage, action poster, alarm bell/ panic button.	Contractor during construction and decommissioning phases. Proponent during operation phase
Procedure for rescue and evacuation	• Evacuation plan • Warning system, • Assembly site • Shelter in place plan.	Contractor during construction and decommissioning phases. Proponent during operation phase
Emergency Response Plan review	•Annual Emergency Response Plan review	Contractor & Proponent during all project phases.

CHAPTER TWELVE: QUANTITATIVE RISK ASSESSMENT

12.1 Introduction

12.1.1 Chemical Properties of LPG

- LPG is approximately twice as heavy as air when in gas form and will tend to sink to the lowest possible level and may accumulate in cellars, pits, drains etc.
- LPG in liquid form can cause severe cold burns to the skin owing to its rapid vapourisation.
- Vapourisation can cool equipment so that it may be cold enough to cause cold burns.
- LPG forms a flammable mixture with air in concentrations of between 2% and 10%.
- It can, therefore, be a fire and explosion hazard if stored or used incorrectly.
- Vapour/air mixtures arising from leakages may be ignited some distance from the point of escape and the flame can travel back to the source of the leak.
- At very high concentrations when mixed with air, vapour is an anaesthetic and subsequently an asphyxiant by diluting the available oxygen.
- A vessel that has contained LPG is nominally empty but may still contain LPG vapour and be potentially dangerous. Therefore, treat all LPG vessels as if they were full.
- It's a liquified petroleum gas obtained from refining of crude or directly from natural gas

12.1.2 Physical Properties of LPG

- Chemical Formula C3H8
- Boiling point at 101.3 kPa (°C) -42.1
- Liquid density at 15 °C (Kg/m3) 506.0
- Absolute vapour pressure at 40 °C (kPa) 1510
- Flash Point (°C) -104
- Upper flammable limit (% vol. in air) 9.5
- Lower flammable limit (% vol. in air) 2.3
- Vol. vapour per vol. liquid 269
- Relative vapour density (air = 1) 1.55
- Coefficient of expansion (liquid) per 1°C 0.0032
- Minimum air for combustion (m3/m3) 24
- Kinematic Viscosity (centistokes) @ 20°C 0.20
- Latent Heat of Vapourisation (kJ/Kg) @ 20°C 352
- Specific Heat (kJ/Kg/°C) @ 20°C - liquid 2.554
- Specific Heat (kJ/Kg/°C) @ 20°C - vapour 1.047
- Minimum ignition temperature (°C) in oxygen 470 - 575
- Maximum Flame temperature (°C) 1980
- Octane number >100
- Specific Energy (gross) kJ/Kg 49.83

12.2 Identification of Hazards

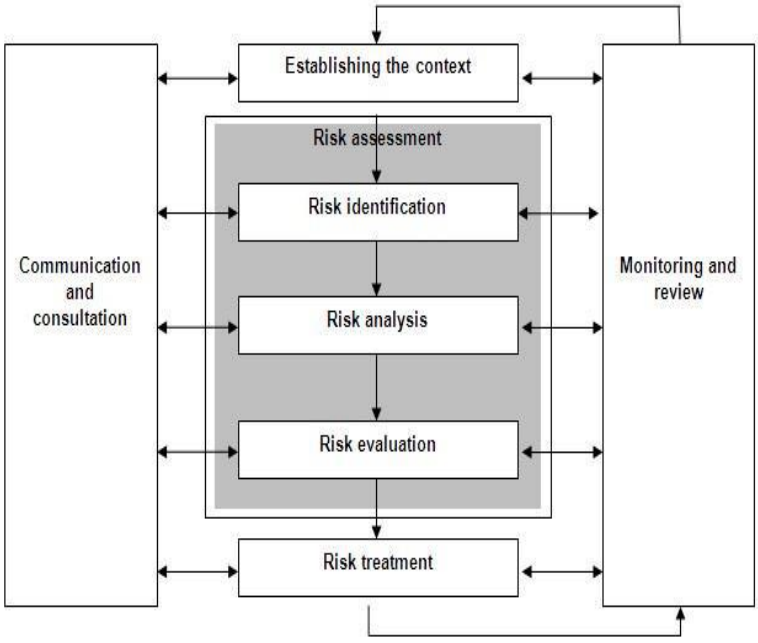
The material of concern was the large LPG inventory that is hazardous, and which has the potential to create major hazards, if released. The proposed project is a Major Hazard installation and LPG is classified as a highly flammable gas under UN classification of dangerous goods. Environmental effects (biophysical impacts) are not relevant the proposed project and no environmental risk assessment was carried out as part of the Major Hazard Installation Risk Assessment.

12.3 Hazard Analysis

12.3.1 Hazard Identification

Identification of hazards is an important step in Risk Assessment as it leads to the generation of accidental scenarios. The merits of including the hazard for further investigation are subsequently determined by its significance, normally using a cut-off or threshold quantity. Once a hazard has been identified, it is necessary to evaluate it in terms of the risk it presents to the employees and the neighbouring community. In principle, both probability and consequences should be considered, but there are occasions where it either the probability or the consequence can be shown to be sufficiently low or sufficiently high, decisions can be made on just one factor.

Figure12.1 Risk and hazard management summary



12.3.2 The Risk Matrix

The Risk Matrix is the adequate way to represent results from a qualitative assessment. On the x-axis classes of consequences are represented (increasing damage from left to right). On the y-axis classes of likelihood are represented (increasing likelihood from below to above). The Cartesian product of both axes provides all the possible combinations of likelihoods and consequences. A colour code (green – yellow -red) and/or number code (I–II-III-IV, etc.) indicates the severity of the combination likelihood-consequences.

Table 12.2 The Risk Matrix

	Severity					
Almost Certain	Medium	High	High	High	High	Likelihood
Probable	Medium	Medium	High	High	High	
Possible	Low	Medium	Medium	High	High	
Unlikely	Low	Low	Medium	Medium	High	
Rare	Low	Low	Low	Medium	Medium	
	Insignificant	Significant	Severe	Major	Catastrophic	

12.3.3 Sections Analyzed

The site was broken down into discrete sections to facilitate the analysis of possible hazards. These sections are:

- LPG receiving line from the KPRL/KPC tie in
- LPG storage in mounded bullets
- Piping from bullets to pump suction and delivery to rail and road tanker filling
- LPG pump
- Rail wagon filling
- Road tanker loading

12.3.4 Cause Development

When a flammable material like LPG is released as a gas, initial dispersion will take place by the jet velocity, where-after it will form a gas cloud, which will drift away assisted by the wind. Similarly, when an LPG liquid is released, a portion will flash off from the jet, while the remainder will fall on the ground and form a pool. If there is immediate ignition, a flash, jet and pool fire will result, otherwise evaporation will take place from the pool, and will combine with the flashed off vapour to form a cloud, which will drift away assisted by the wind. Later ignition could cause a flash fire or an explosion when the cloud is in a confined area, or the flash fire could flash back igniting the pool. Fires will lead to radiation injuries and damage, whereas explosions will result in blast injuries and damage. When a toxic material is released as a gas, initial dispersion will take place by the jet velocity, where-after it will form a gas cloud, which will drift away assisted by the wind. Similarly, when a toxic liquid is released, a portion will flash off from the jet, while the remainder will fall on the ground and form a pool. If the liquid is volatile, evaporation will take place from the pool, and combine with the flashed off vapour to form a cloud, which will drift away assisted by the wind. As the cloud moves away, it will mix with air and become dispersed and the concentration will decrease as it travels. Thus, the further away from the source, the lower will be the gas concentration.

12.3.5 Hazard Analysis

Table 12.3 The Hazard Analysis

Terminal Section	Failure & Cause	Hazard & Consequence	Control
Tank farm	-Bullets -Bullet rapture due to corrosion, Sabotage, Ignition sources, e.g., hot work, electrical sparks, static, smoking	• Pool fire • Jet fire • Flash fire • Explosion -Damage to property -Personnel injury	- Emergency Shut down (ESD) - maintenance - Electrical area classification - Earthing & Bonding – Security surveillance by CCTV, patrols, Wall fence
Road tanker loading	-Wagon burst -Loading arm rupture due to loss of integrity e.g., corrosion, or tanker pulled away with arm	• Pool fire • Jet fire • Flash fire • Explosion -Damage to property -Personnel injury	-Emergency procedures, e.g., isolation - Fire extinguishing

	-Ignition sources present, e.g., hot work, electrical sparks, static, smoking		
Pump	-Pump burst or gland leak - Ignition sources present, e.g., hot work, electrical sparks, static, smoking	• Pool fire • Jet fire • Flash fire • Explosion -Damage to property -Personnel injury	-Emergency procedures., isolation - Fire extinguishing

12.4 Effect Categories

In order to interpret the effects of explosion, fire and toxic releases, effects of consequence were compiled from various sources: DNV (2020), TNO (1992), TNO (1997), ICI (1986). From this information the following three effect categories are defined based on the modelling outputs in the 'Safeti 'software

Table:12.4 Effect Categories

Category	1-Least severe	2-Moderately severe	3-Most severe
Fire radiation kW/m2	4	12.5	37.5
Effects from a pool or jet fire or a fire ball for 10 s	Pain, Blisters	2nd Degree Burns	100% Fatal
Flash fire radius m	Radius from the release to ½ the Lower Flammable Limit (LEL)		
Effects from a flash fire	100 % Fatal		

12.5 Likelihood Analysis

Currently, there is no information available in Kenya related to failure frequencies or rates of petroleum facilities infrastructure. Subsequently, generic failure rates from the data bases in the Dutch Standards i.e. Purple Book, Bevi document and HSE etc. The failure data was adjusted according to the evaluation of the Process Safety Management (PSM) and organizational measures which are proposed to be practiced on the site. This may be well managed, not well managed or neutral and the failure frequency was adjusted accordingly.

12.6 Risk Results

Two types of risks were evaluated using QRA computer model DNV-GL SAFETI individual risk to employees and public and societal risks.

12.6.1 Individual Risk to Employees

Individual risk is the chance that a particular individual at a particular location will be harmed in the course of a year. The risk is typically expressed as the chance (e.g., 10-3, 10-4, 10-5… 10-8) of a fatality per person per year. Contours have been plotted on a map of the site taking into account the combined risk scenarios

12.6.2 Societal Risk

Societal risk depends on the population distribution normally surrounding the site, as well as on whether persons are indoors or outdoors, i.e., their ability to escape from the hazard area. Societal risk is a way to estimate the chances of numbers of people being harmed from an incident. The likelihood of the primary event (an accident at a major hazard plant) is still a factor, but the consequences are assessed in terms of level of harm and numbers affected, to provide an idea of the scale of an incident in terms of numbers killed or harmed. An estimate of the number of people in a populated area was done and the population density calculated based on the surface area. The areas delineated on probability that people would be indoors was assigned to each population area based on the Dutch risk management guidelines, known as the Green Book 1992.

Societal risks were determined by using the individual risks to calculate the number of fatalities in a specific population area, taking account of the population density, the probability that people will be indoors, the wind direction distribution and ignition probabilities associated with the population and other activities. Societal risk was then expressed in frequency

Table:12.5 RISK Assessment Template

No.	Risk	Likelihood	Impact	Overall Ratings	Process
1.	Fire and explosion	4	5	20	HSE Emergency Management
2.	Environmental Pollution	3	5	15	HSE Emergency Management
3.	Personnel Injuries	3	5	15	Incident and Accident Reporting
4.	Explosion	4	4	16	

Legend 1: Overall Risk Rating

	Low Risks		Medium Risks		High Risks		Extreme Risks

12.6.3 Key Risk Indicators

12.6.3.1 LPG Terminal Top Risks and Improvement Plans

Below are the top risks and Proposed Improvement Plans

Table:12.6 FSL LPG Terminal Top Risks

No	Risk Name	Likelihood	Impact	Overall Ratings	Mitigation plan
1	Fire and explosion	4	5	20	1. Design fire alarm and detection systems 2. Train staff on basic fire course 3. Sensitize staff and stakeholders 4. ESD systems 5. Have MOUs with stakeholders 6. Design and implement fire resistant systems. 7. Carry out periodic fire drills as per OSHA 2007 8. Have HSE committees as per OSHA 2007 legal notice 31
2	Environmental Pollution	3	5	15	1. Implement EIA study EMP 2. Design and implement leak detection system 3. Design and implement spill containment
3	Personnel Injury	3	5	15	1. Sensitize staff and stakeholders on Near Miss Reporting 2. Adhere to permit to work system 3. Provide appropriate and adequate PPE

Below are the Key Risk Indicators (KRI) Top Risks

Table:12.7 FSL LPG Terminal Key Risk Indicators

No.	Risk	Risk Indicator	Tolerance Levels	
1.	Fire and explosion	No of fire incidents	1. zero	
			2. 1 to 2	
			3. Above 3	
2.	Environmental pollution	No of Spillage	1. zero	
			2. 1 to 2	
			3. Above 3	
3	Personnel Injury	No. of Incidents	1. Zero	
			2. 1 to 5	
			3. Fatal	

12.7 Mitigation Measures

The following mitigation measures, as part of the organizational risk management should be implemented by FSL during operation of the project

- Compile registers of all pressure vessels (bullets), relief valves, piping, loading hoses and arms, interlock and trips, flame, and explosion proof electrical equipment.
- Set up schedules for inspecting and testing of all pressure vessels (bullets), relief valves, piping, loading hoses and arms, interlock and trips, flame and explosion proof electrical equipment.
- Put in place a system to prevent unauthorized override or defeats of alarms, interlock and trips.
- Institute formal training of all operating personnel with pass out for competency. Set up refresher training, accident recall and major hazard awareness training for operating personnel, as well as the public.
- Implement formal investigation of accidents, incidents and near misses with recording documentation.
- Operating, technical and training manuals as well as formal standard Piping and Instrumentation (P & I) diagrams for the plant should be compiled.
- This information should be updated whenever any change takes place, as it is essential for proper operation and identification of valves, piping, equipment and instrumentation for maintenance. Accidents originating from, e.g., modifications or operations based on inadequate information will thus be avoided.

- The condition of rail and road tanker loading hoses should be regularly inspected to ensure that deterioration is detected early, thus preventing their unexpected rupture.
- Provide emergency isolation on the bullet outlet piping and the pump via a leak detection and intrusion system.
- Provide fire protection systems on the pump and road and rail filling gantries
- Implement a permit to work clearance system for maintenance and a management of change for modifications.
- All project designs must be signed by a professional engineer registered in Kenya in accordance with the Professional Engineers Act, who takes responsibility for suitable designs.

12.8 LPG Terminal Safety Aspects

- The LPG terminal will be designed in accordance with criteria of NFPA 59A,
- Well defined plant operating envelopes and a high level of plant automation (within the Process Control Systems);
- An extensive detection system of abnormal conditions (within the Safety Control System);
- An Emergency Shutdown System to isolate affected plant parts and limit the effects of abnormal conditions (where practical on a “fail-safe” design practice), which is supplemented with;
- Passive design solutions within the plant to minimize the effects of accidents, such as selective LPG spill collection, avoiding the collapse of main structures from cold splash or fire heat-flux influence;
- An active protection system, inclusive stopping of uncontrolled sources of ignition and a fire protection system. The fire protection systems are important either to cool surrounding facilities or to segregate process area and reduce the risk of further escalations of incidents. The active firefighting systems rely on permanent facilities and use the operation crew as first line of defense.
- The LPG terminal will be monitored and controlled from a continuously manned Central Control Room (CCR) located in the control Room building. Emergency Shut Down (ESD) system is part of the main Plant Control & Monitoring system.

- ESD will be designed to monitor key safety variables and equipment and respond automatically or to operator-initiated commands, in such a way as to reduce the risk of hazardous or destructive incidents.
- The ESD system will be independent of the primary control system and will perform the following functions:
    - Monitor dangerous conditions and take appropriate shut-down action.
    - Rapidly and reliably detect a fire condition, a LPG spillage, a leakage of flammable gas or any other specific incident.
    - Respond to manual requests for shut-down, Reset and override from the operator consoles or from the field as per requirements.
    - Record on a suitable Sequence of Event Recorder (SER) all events / alarms and actions taken by the ESD system.
    - Indicate to the control operator that a trip has been initiated and has been successfully completed/not completed.
    - The implementation of the ESD system will consist in selecting for each safety function, an architecture which satisfies the specifications of said function and / or ensuring the P&ID requirements which also correspond to the safety integrity requirements. The ESD System will be based on fail-safe dual redundant Programmable Logic Controller (PLC). I/O module, power supply module and communication module will be redundant. PLC will have watch dog timer for self-diagnosis.

12.9 QRA Conclusions and Recommendations

- Implement the EIA study recommendations and Environmental Management Plan (EMP)
- LPG must be stored in adequate location wherein vessels or cylinders are suitably positioned having regard to the relevant codes of practice
- LPG plant must be designed to appropriate standards and be properly installed and commissioned by competent persons

- Plant must be fitted with adequate safety and monitoring control devices and operated by competent persons
- Occupiers must notify the gas supplier of any structural or other changes which might affect the gas installation
- There must be a suitable programme of maintenance and testing by competent persons
- Plant must be identifiable and accessible for maintenance
- Records of maintenance and tests must be kept
- Precautions must be taken to prevent fire and explosion including appropriate protection of storage vessels
- Installations must have appropriate security measures to prevent deliberate interference
- Incidents involving death or hospitalisation, fire or explosion or a significant release of LPG must be reported to the Authority and records of such incidents must be kept
- Obligations are placed upon occupiers, suppliers of LPG, persons present at installations, designers of plant and persons installing plant.

CHAPTER THIRTEEN: CONCLUSION AND RECOMMENDATION

13.1 Conclusion

The ESIA Study Report has been carried out as per NEMA EIA guidelines, the approved Terms of References and other applicable Laws, Policies and Regulations. It has been professionally executed with involvement of the Proponent.

All Stakeholders who shall be impacted in one way or another by the Proposed LPG Common User Facility were engaged and participated in various forums generally supported the proposed project.

The ESIA Study Report has identified positive and negative impacts of the Proposed LPG Common User Facility to the Environment. Further the report has recommended comprehensive mitigation measures to eliminate the hazards and minimise the risk to as low as practically possible.

A Quantitative Risk Assessment (QRA) was carried out as per requirement under the OSHA 2007 and the summary has been included herein.

The Proposed LPG Common User Facility and associated infrastructures are unlikely to result in permanently damaging environmental and social impacts if the proposed mitigation measures proposed in this study are adequately implemented in all phases of the project. The potential for positive socio-economic benefits can be realized if the enhancement measures are put in place.

The Environmental Management Plan in this report has proposed several management measures to mitigate identified impacts and to enhance identified positive benefits of the proposed project.

13.2 Recommendations

1. The Proposed LPG Common User Facility must be designed as per the ISPS Standards and be properly installed and commissioned by competent persons;
2. The facility must be fitted with adequate safety and monitoring control devices e.g. Safety Instrumented System (SIS) and operated by competent persons;
3. The proponent should follow the guidelines as set out by relevant lead agencies to safeguard and visualise environmental management principles during construction and operation / occupation phases of the proposed project such as: -
    - All solid waste materials and debris resulting from construction activities should be disposed-off at approved dumpsites.
    - Elaborate treatment for active gaseous waste, active liquid and solid waste before any discharges should be provided.
    - The management should adopt an onsite recycle/reuse potential of treated water for dust suppression at sites, damping and/or flushing of toilets.

- Personal protective equipment should be provided to all workers/staff on site.
- Develop a full offloading and installation methodology with supporting engineering design and checks, to ensure the safety of the offloading, delivery and installation operation.
- Implementing social and community welfare measures aimed at improving infrastructural facilities including road, education, and health in the project area as part of community social responsibility.
- implement a traffic management plan
- Develop a waste management plan aimed at minimising production of hazardous wastes.
- All project activities should be restricted from ocean shoreline to prevent damage to marine flora and fauna.
- Conduct statutory Environmental audits, Fire risk assessments and Occupational Safety and Health audits annually through licensed advisors for the facility during operations phase, as per the NEMA requirements to monitor the environmental compliance standards during the project implementation and operation phases.
- Safety within the living and working environment is of great importance, it is recommended that all provisions of OSHA 2007 be adhered to. An annual Occupational Safety and Health Audit, and Fire Safety Audit should be conducted.

It is hereby recommended that the Proposed Fossil Supplies Limited Liquified Petroleum Gas (LPG) Common User Facility ESIA Study Report is considered for approval.

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ATTACHMENTS

1. Lead Expert Licence
2. Experts CV and Certificates
3. Environmental Measurement
4. Public Participation Minutes and their attendance list
5. TOR Approval
6. Public Participation Questionnaires
7. FSL Certificate of Incorporation
8. FSL PIN Certificate
9. Lease Agreement
10. KPRL No objection
11. Approved BoQ