CONSULTANCY SERVICES FOR FRONT-END ENGINEERING DESIGN FOR THE PROPOSED LPG IMPORT, STORAGE, AND HANDLING FACILITY

CHANGAMWE MOMBASA

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY

Document No: KPC.KPRL.CHANGAMWE.EHS.06.22-01B

Client Reference Project No: KPC/PU/OT – 241/PROJECTS/KPRL/21 – 22

C								
B								
A	30.09.2022	Issued for CIT Review	K.M		P.N		S.A	
Rev	Date	Description	Initial	Signature	Initial	Signature	Initial	Signature
			Prepared by		**Checked by**		**Approved by**	

CLIENT:	KPC	**KENYA PIPELINE COMPANY LIMITED**	Kenpipe Plaza, Sekondi Road, Off Nanyuki Road, Industrial Area, P.O. Box 73442 – 00200, Nairobi, Kenya
CONSULTANT:	R&E MODERN TECHNOLOGIES LTD	**R&E MODERN TECHNOLOGIES LTD**	Eastern Bypass, Pondo Arcade, 3rd Floor Suite AC3 P.O Box 50692-00200, Nairobi info@rnemoderntechnologies.co.ke
CONSULTANT:	PES	**PETROCHEM ENGINEERING SERVICES**	Pakistan B-69, Block No. 18, Gulshan-e-Iqbal Karachi-75300, info@petrochemengg.com.pk

Certification

Project Proponent: Kenya Pipeline Company Limited (KPC)

Assignment Title: Environmental Impact Assessment Study for the Proposed LPG Import, Storage, and Handling Facility in Changamwe, Mombasa County.

Report Submitted by: **Kennedy Kijana**

Expert Reg. No. 1254

Signature: …….. Date: ……..

For R&E Modern Technologies Limited/Petrochem Engineering Services JV,

On Behalf of:

Kenya Pipeline Company Limited

Kenpipe Plaza, Sekondi Road, Off Nanyuki Road,

Industrial Area,

P.O. Box 73442 – 00200

Nairobi, Kenya

Signature: …….. Date: ……..

Designation: ……..…

Stamp:

Table of Contents

List of Tables

List of Figures

List of Plates

List of Annexes

List of Abbreviation

ANSI	-	American National Standards Institute
APELL	-	Awareness and Preparedness for Emergencies at a Local Level
API	-	American Petroleum Institute
AS	-	Australian Standards
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing and Materials
BLEVE	-	Boiling Liquid Expanding Vapor Explosion
BS	-	British Standard
BSI	-	British Standards Institution
CBD	-	Convention on Biological Diversity
CBO	-	Community-Based Organisations
CSR	-	Corporate Social Responsibility
DIV	-	Dutch Intervention Values
EA	-	Environmental Audit
EEMUA	-	Engineering Equipment and Materials Users Association
ESIA	-	Environmental & Social Impact Assessment
EMCA	-	Environmental Management and Coordination Act
EMP	-	Environment Management Plan
EPRA	-	Energy & Petroleum Regulatory Authority
ESIA	-	Environmental and Social Impact Assessment
ESMP	-	Environmental and Social Management Plan
IEC	-	International Electrotechnical Commission
IFC	-	International Finance Corporation
ISA	-	International Society of Automation.
ISO	-	International Organization for Standardization
KAA	-	Kenya Airports Authority

LPG	-	Liquefied Petroleum Gas
MIA	-	Moi International Airport, Mombasa
NEMA	-	National Environment Management Authority
NFPA	-	National Fire Protection Association
NGO	-	Non–Governmental Organization
OP	-	Operational Policy
OSMAG	-	Oil Spill Mutual Aid Group Society
PCM	-	Public Consultation Meeting
PPE	-	Personal Protective Clothing
SE4All	-	Sustainable Energy for All
SGR	-	Standard Gauge Railway
TPH	-	Total Petroleum Hydrocarbon
WB	-	World Bank
URTI	-	Upper Respiratory Tract Infections

Acknowledgment

We extend our special thanks to the management of KPC for contracting R&E Modern Technologies Limited/Petrochem Engineering Services JV to prepare this ESIA Study Report for the Proposed LPG Import, Storage, and Handling Facility in Changamwe Mombasa County.

We further register our gratitude to the KPRL for their unwavering support, provision of baseline documents, and guidance towards the preparation of this ESIA Study Report.

We would like to thank also various stakeholders consulted during public stakeholder consultation for their invaluable contribution, support, and cooperation. Their input contributed enormously towards the successful completion of this Report.

Non-Technical Summary

Introduction

Kenya Pipeline Company Limited (the Proponent) intends to install a new LPG Facility of 30,000 MT. The proposed handling and storage LPG Facility will primarily receive LPG from pressurized LPG ships berthed at the newly constructed Kipevu Oil Terminal (KOT-2) Jetty, using a pipeline being constructed from Common User Manifold (CUM) located next to KPC. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

The Proposed LPG Import, Storage, and Handling Facility is listed in the EMCA Amended Second Schedule (Legal Notice No. 31) under High Risk Projects under Hydrocarbon projects including depots and refinery facilities for hydrocarbons. The proposed project has the potential of causing impacts to the environment. It is against this backdrop that KPC commissioned R&E Modern Technologies Limited/Petrochem Engineering Services JV Consultancy Company to carry out an Environmental Impact Assessment (EIA) Study for the project.

Project justification

The Second Medium Term Plan (2013-2017) under Kenya's Vision 2030 set a long-term goal of ensuring that 42% of the households in Kenya adopt clean cooking fuels. This was the country's commitment toward universal access to modern energy services by 2030, being one of the goals under the Sustainable Energy for All initiative launched by the UN in 2011. Further, data from the Kenya National Bureau of Statistics (KNBS), indicate a tremendous growth in the per capita consumption of LPG from 2.3kgs in 2012 to 7.57kgs in 2021.

Growth in LPG consumption in Kenya has been on the rise demonstrating an exponential trend. However, the country needs to urgently adopt new strategies to ensure that the target goal of 15kgs per capita is not missed by 2030. Hence the Proposed bulk LPG import handling and storage project by KPC has the following objectives:

a) Upgrade of the current LPG importation, storage, and distribution infrastructure that will ensure a robust supply chain and also reduce the landing costs due to economies of scale and elimination of monopolies;

b) Development of an efficient bulk import system similar to the Open Tender System (OTS) which currently works efficiently in the importation of Premium Motor Spirit, Automotive Gasoil, and Dual-Purpose Kerosene;

c) Designation of appropriate primary LPG facilities as common user import facilities to enhance economies of scale during handling of imported LPG, ensure equitable access, non-discrimination, and fair tariffs to all players;

d) Strong regulatory intervention to reduce malpractice in the LPG sector that will serve to ensure a fair return to investors and hence boost investor confidence attracting more Foreign Direct Investments; and

e) Continued sensitization of the public on the dangers of the use of dirty fuels such as biomass and the resultant health effects.

The proponent's effective project would not only augment their current LPG storage capacity at KPRL but also the overall capacity in Kenya which stands at 37,470 Metric tons by an additional 30,000MT, making it the largest installation in East and Central Africa. Given the urgent energy requirements of the country, and the growing use of LPG in the market, this would be a nationally important and landmark achievement.

Terms of Reference for ESIA

Terms of Reference for the Study were formulated and submitted to NEMA for approval and are attached in Annex 1. The process involved having discussions with the Proponent on the key issues and collection of primary and secondary data on the same. The primary data was collected using both qualitative and quantitative methods of data collection through field visits/site walks, public and stakeholder's consultation. Secondary data was collected through a literature review which included the review of policies, Acts and regulations; County Development Plans; project area maps; previous project area reports among others.

This exercise was designed to meet the requirements of EMCA 1999 (Amended 2015) and the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019. For the most part, the exercise involved studying the proposed design of the Proposed LPG Import, Storage, and Handling Facility, the operational mechanisms of each component, the input and outputs of the facility, and determining the impacts that may manifest during design and construction. In addition, baseline information was obtained through desk studies, physical investigation of the project areas, public and key informant consultations. The study adopted an integrated approach whereby a multi-disciplinary team was engaged in the data collection and analysis.

Generally, the key activities that fed into the EIA Study entailed, but are not limited to the following:

- A site visit to collect baseline information of the project area;
- A comparative analysis of the project with existing land uses in the neighborhood;
- A review of relevant policy and legislation;
- Discussions with the project proponent to obtain information on various project aspects;
- Identification of health and safety concerns that may be occasioned by the project;
- Seeking views and input through discussions and interviews with the public and key informants;
- Assessment of the site to detail the various existing and likely impacts; and
- Proposal of mitigation measures to avert or minimize negative impacts.

Both positive and negative impacts of the proposed project have been identified and appropriate measures to abate any adverse effects that may emanate from the project activities.

Review of the policy, legal and administrative framework

Environmental Management and Coordination Act 1999 Amended 2015 with all its subsidiary legislation and other sectoral laws were reviewed to establish their bearing on the proposed project. Legislation reviewed included:

- The Constitution of Kenya (2010)
- Environmental Management and Coordination Act 1999, Amended 2015
- Environmental (Impact Assessment and Audit) Regulations, 2003 Amended 2019
- Environmental Management and Co-ordination (Water Quality) Regulations 2006
- Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009
- Environmental Management and Co-ordination (Waste Management) Regulations 2006
- Environmental management and co-ordination (conservation of biological diversity and resources, access to Genetic resources, and benefit sharing) Regulations, 2006
- Environmental Management and Coordination (Air Quality) Regulations, 2014
- The Public Health Act (Cap 242)
- Occupational Safety and Health Act (OSHA), 2007
- The Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005
- Water Act 2016
- Water Resource Management Rules 2007
- The Energy Act 2019
- The Energy (Energy Management) Regulations 2012
- Liquefied Petroleum Gas (LPG) Regulations, 2019
- Climate Change Act, 2016
- Physical and Land Use Planning Act, 2019
- Land Act, 2012 (Act No. 6 of 2012)
- National Construction Authority Act. (Cap.449A)
- National Construction Authority Regulations, 2014
- The Standards Act, Chapter 496
- The Weights and Measures Act, Chapter 513
- KS EAS 924-1:2018
- The Traffic Act, Cap 403
- Public Roads and Roads of Access Act Cap. 399
- The KMA Act

- The BMU Regulations, 2007
- Employment Act No 11 of 2007

The assessment also reviewed IFC Performance Standards on Environmental and Social Sustainability that the Proponent will comply with throughout the life of the proposed project:

- **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;
- **Performance Standard 5:** Land Acquisition and Involuntary Resettlement;
- **Performance Standard 6:** Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- **Performance Standard 7:** Indigenous Peoples; and
- **Performance Standard 8:** Cultural Heritage

The proposed project is expected to start immediately after this Study report is approved by the relevant authorities including EPRA and County Government of Mombasa.

Project Location

The site for the location of the facility is on land owned by KPRL, a subsidiary of KPC at Changamwe, Mombasa County, Kenya. This is on Coordinate Latitude -4.012983˚ and Longitude 39.615719˚. Offloading of the product from the ship will be at KOT-2 Jetty. An import delivery line has been constructed from the new Jetty to the Common User Manifold (CUM) next to the Storage Depot at Kipevu (KOSF), Mombasa County.

Project Objectives

The proposed project aims to increase the supply capacity of LPG to industrial, commercial, and residential customers throughout Kenya and East Africa thereby promoting reliance on LPG as opposed to wood fuel and charcoal to enhance the biodiversity and environmental conservation. The Proposed Project will also stabilize the current fluctuating LPG prices by securing the supply, reduce the deficit and meet the increasing demand for LPG.

Project Description

KPC has selected mounded storage for their proposed LPG terminal. Mounded bullets provide an intrinsically passive, safe environment. LPG handling possess many challenges, due to its inherent properties, modern state of art safety features shall be taken into consideration while designing the facilities using Kenya standard codes as well as international standard as referenced in the related section.

This scope of the project will involve the construction of eighteen (18) mounded LPG bullets. Mounded LPG Bullets are large, buried, horizontal cylindrical steel bullets with dished ends

having a diameter of 8.0 meters and a length of 64 meters and capacity of 3,200m3 or 1,650MT. The proposed Project has an added advantage that the load is distributed over a larger area thus the problem of uneven settlement/collapse is largely reduced as the bullets shall be placed on subgrade ground and completely covered with sand which will be compacted up to 98%.

The pipeline shall be designed in accordance with ASME 31.4 for liquid hydrocarbon for Location Class 4. The pipeline shall withstand all installation, testing, and operating condition/ loads. All necessary calculations shall be carried out to verify structural integrity and stability of the pipeline for the combined effect of pressure, temperature, bending (elastic), soil/pipe interaction, external loads and other environmental parameters as applicable during all phases of work from installation to operation

Potential Impacts of the Project

The proposed project is expected to have impacts on the environment. Evaluation of the potential impacts shows that their significance will range between very low to medium low in the absence of the mitigation measures.

The impacts will reduce further with the implementation of the proposed mitigation measures.

The potential impacts anticipated include:

a) Socio-economic impacts

The proposed project is expected to create job opportunities for both skilled and unskilled Labor during the construction and operation phases. It is anticipated that the proposed project will provide opportunities for local employment and provision of goods and services to construction workers. The proposed project is also expected to contribute in government revenue through payment of taxes.

On the other hand, negative impacts may include behavioural change among the construction crew and the residents as they socialize resulting in upsurge in prostitution, family break ups and sexually transmitted diseases including HIV/AIDS. Temporary work may be taken by "outsiders" rather than local residents, creating tensions thereby affecting project implementation.

b) Impacts on air quality

The proposed project is anticipated to generate negative air quality impacts. Increase in dust generated during construction and exhaust gases from construction vehicles and machines/equipment may be a health hazard and could lead to chest problems, coughs, flu and have serious effects on asthmatic and sinus sufferers. It may also result in increased medical care for the residents.

c) Pollution from waste

Solid and liquid wastes are going to be generated during construction and operation phases of the facility. During construction the waste that is going to be generated include used oils and other chemicals, left over construction materials, wrapping materials which may include non-biodegradable plastics and broken glass. During construction, the Contractors camp will generate domestic waste foods, plastics, papers, broken glass, grey water from the bathrooms and black

water from the toilets. Other wastes are wood and metals from repairs and other commercial activities. During operation used oils and other chemicals will be generated.

The decommissioning activities are likely to generate residue materials at the project site.

d) Impacts on ambient noise quality

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

e) Impacts on biodiversity

The construction of the LPG Mounds and associated facilities will result in the loss of biodiversity. Preparatory work for excavations for the placement of the LPG Mounds will result in clearance of vegetation thus impacting negatively on the integrity of ecosystems that serve as critical habitats to a wide range of faunal organisms. However, given the high disturbance, low tree density and lower species diversity in the proposed project site, the implementation of the project on this block would have lower impacts on the vegetation and biodiversity loss compared to the adjacent alternative block.

f) Health and safety impacts

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

The potential occupational health and safety impacts during operation phase include injuries to workers from, routine monitoring and maintenance and deaths and injuries from major disasters e.g. explosions and fire outbreaks. During the operation phase, the workers may come in contact with liquid LPG and suffer from severe cold burns whereas during decommissioning, the potential H&S risks include injuries occasioned by dismantling of the facility. The proposed project could be of great public concern especially in the event of a major disaster such as explosions and fire outbreaks. Liquefied Petroleum Gas is a highly flammable product and can be detrimental to the public safety if measures are not put in place.

Analysis of alternatives

During the course of formulating the proposed project, several project alternatives were considered and evaluated to ensure that the best option of project development was adopted. The alternatives considered include: Storage Type alternatives, LPG Storage Technology alternatives, Alternative to the LPG Import, Storage and Handling facility Design, Alternative to the proposed location of the LPG Import, Storage and Handling facility and the “No Action” Alternative

On the basis of the above considerations, the Consultant concludes that the proposed project satisfies the overall economic, technical, environmental considerations. KPC's effective project would not only augment their current LPG storage capacity at KPRL, but also the overall capacity in Kenya by 30,000MT, making it the largest installation in East and Central Africa. Given the urgent energy requirements of the country, and the growing use of LPG in the market, this would be a nationally important and landmark achievement.

Public Consultation

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

The ESIA employed three main methods of consultations to get the data presented in this report. These are:

- Meetings and discussions with Key Stakeholders;
- Questionnaire administration and interviews; and
- Convening of Public Consultation Meetings within the project area.

Generally, the project is accepted by all those who were consulted and those who attended the Public Consultation Meetings since there is potential for job opportunities and the lowering of the price of gas. However, they called upon the proponent to ensure that employment opportunities are given first to youths from the community. They also urged the proponent to involve the community in Corporate Social Responsibilities such as building hospitals/clinics, sponsoring needy bright students from the area etc. Another aspect was to ensure safety measures are top notch and have in place a disaster response plan. The pertinent issues raised by the stakeholders have been addressed in the environmental management plan.

Project Cost Estimate (This cost will be provided after FEED)

The proponent has undertaken a preliminary estimate of the total project cost using experienced consultants. The project is estimated to cost the Proponent Kshs. 17,731,000,000 (Seventeen Billion Seven Hundred and Thirty One Million) to implement. The NEMA License fees is payable at 0.1% of the project cost with a minimum of 10,000.00 whichever is greater. Therefore, the total fee payable to NEMA is **Kshs. 17,731,000** (Seventeen Million Seven Hundred and Thirty One Thousand).

Conclusion and Recommendations

a) Conclusion

The project, including the construction and operation of the Proposed Project is anticipated to provide efficient and seamless transfer of LPG from the receiving KOT-2 Jetty to the storage terminal in addition to the provision of sufficient stock of LPG to augment KPC's current LPG storage capacity at KPRL thereby increasing the supply capacity of LPG to industrial, commercial and residential customers throughout Kenya and East Africa. This will also reduce the deficit and meet the increasing demand of LPG and therefore promote LPG as environment friendly fuel source.

The potential adverse impacts associated with the proposed project are possible to mitigate successfully. The impacts before implementation of mitigation measures are assessed as low to medium and the ratings are expected to improve further with the implementation of the proposed mitigation measures. In particular, the LPG facility will be designed, constructed and operated according to the latest industry norms and standards. Programs and plans developed and implemented through the EMP will be monitored and audited to ensure compliance with current regulations and cleaner production practices. The total cost of implementing the EMP is estimated at Kshs. 9,030,000/= (Nine Million and Thirty Thousand Shillings)

b) Recommendation

The Consultant recommends that the proposed development should be allowed to proceed considering the implementation of the proposed Mitigation Measures and Environment Management Plan (EMP). An environmental audit is recommended upon the completion of construction works to corroborate the implementation of the proposed mitigation measures. Any unforeseen project impacts shall be identified and addressed through annual environmental audits.

1.0 PROJECT INTRODUCTION AND BACKGROUND

1.1 Introduction

Kenya Pipeline Company Limited (the Proponent) intends to install a new LPG Facility of 30,000 MT. The proposed Import, Storage and Handling LPG Facility will primarily receive LPG from pressurized LPG ships berthed at the newly constructed Kipevu Oil Terminal (KOT-2) Jetty, using a pipeline being constructed from Common User Manifold (CUM) located next to KPC. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

The Proposed LPG Import, Storage and Handling Facility is listed in the EMCA Amended Second Schedule (Legal Notice No. 31) under High Risk Projects under Hydrocarbon projects including depots and refinery facilities for hydrocarbons. The proposed project has the potential of causing impacts to the environment. It is against this backdrop that KPC commissioned R&E Modern Technologies Limited/Petrochem Engineering Services JV Consultancy Company to carry out an Environmental Impact Assessment (EIA) Study for the project.

The Proponent has complied with the above legal requirement including compliance to The IFC Performance standard 1: Assessment and management of environment and social risks and impacts. The Proponent engaged R&E Modern Technologies Limited/Petrochem Engineering Services JV Consultancy Company Ltd who conducted a process of environmental and social assessment, and has produced a report establishing and maintaining an ESMS appropriate to the Proposed LPG Infrastructure Expansion project which has addressed all grievances raised by stakeholder during stakeholders consultation process including emergency preparedness and response system that shall be put in place together with the community and neighbouring facilities. The emergency preparedness and response activities will be periodically reviewed and revised, as necessary, to reflect changing conditions.

1.2 Objectives of the Environmental and Social Impact Assessment (ESIA)

The main objective of this ESIA is to ensure that the construction and operation of the proposed project is undertaken in an environmentally friendly manner compatible with economic and operational parameters. The following are the ESIA objectives:

- To fulfil the legal requirements as outlined in Environmental Management and Coordination Act, EMCA 1999 (Amended 2015) and the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019;
- To obtain background biophysical information of the site and legal and regulatory issues associated with the Project;

- To assess and predict the potential environmental and social impacts during site preparation, construction and operational phases of the Project;
- To make suggestions of possible alterations to the proposed design, based on the assessment findings;
- To propose mitigation measures for the potential significant adverse environmental impacts and safety risks;
- Disclosure and initiate public participation;
- To lower project cost in the long term; and
- To prepare an Environmental and Social Management Plan (ESMP).

1.3 Project Justification

The Second Medium Term Plan (2013-2017) under Kenya's Vision 2030 set a long-term goal of ensuring that 42% of the households in Kenya adopt clean cooking fuels. This was the country's commitment toward universal access to modern energy services by 2030, being one of the goals under the Sustainable Energy for All initiative launched by the UN in 2011. Further, data from the Kenya National Bureau of Statistics (KNBS), indicate a tremendous growth in the per capita consumption of LPG from 2.3kgs in 2012 to 7.57kgs in 2021.

Growth in LPG consumption in Kenya has been on the rise demonstrating an exponential trend. However, the country needs to urgently adopt new strategies to ensure that the target goal of 15kgs per capita is not missed by 2030. Hence the Proposed bulk LPG import handling and storage project by KPC has the following objectives:

a. Upgrade of the current LPG importation, storage, and distribution infrastructure that will ensure a robust supply chain and also reduce the landing costs due to economies of scale and elimination of monopolies;
b. Development of an efficient bulk import system similar to the Open Tender System (OTS) which currently works efficiently in the importation of Premium Motor Spirit, Automotive Gasoil, and Dual-Purpose Kerosene;
c. Designation of appropriate primary LPG facilities as common user import facilities to enhance economies of scale during handling of imported LPG, ensure equitable access, non-discrimination and fair tariffs to all players;
d. Strong regulatory intervention to reduce malpractice in the LPG sector that will serve to ensure a fair return to investors and hence boost investor confidence attracting more Foreign Direct Investments; and
e. Continued sensitization of the public on the dangers of the use of dirty fuels such as biomass and the resultant health effects.

The proponent's effective project would not only augment their current LPG storage capacity at KPRL, but also the overall capacity in Kenya which stands at 37,470 Metric tons by an additional 30,000MT, making it the largest installation in East and Central Africa. Given the urgent energy requirements of the country, and the growing use of LPG in the market, this would be a nationally important and landmark achievement.

1.4 Scope and Terms of Reference for the ESIA

This assessment evaluates the environmental and socio-economic impacts of the following aspects of the Project:

- Site preparation and earthworks;
- Construction;
- Commissioning and operation; and
- Decommissioning

Terms of Reference for the Study was formulated and submitted to NEMA for approval and is attached in Annex 1. The process involved having discussions with the Proponent on the key issues and collection of primary and secondary data on the same. The primary data was collected using both qualitative and quantitative methods of data collection through field visits/site walks, public and stakeholders consultation. Secondary data was collected through literature review which included the review of policies, Acts and regulations; County Development Plans; project area maps; previous project area reports among others.

This exercise was designed to meet the requirements of EMCA 1999 (Amended 2015) and the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019. For the most part, the exercise involved studying the proposed design of the Proposed LPG Import, Storage and Handling Facility, the operational mechanisms of each component, the input and outputs of the facility and determining the impacts that may manifest during design and construction. In addition, baseline information was obtained through desk studies, physical investigation of the project areas, public and key informant consultations. The study adopted an integrated approach whereby a multi-disciplinary team was engaged in the data collection and analysis.

Generally, the key activities that fed in to the EIA Study entailed, but are not limited to the following:

- A site visit to collect baseline information of the project area;
- A comparative analysis of the project with existing land uses in the neighbourhood;

- A review of relevant policy and legislation;
- Discussions with the project proponent to obtain information on various project aspects;
- Identification of health and safety concerns that may be occasioned by the project;
- Seeking views and input through discussions and interviews with the public and key informants;
- Assessment of the site to detail the various existing and likely impacts; and
- Proposal of mitigation measures to avert or minimize negative impacts.

Both positive and negative impacts of the proposed project have been identified and appropriate measures to abate any adverse effects that may emanate from the project activities.

1.5 ESIA Activities

1.5.1 Literature Review

Literature review pertaining to the project development and operation activities have been done. This included documentary review on the nature of the proposed activities, project documents, relevant policies and legislative framework as well as the environmental setting and socio-economic data of the area and discussions with the Proponents contact person. This has included the review of the appropriate national legislation and other relevant studies and reports on the construction of Bulk LPG Storage facilities.

1.5.2 Site Visits for Data Collection

Project area site visit and execution of other activities took place between Monday June 27th and Saturday July 23rd, 2022

Activities during the field trip include the following:

- Project Start up meeting and site reconnaissance survey;
- Project area data collection;
- Interviews with key stakeholders and local community and administration of questionnaires;
- Holding discussions with key stakeholders and administration of key informant interviews;
- Evaluation of the geographical location of the project including the physical area that may be affected by the project's activities and physical limits for the ESIA area;
- Obtain project baseline data covering socio-economic and bio-physical aspects including air, soil, noise and biodiversity; and
- Convening of Public Consultation Meeting (PCM).

1.5.3 ESIA Study report Preparation

A comprehensive ESIA Study report containing the findings has been compiled by the Consultant in accordance with NEMA guidelines for consideration and approval. In preparing the report, the Consultant paid attention to the following issues as specified in the second schedule of the Environmental (Impact Assessment and Audit) Regulations, 2003 Amended 2019:

- Ecological considerations including: Biological diversity, sustainable use, and ecosystem maintenance;
- Social consideration including: Economic impacts, social cohesion or disruption, effect on human health, communication, and effects on culture and objectives of culture value;
- Landscaping including: views opened up or closed, visual impacts (features, removal of vegetation, etc), compatibility with surrounding area, and amenity opened up or closed e.g. recreation possibilities;
- Land use including: effects of proposal on current land uses and land use potentials in the Project area, possibility of multiple use, and effects of the proposal on surrounding land uses and land use potentials; and
- Water including: water sources (quantity and quality) and drainage patterns/drainage systems.

1.6 Field Data Collection Schedule

Baseline data was collected on the proposed project site and the immediate neighbourhood. The data collected was on aspects such as: topography; local flora and fauna; soils and geology; existing and past activities including human settlements; local surface and ground water resources; ambient air quality and noise levels (qualitative); waste management practices; and natural resources and cultural heritage aspects of the project area.

1.7 Impact Assessment Methodology

To identify potential and assess impacts associated with or resulting from Project activities, the ESIA team used professional judgment, fieldwork, and desk-top analysis to identify potential impacts and their interactions. The significance of potential impacts that may result from the proposed Project was determined to assist in preparing recommendations for evaluation of the proposed Project. The methodology that was used to identify and assess potential impacts of the proposed project is described below:

1.7.1 Steps of impact assessment

Impact Assessment took place as follows:

- Characterize the baseline – the existing conditions before the Project is undertaken and any effects are generated;
- Identification of sources of impacts and the impacts themselves that are generated by any aspect of the Project;
- Recommend mitigation and enhancement measures to address the impact; and
- Rate impacts after mitigation to produce a “residual” impact rating.

1.7.2 Rating Impacts

Potential ESIA impacts are rated to:

- Provide a basis for prioritization of impacts to be dealt with;
- Provide a method of assessing the effectiveness of proposed mitigation measures; and
- Provide a scale which shows the level of impact both before and after a proposed mitigation measure has been applied.

1.7.3 Impact rating Criteria

An impact rating is the product of two elements: (1) the severity of the potential impact and (2) the likelihood of the “event” occurring.

1.7.4 Severity Criteria

The severity or enhancement of each impact was rated using the criteria identified in Table 1 and Table 2.

Table 1: Impact Rating Criteria

Severity	Negative Social/Health Impacts					Negative Environmental Impacts
	Duration	**Geographic Extent**	**Ability to Adapt**	**Socio-cultural effect**	**Health Effects**	
Low	• Short-term • <1 year • Low frequency	• Individual • household	• Those affected will be able to adapt to the changes with relative ease, and maintain pre-impact livelihoods, culture, quality of life and health.	• Inconvenience but with no consequence on long-term Livelihoods, culture, quality of life, resources, infrastructure and services.	• Event resulting in annoyance, minor injury or illness that does not require hospitalization.	• Affects environmental conditions, species, and habitats over a short period of time, is localized and reversible.
Moderate	• Medium-term 1-6 years • Medium or intermittent frequency	• Small number of households	• Those affected will be able to adapt to change, with some difficulty, and maintain pre- impact livelihoods, culture, quality of life and health but only with a degree of support	• Primary and secondary impacts on livelihoods, culture, quality of life, resources, infrastructure and services	• Event resulting in moderate injuries or illness, which may require hospitalization	• Affects environmental conditions, species and habitats in the short to medium term. Ecosystems integrity will not be adversely affected in the long term, but the effect is likely to be significant in the short or medium term to some species or receptors. The area/region may be able to recover through natural regeneration and restoration.

High	• Long-term/ • Irreversible • > 6 years Constant frequency	• Large part of/ full settlement	• Those affected will not be able to adapt to changes and continue to maintain pre-impact livelihood	• Widespread and diverse • Primary and secondary impacts likely to be impossible to reverse or compensate for.	• Catastrophic event • Resulting in loss of life, severe injuries or chronic illness requiring hospitalization.	• Affects environmental conditions, species and habitats for the long term (i.e., over the life of the Project) may substantially alter the local and regional ecosystem and natural resources, and may affect sustainability. • Regeneration to its former state would not occur without intervention. • Affects environmental conditions or media over the long term, has local and regional affects and/or is irreversible.

1.8 Likelihood Criteria

Likelihood of the event occurring is comprised of the following categories:

- Low likelihood – Rare (e.g., few or no occurrences in related projects);
- Medium likelihood – Uncommon (e.g., documented occurrences in related projects); and
- High likelihood – Common (e.g., occurs within the LPG projects).

1.8.1 Determining Rating

The overall rating of the impacts will be determined by using the following matrix (Table 2). It should be noted that these matrices act as a guide and there may be situations where their rigid application is inappropriate and where stakeholder perceptions and feedback have a significant role to play. For specific impacts where this is the case, the rating is clearly explained in the evaluation of the impact.

Table 2: Overall rating of Impacts

Severity/Enhancement	Likelihood		
	Low	**Medium**	**High**
High level of Enhancement	Moderate	Major	Major
Medium level of Enhancement	Minor	Moderate	Major
Low level of Enhancement	Insignificant	Minor	Moderate
Low severity	Insignificant	Minor	Moderate
Medium severity	Minor	Moderate	Major
High severity	Moderate	Major	Major

Criteria for assessing the significance of impacts stem from the following key elements:

- Status of compliance with relevant Kenyan legislation, policies and plans and any relevant Kenyan or industry policies, standards or guidelines;
- The magnitude (including nature, scale and duration) of the change to the natural or socio-economic environment (e.g. An increase in noise, an increase in employment opportunities), expressed, wherever practicable, in quantitative terms. The magnitude of all impacts is viewed from the perspective of those affected by considering the likely perceived importance as understood through stakeholder engagement;
- The nature of the impact receptor (physical, biological, or human). Where the receptor is physical (e.g. the air shed) its quality, sensitivity to change and importance are considered. For a human receptor, the sensitivity of the household, community or wider

societal group is considered along with their ability to adapt to and manage the effects of the impact; and

- The likely that the identified impact will occur.

An impact of minor significance (a 'Minor impact') is one where an effect will be experienced, but the impact magnitude is sufficiently small (with or without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value.

An impact of moderate significance (a 'Moderate impact') is one within accepted limits and standards. Moderate impacts may cover a broad range, from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that 'Moderate' impacts have to be reduced to 'Minor' impacts, but that moderate impacts are being managed effectively and efficiently.

An impact of major significance (a 'Major impact') is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of ESIA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones such as employment, in coming to a decision on the Project.

1.8.2 Mitigation Measures

In developing mitigation measures, the first focus is on measures that will prevent or minimize impacts through the design and management of the Project rather than on reinstatement and compensation measures. A 'hierarchy' of mitigation measures for planned activities and unplanned events is outlined below:

a) Avoid at Source; Reduce at Source: avoiding or reducing at source through the design of the Project (e.g. avoiding by sitting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity);

b) Abate on Site: add something to the design to abate the impact (e.g. pollution control equipment);

c) **Abate at Receptor:** if an impact cannot be abated on-site then control measures can be implemented off-site (e.g. traffic measures);

d) **Repair or Remedy:** some impacts involve unavoidable damage to a resource (e.g. material storage areas) and these impacts require repair, restoration and reinstatement measures. Compensate in Kind; Compensate Through Other Means where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g. financial compensation for degrading agricultural land and impacting crop yields). It is emphasized that compensation to individuals with residual impacts to livelihood or quality of life will generally be non-financial and will have a focus on restoring livelihoods.

e) **Control:** this aims to prevent an incident happening or reduce the risk of it happening to as low as reasonably practicable (ALARP) through reducing the likelihood of the event (e.g. preventative maintenance regimes, traffic calming and speed limits, community road safety awareness training);

f) **Reducing the consequence** (e.g. Bunds to contain hazardous substance spills); and a combination of both of these;

g) **Recovery/Remediation:** this includes contingency plans and response, e.g. Emergency Response Plans and Procedures.

1.9 Method used for Gathering Opinions on the Proposed Project

Stakeholder consultations were carried out in order to: inform project stakeholders of the proposed project; to explain the likely impacts (positive/negative) of implementing the project; and to obtain views, concerns, comments and suggestions from interested and affected parties regarding the proposed project.

Four categories of stakeholders were identified. These included:

a) **Internal Project Stakeholders:** These were the project 'insiders' who worked closely with the Consultant to ensure successful execution of the ESIA. They provided the Consultant with the project brief, information on the project area and on other stakeholders.

b) **The Local Community:** These were the key stakeholders important in the mapping of impacts and their magnitude/significance. Information from these stakeholders was gathered through questionnaires administered to a sample of the neighboring population and through public barazas held in each of the four locations (Kwahola, Chaani,

Changamwe and Port Reitz) within Port Reitz and Changamwe Divisions in Changamwe Sub County, Mombasa County.

c) **Key Informants:** These were the key stakeholders who the Consultant selected on the basis of their knowledge of the goings-on in project host community, as well as their knowledge of the proposed LPG works. They included both Central Government officials, Mombasa County Government, KPA, KAA, KCAA, Kenya Forest, NEMA County Director, Oil industry players and other relevant stakeholders).

1.10 Socio-economic Survey

The Consultant undertook socio-economic survey in order to establish the current social and economic status of the project area community. This was to assist the Consultant in identifying how the project is likely to change the socio-economic dynamics of the project area so as to proposed cost effective mitigation measures.

The survey mainly used quantitative methods and included qualitative information and analysis wherever possible. The objective of the study was to check on the level of income, education level, proximity to water accessibility, type of energy used within the community of the project area.

1.11 Biodiversity Baseline Survey

Rapid biodiversity baseline survey was undertaken within the project area to document wildlife species diversity within and around the area, identify any IUCN-listed species, identify any species of special concern, identify critical habitats if any and identify species to be monitored during construction and operation. Five major biodiversity thematic areas including plants, birds, mammals, herpetofauna and invertebrates were covered.

1.11.1 Vegetation study methodology

A plot-less method as developed by Hall and Swaine (1981) was used to establish plant species diversity and the vegetation types. This involved documenting the plant species through random walks within the various habitats. All vascular plant species were recorded and specimens collected using standard methods (Foreman & Bridson, 1992). Most species were identified on site and the difficult ones collected for confirmation at the East African Herbarium.

Identification of indigenous vascular plants followed Beentje (1994), Agnew (2013), Ngumbau *et al.* (2020) and various publications of the Flora of Tropical East Africa. The vegetation of each

study site was documented separately to compare the species distribution within the whole study area.

The assessment of potential impacts of vegetation by the proposed project was guided by the International Finance Corporation's (IFC) Performance Standards on Environmental and Social Sustainability (IFC, 2012). Particular emphasis was laid upon the Performance Standard 6 concerned with Biodiversity Conservation and Sustainable Management of Living Natural Resources.

1.11.2 Bird Census Techniques Used

a) Point Counts

Fixed width point counts (based on distance sampling, Thomas *et al* 2009) were used due to their ease of replication hence ideal for monitoring purposes and for making comparisons between transects as well as correlating bird abundances and richness with habitat variables around each point (Thomas *et al* 2009).

b) Road Counts

Road counts are ideal for birds of prey (Bibby *et al.* 2000). This method involved noting down any birds of prey as well as other species seen and their numbers it helped add to the numbers of birds seen using the systematic point counts described above.

c) Opportunistic Observations

The systematic bird survey protocols were supplemented by opportunistic observations between points. During the breaks, or when moving from one sampling site to the other, any birds seen or heard that had not been recorded before was recorded to build up the species checklist.

d) Expertise and Equipment

During the bird surveys pairs of binoculars ('Bushnell' 8 X 32), field guide books (Stevenson and Fanshawe (2002) and Zimmerman et al. (1996) were used and previous experience on the birds' calls aided identification.

1.11.3 Methods of mammal's survey

Transects were identified in various places around the project area, visited and surveyed. Searches of individuals of mammals as well as their signs (predominantly tracks, but also faeces, carcasses or body parts, digging of burrows was done in each transect for given duration of time. Searches were made with naked eyes and also with the help of binoculars 10 × 50 binoculars (Kiszka *et al.* 2007). Local people encountered at the transect sites or guides, were asked about the presence or absence of large and medium sized mammals. They were shown photos of

mammals in Kingdon's (2015) African mammal guide and asked to confirm or deny the presence of these species in their area. Setting of snaps traps was done in the site and one rodent species was captured identified and recorded.

1.11.4 Methodology used for herpetology survey

Time limited Searches (TSL) was conducted in the transect which was about 700m long within the project area where the searches were conducted for 30 min and observation recorded until the end of the transect. Sampling was supplemented with the opportunistic searches which also was done on suitable habitat such as under the rocks, shrubs, holes and fallen leaves and logs (Howell 2002, Kerns 1986) conducted by the observer.

Interview from the different people who have been working within the area regarding information about the reptiles and amphibians found in the block for example the savanna monitor lizard, python, puff adder, cobra have been sighted on different dates and occasions in the two blocks mostly at night during their normal working routine and were not sighted and were not sighted during this time of rapid survey.

1.11.5 Invertebrates survey methodology

Different methods were in-cooperated in the survey which ensured proper representation of species occurring in the within the site. They included:

a) Pitfall trapping

Pitfall traps were mainly used to collect crawling invertebrates. The technique entailed selecting points running through a transect that best represents the selected habitat and then making successive holes within the sampling point into which the pitfall traps (cups of approximate 250 ml) were laid with the top flush with the ground level. A killing agent and preservative (ethanol) was added in the traps to avoid decay of caught specimens. In each transect, a total of 15 traps were laid and left for 24 hours to trap whereby they were harvested on expiry of this duration. Collected samples were transferred into jars containing 70% for temporally preservation and storage waiting further processing.

b) Pan traps

Pan traps are mainly used to collect pollinators such bees, some species of beetles, flies and also other invertebrates. The traps are usually small bowls painted with different colors to mimic flowers. Three trap colours were used, yellow, blue and white. A total of 30 traps were spread randomly within the transect and filled half way with water mixed with odorless detergent to break the water surface tension. The traps were inspected in evening to harvest trapped insects and stored in well labeled vials containing 70% ethanol.

c) Time Limited searches/Sweep net

Time limited searches involved walking along a transect within a time limit, collecting invertebrates under tree logs, rocks, on vegetation and in flight. It also entailed use of a sweep net to collect flying insects like butterflies, flies, dragonflies and bees. Within each sampling point in the transect, 30 minutes were used to record and collect invertebrates. Collected specimens were killed and preserved for further processing.

2.0 Project Description

2.1 Objective of the Project

Government of Kenya has earmarked LPG as the major energy source to be utilized in household both in the urban and rural areas. As such, due to the imminent increase in demand, KPC has embarked on this capacity expansion project as part of its mandate to meet the minimum market requirements. The objectives therefore shall be as follows:

- To increase the supply capacity of LPG to industrial, commercial and residential customers throughout Kenya and East Africa;
- To promote reliance on LPG as opposed to wood fuel and charcoal and thereby enhance the biodiversity and environmental conservation;
- To stabilize the current fluctuating LPG prices by securing the supply;
- To reduce the deficit and meet the increasing demand of LPG;
- To promote LPG as cheaper option due to economies of scale; and
- To promote LPG as environment friendly fuel source LPG to residential, industrial and commercial customers throughout Kenya.

2.2 Location of the Proposed Project

The site for the location of the facility is on Plot No. L.R. 12223 owned by KPRL, a subsidiary of KPC at Changamwe, Mombasa County, Kenya. This is on **Coordinate Latitude -4.012983˚ and Longitude 39.615719˚**. Offloading of the product from the ship will be at KOT-2 Jetty. An import delivery line has been constructed from the new Jetty to the Common User Manifold (CUM) next to KPC storage Depot at Kipevu (KOSF), Mombasa County.

The project area is within the Refinery which is delineated by the following landmarks with respect to the true north:

- Towards the north-west lies the KPC's Pump Station 1 and Pump Station 15;
- Towards the east and north-east lies the KRC's main Mombasa – Nairobi railway line;
- Towards the south-east lies the southern fence of the Refinery and is delineated by the Refinery Road; and
- Towards the south-west lies the western fence of the Refinery and is delineated by the Magongo Road beyond which are residential areas of Port Reitz.

Figure 1 below is a map showing the location of the project site.

Figure 1: Proposed project site

2.3 LPG pipeline

The pipeline shall be designed in accordance with ASME 31.4 for liquid hydrocarbon for the Location Class 4. The pipeline shall withstand all installation, testing and operating condition/ loads. All necessary calculations shall be carried out to verify structural integrity and stability of the pipeline for the combined effect of pressure, temperature, bending (elastic), soil/pipe interaction, external loads and other environmental parameters as applicable during all phases of work from installation to operation. Allowable stress limit shall be as per ASME B 31.4 / ASME B31.3. Such calculations shall include, but not limited to the following:

- Stress analysis at the crossing of major rivers and highway etc.
- Pipeline expansion and its effect on station piping (above ground/below ground).

It shall also be checked for adequacy against anticipated earthquake loading and any special measures such as an increase in wall thickness/ grade/ select backfill etc. as required to ensure safety and integrity of the pipeline system shall be implemented. Select backfill shall also be provided as applicable for areas prone to seismic activity.

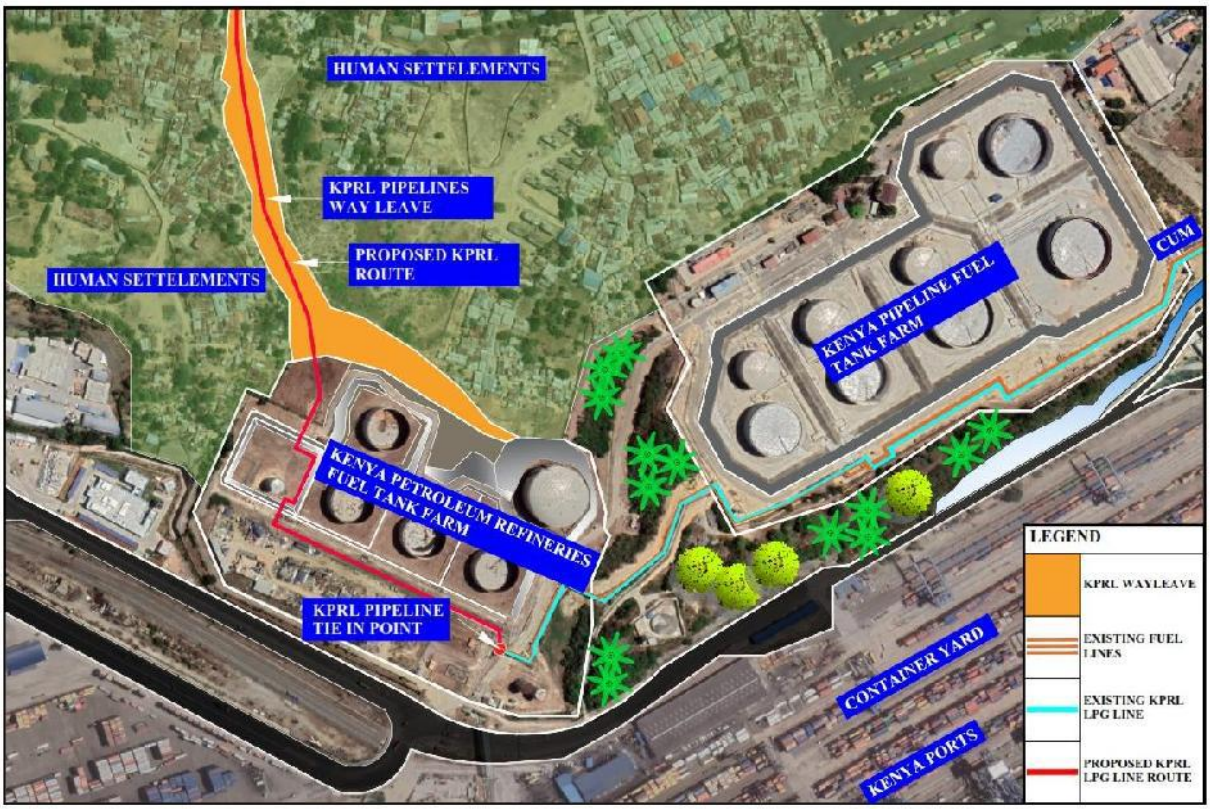


Figure 2: Pipeline route Zone A

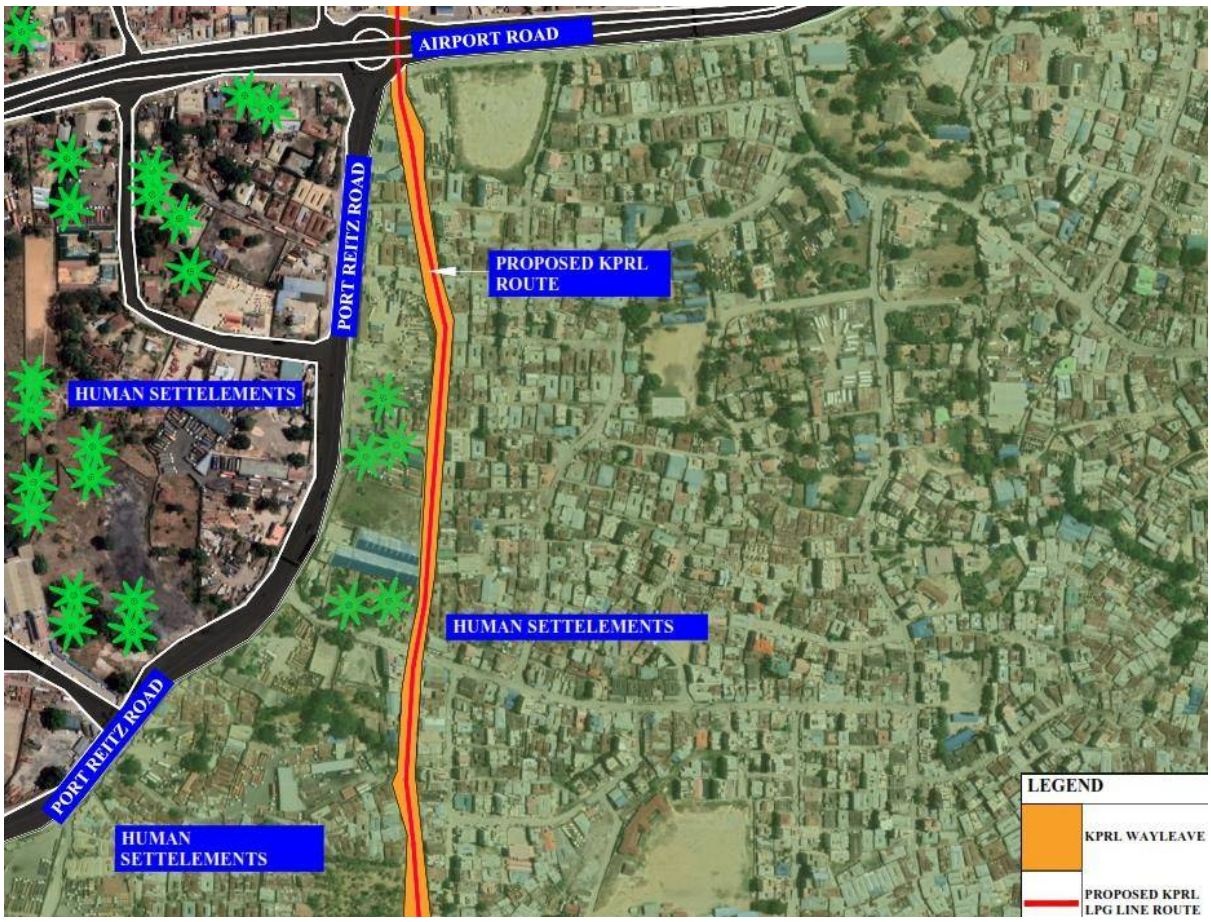


Figure 3: Pipeline route Zone B

Figure 4: Pipeline route Zone C

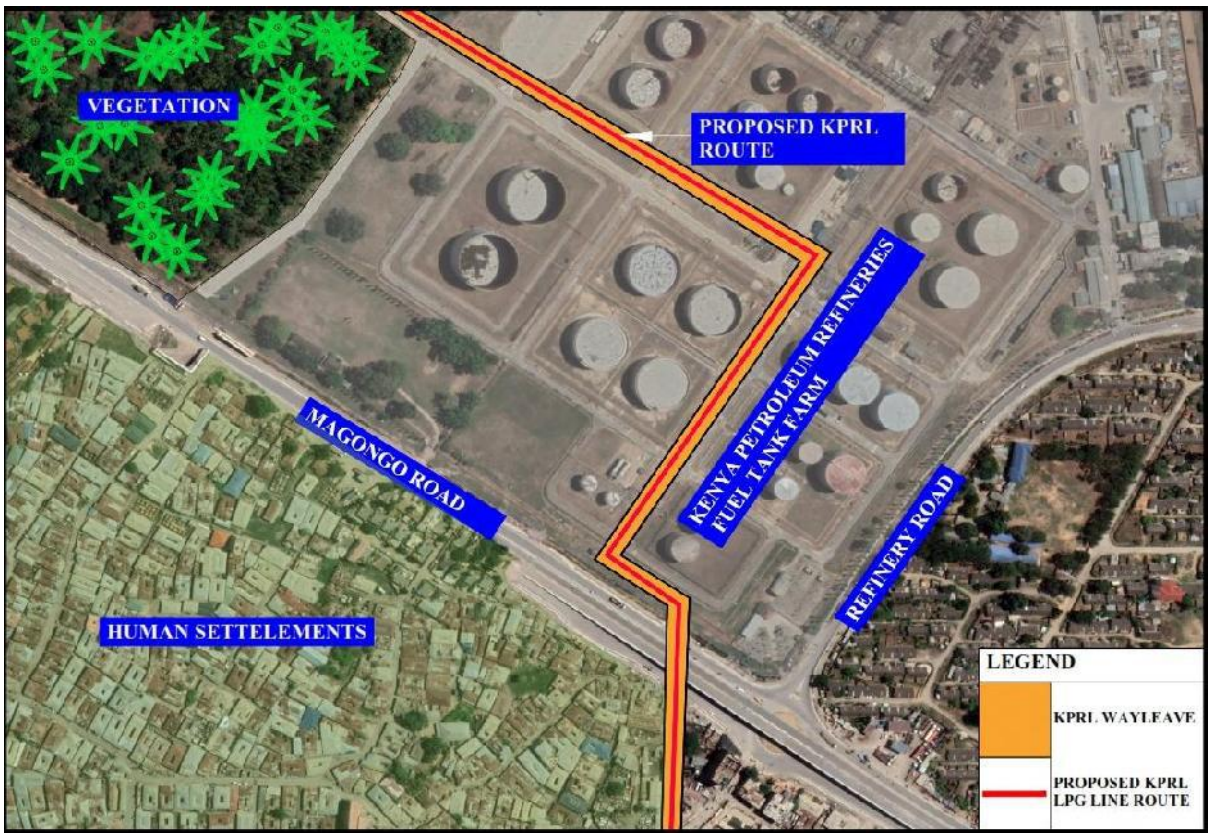


Figure 5: Pipeline route Zone D

2.3.1 Pipeline burial

The pipeline shall be buried normally at a depth of a minimum of 1.5 meter below natural ground level except river/ rail/ road/ canal/waterways crossing. Additional soil cover other than specified above shall be provided at locations indicated by statutory/ local authorities or in areas likely to have an increased risk of impact damage or third party interference as per agreements between KPC and other authorities. Select back fill shall also be provided as applicable for areas prone to seismic activity.

2.3.2 Welding

The main pipeline welding shall be carried out in accordance with API 1104, the specification for welding and welding charts. All mainline welds shall be 100 % radiographed.

2.3.3 Insulating joints

Insulating joints shall be provided to electrically isolate the buried pipeline from above ground pipeline. Insulating joints shall be monolithic type and shall allow smooth passage of pigs. They shall be installed in the above-ground portion of the pipeline, immediately after the buried/aboveground transition at the scraper stations.

2.3.4 Crossings

The pipeline at road crossing should comply with the requirement of API RP 1102. Pipeline at Metalled /District Roads, State/National Highways, Railways, Lined Canal shall be provided with Casing pipe. Un-metalled road, Nallah, unlined canal, channels & other water bodies shall be uncased (open-cut) crossings. Size of casing pipe shall be minimum two sizes greater than carrier pipe. The casing pipe shall be installed by trenchless method like ramming/ boring/ jacking/HDD. Before insertion Hydro testing shall be done for carrier pipe for minimum 2 hours prior to joint coating of welded joints.

Casing pipe shall be coated using epoxy, 500 microns thick on the external surface and 200 microns thick on the internal surface of the casing pipe. The carrier pipe shall be electrically insulated from the casing by making use of insulating spacers of the proper size and in sufficient numbers. Spacing between two spacers shall not be more than 1.0 meter. Casing pipe shall be protected by a set of sacrificial anodes.

2.3.5 Hydrostatic testing

After installation, the entire pipeline system shall be hydro tested with inhibited water. The minimum hydrostatic pressure shall be 1.25 times design pressure as per B 31.4 for liquid hydrocarbon pipeline. The maximum hydrostatic test pressure at any location of the pipeline shall not exceed the pressure required to produce hoop stress equal to 95% of SMYS of the pipe material based on minimum wall thickness in the test section. The test duration shall be a minimum of 24 hours.

2.3.6 Health, safety, and environment

Contractor shall strictly comply with all the statutory requirements related to Health, Safety & Environment for design and installation of the complete pipeline system.

2.4 Mounded storage tanks

KPC has selected mounded storage for their proposed LPG terminal. Mounded bullets provide intrinsically passive, safe environment. LPG handling possess many challenges, due to its inherent properties, modern state of art safety features shall be taken into consideration while designing the facilities using Kenya standard codes as well as international standard as refereed in related section.

This scope of the project will involve the construction of eighteen (18) mounded LPG bullets. Mounded LPG Bullets are large, buried, horizontal cylindrical steel bullets with dished ends

having a diameter of 8.0 meters and a length of 64 meters and capacity of 3,200m^3 or 1,650MT. Proposed Project has an added advantage that the load is distributed over a larger area thus the problem of uneven settlement/collapse is largely reduced as the bullets shall be placed on subgrade ground and completely covered with sand which will be compacted up to 98%. The Mound will be been designed as per EEMUA 2000 (Publication No.190).

The project will apply civil, structural, mechanical, process, electrical and Instrumentation principles in the design and the construction. The full scope of installation of the LPG Mounds will involve the following;

- Civil works including stabilization, R.C. foundations, R.C retaining wall, Inspection tunnel, and sand compaction.
- Construction of eighteen (18) 1650MT mounded tanks which will involve rolling and welding.
- LPG equipment and piping network complete with compressor units, pumps, blending and refrigeration units, piping, valves, and other mechanical accessories
- Compressed air network and/or hydraulic network.
- Firewater network with pump, piping, valves, and equipment.
- Electrical network complete with L.V. switchboard, MCC, cables, and accessories.

The layout of the proposed mounded bullets are shown in the figure overleaf.

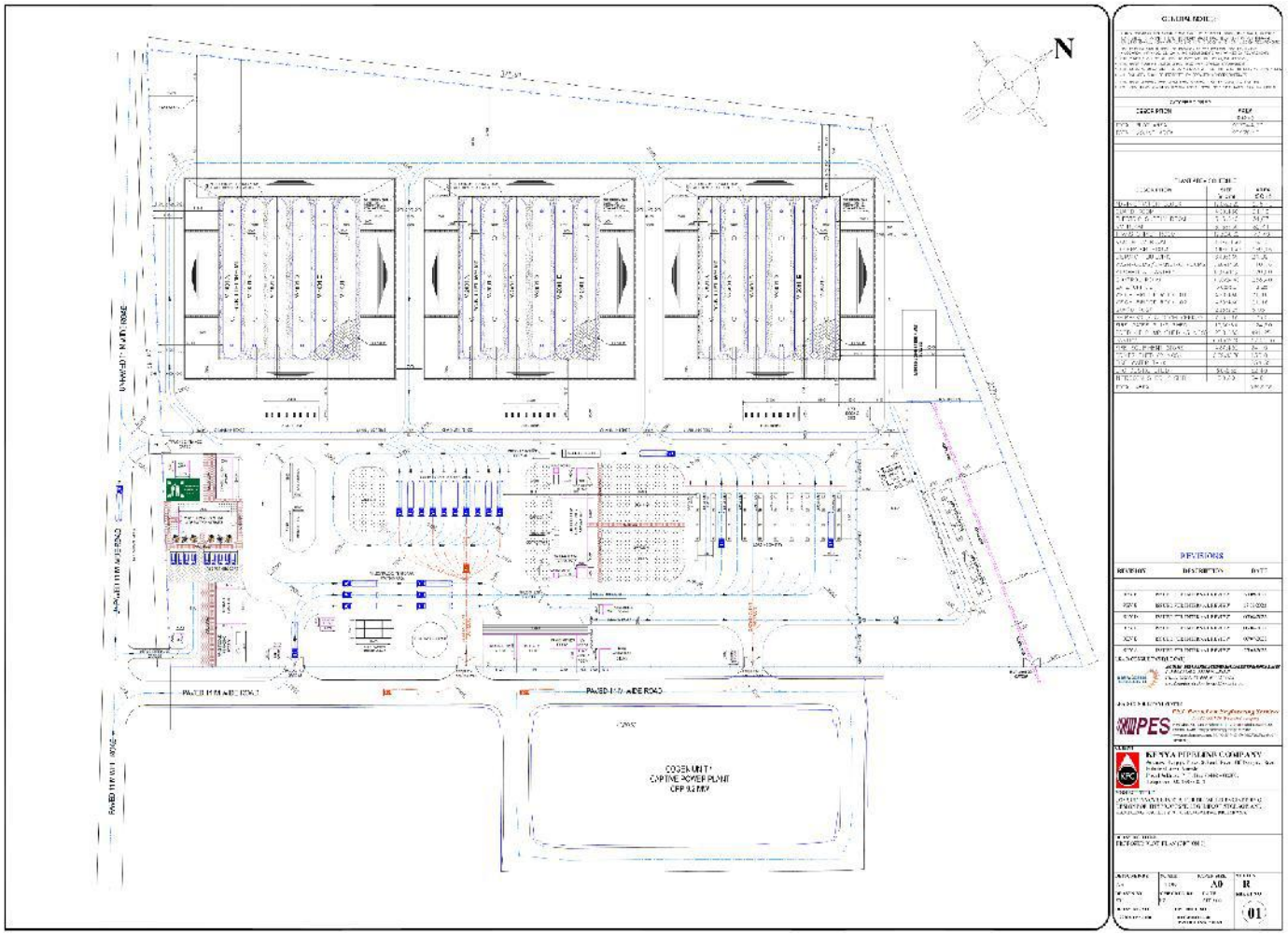


Figure 6: Mounded bullets layout

2.5 Governing Installation Standards

All engineering works shall be performed in accordance with the applicable engineering codes adopting sound engineering practices and it shall meet the requirement of local laws, rules and regulations as may be applicable. A list of latest codes and standards or their replacement to be used wherever applicable are given below:

LP-Gas Installation and design shall be in accordance with the following codes:

EEMUA Publication 190-2000	Guide on design, construction and use of mounded LPG
NFPA 58, API 2510	LPG facilities
NFPA 30, API 2610 (Int'l)	Depot general layout

Firefighting installations shall be in accordance with the following codes:

NFPA 20	Fire water systems
API 2030 and NFPA 15	General fire protection spray systems
API 2510 and 2510A	LPG fire protection

LPG Vessel design and fabrication shall be in accordance with the following codes:

ASME VIII Division 1 & EN 13445	LPG vessels
PD 5500	

Pumps and Compressors shall be in accordance with the following codes:

ANSI/API Standard 610	Centrifugal pumps for Petroleum, Petrochemical and LNG
API Standard 676	Positive Displacement Pumps

Pipe fittings, flanges etcetera shall be in accordance with the following codes:

ASME B16.5	Pipe flanges
ASME B16.9	Factory made wrought steel butt welding fittings
ASME B16.11	Forged steel fittings, socket welding and threaded
ASME B16.20	Ring joint, metallic gaskets for Pipe Flanges spiral wound
ASME B16.21	Non-metallic Flat gaskets for Pipe Flanges

ASME B16.34	Valves, Flanged, Threaded and Welding end
ASME B31.3	Process piping
ASME B31.4	Liquid transportation systems for hydrocarbons, LPG
ASME B36.10	Welded and seamless Wrought steel pipe
ASME B46.1	Surface texture (surface roughness, Waviness and lay).

LPG Pressurized Pipelines shall be in accordance with the following codes:

ISO 3183	Petroleum and Natural Gas Industries - Steel Pipe for Pipeline Transportation Systems (ISO)
AS 2885 - 1/2	Australian Standards for Gas and Petroleum Liquids Pipelines Construction and Welding (Australian Standards)
API 1104	Welding of Pipelines and Related Facilities
API 1102	Steel Pipelines Crossing Railroads and Highways
API 5L	Specification for line pipe

Valves and similar items shall be in accordance with the following codes:

API 6D	Specifications for Pipeline Valves (Gate, Plug, Ball & check)
API 600	Steel gate valves Flanged and butt-welding ends
BS 535	Steel Ball Valves for the Petroleum, Petrochemical
BS 5352	Steel wedge Gate, Globe and Check valves 50mm smaller
BS 1133 Section 6	Temporary Protection of Metal Surfaces against Corrosion
BS6755	Testing Valves

Pressure Vessel Plates shall be in accordance with the following codes:

ASTM A285	Standard specification for pressure Vessels plates, Carbon, steel, low and intermediate Tensile strength service
ASTM A516	Grades 60 or 70- Carbon steel plates for pressure vessels

Electrical and Instrumentation shall be in accordance with the following codes:

IEC 60079, and API 505	Electrical power supply in hazardous areas
NFPA 70-E	Electrical power supply in LPG Facilities
ISA	Instrument Society of America
ISAS5.1	Instrument Symbol and Identification
ISAS5.2	Binary Logic Diagram for Process Operation
ISA S5.4	Instrument Loop Diagrams
ISA S51.1	Process Instrumentation Terminology

Civil and Structural Works shall be in accordance with the following codes:

ACI318	Building Code Requirements for Reinforced Concrete
ASTMC31	Standard Method of Making & Curing Concrete Test Specimens In the Field
C33	Standard Specification for Concrete Aggregates
C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
C150	Standard Specification for Portland Cement
C172	Standard Method of Sampling Fresh Concrete
C494	Standard Specification for Chemical Admixtures for Concrete
ASTM AA82	Standard Specification for Cold Drawn Steel Wire for Concrete Reinforcement
AISC	Specification for the Design, Fabrication & Erection of Structural Steel for Buildings
AISC	Code of Standard Practice for Steel Buildings & Bridges

Painting and Coating Works shall be in accordance with the following codes:

PAINTING COUNCIL (SSPC) Vol.2:	Systems & Specifications SSPC-SP10 Near White Blast Cleaning
SIS 055900	Pictorial Surface Preparation S.A.2.5
STEEL STRUCTURES Vol. 1:	Good Painting Practice

2.6 LPG Design Case and Pressure Vessel Characteristics

2.6.1 Characteristic Commercial Propane

Vapour pressure at 37.8°C	Max. 14.8
Volatile residue	95%
Evaporated Temperature	0°C, max. at 760 mm Hg. -38.3
Residue on evaporation of 100 ml	Max. 0.05
Oil stain observation	Pass
Corrosion, copper strip	Max. No. 1
Volatile sulphur mg/m3	at 15.6°C and 101 kPa max.
Before stanching	343
Moisture content	Pass
Odour stanching mercaptan sulphur content as ethyl mercaptan	Mg/m3 max. 0.05
Hydrogen sulphide (H2S) mg/m3	Max. 5

2.6.2 Vessel Design Parameters / Material Specifications:

Storage Capacity of LPG	1650 MT. each
Volumetric Capacity	3462 cum
LPG Max. Storage Capacity	3235 cum, 97% filling level of vessel
Density of LPG	0.510 Kg /cum
Design Code	BSI PD5500, ASME Section VIII Div. 1 &EEMUA

Design Pressure (Internal)	17.24 bar
Design Pressure (External)	1.17 bar
Design Temperature	-27° C to + 55° C
Hydraulic Test Pressure	as per code
Radiography	100% before and after PWHT
Corrosion Allowance	2 mm
Post weld Heat Treatment	Required
Wet Fluorescent Magnetic	Required after PWHT
Mapping of plate thickness	Required
Joint efficiency	1
Length of Vessel	64000 mm (T/T)
Internal Dia of Vessel	8000 mm
Dished Ends	Hemispherical

2.6.3 Material Specification

Shell, Dished Ends, Stiffener	SA 517 Gr. A or P355NL1 Rings, Pad plates, Cleats etc.
Nozzles Neck	SA 333Gr. 6
Flanges	SA 350 Gr. LF2 Weld neck raised face dimensions as per ANSI 16.5
Couplings	SA 350 Gr. LF2 6000 lbs.
Bolts/Nuts	SA 320 Gr. L7 or SA 194 Gr. 4 / Gr. 7
Gaskets	SS 316 Spiral Wound Asbestos filled

2.7 Governing Load

The vessel length should not exceed 8 times the vessel diameter. In vessels with a length-to-diameter ratio exceeding this limit, the longitudinal stresses caused by bending and frictional forces will govern the shell plate thickness, which leads to a less economical design.

2.8 Stiffeners

Stiffeners, protruding nozzles and/or domes (including forged) shall be provided with mouse holes of 25 mm radius in the top of the vessel to release the air during hydro-test. Stiffeners shall be provided with drain holes of radius between 50 and 100 mm in the bottom part to allow the vessel to be drained and to allow sufficient flow towards either the bottom discharge or the submersible pump.

2.9 Welding

All welding shall be carried out using approved welding procedures and welders according to applicable codes requirements.

2.10 Heat Treatment

2.10.1 Preheat Treatment

During all welding, preheating to between 100 and 150 ºC shall be carried out for all steels with an ultimate tensile strength of 450 N/mm² or greater.

2.10.2 Post Weld Heat Treatment

The vessel shall be post weld heat treated in accordance with the requirements of ASME section VIII / BSI PD5500.

2.11 Emergency Shutoff Valves

On new installations and on existing installations, stationary container storage systems with an aggregate water capacity of more than 4000 gal (15.1m3) utilizing a liquid transfer line that is 1½ in. (39 mm) or larger and a pressure equalizing vapour line that is 1¼ in. (32mm) or larger shall be equipped with emergency shutoff valves.

2.12 Cathodic Protection System

The foundation and mound present a potentially corrosive environment. Therefore, a heavy-duty corrosion protection system shall be installed, consisting of a combination of coating and cathodic

protection. Because access to any external part of the mounded storage vessel is normally not possible, the corrosion protection system shall be so designed to provide full protection for the design life of the vessel.

The impressed current cathodic protection system should be provided. For each bullet two guard against corrosion, proper electrical isolation with isolation joint /flange to be provided suitably for all bullet flanges.

Coating system should be either an epoxy or a urethane system. A glass fibre reinforced bitumen coating shall not be used as it would deteriorate under atmospheric conditions.

2.13 Mound Foundation and Earthing

The area to be covered by the mound shall be cleared of all trees, stumps, roots, bushes and other objection able matters before starting the construction. The excavated natural soil surface shall be dressed and well compacted with a vibratory roller before commencement of the murram filling works. Prevent the excavated area and the sub-grade formation level being flooded by rain or surface water, if required dewatering to be provided.

2.14 Ground Improvement & Sand Bed

Murram / sand shall be used for the ground improvement work as follows:

i) Murram shall be laid in layers, each layer in loose state shall not be more than 200mm in thickness. Water as per OMC requirement shall be sprinkled on the layer and after allowing for soaking, compaction shall be done using a vibratory roller (10 MT static weight) of 20 MT – 30 MT weight in dynamic state. The layer shall be compacted to obtain a degree of minimum 95% with respect of the max. dry density. Each layer shall be tested for compaction at rate of 1 test per every 500 sq.m area. Each test shall consist of 6 samples.

ii) The bullet bed material shall be sand laid in layers, each layer in loose state shall not be more than 300 mm in thickness so as to give compacted thickness of 200-150 mm. Water to the tune of 3 to 5 lit/ sq.m shall be sprinkled on the sand layer and after allowing for soaking. Compaction shall be done using a vibratory roller (10 MT static weight) of 20 MT – 30 MT weight in dynamic state. The required sand filling shall be completed in layers as above to reach the desired level up to the bottom of the bullets.

iii) The sand bed shall be laid to the falls & to the levels and full depth as shown on the drawings and the bed for the bullets shall be excavated out of the fully compacted bed using a template formed to the exact shape and size of the bullets.

iv) If welding trenches are to be used they shall be backfilled with sand compacted in accordance with the above clauses. The trenches shall be adequately propped and braced to ensure that there is no loss of compaction of the adjacent sand bed.

2.15 Sand Surround/ Filling between Bullets

i) The sand surround to each bullet shall be material in compliance with the sand specification and laid around the bullet during the mounded filling operation to a 300 minimum thickness and shall be compacted to a 90% maximum dry density.

ii) The filling material between the bullet surround shall be sand in compliance with the sand specification laid in maximum 200 mm layers.

iii) Compaction shall be sufficient to avoid significant settlement of the sand filling/mound surface but shall be such as not to impose undue stresses on the bullets.

iv) The sand filling shall be placed equally, in maximum 300 mm layers (uncompacted depth), on each side of the bullets so as to avoid any lateral displacement/rotation of the bullets during compaction.

v) Sand filling shall be brought up to the levels and slopes as shown in the drawings to below the drainage layer.

2.16 Material Specification

The sand for the bullet bed, bullet surround and filling between bullets shall consist of material complying with the following specification: -

i) Good quality clean, non-aggressive sand with a maximum organic material content of 3% by weight.

ii) A max. silt content of 10% by weight (particles smaller than 0.063mm)

iii) A maximum particle size of 5 mm.

iv) A grain size distribution uniformity coefficient (D60/D10) of between 2 & 8.

The Tile / paver to the top of the mound shall consist of clean, well grated stone free from all organic material, sulphates, or any other detritus material, and with a particle size of 5mm to 50 mm. Depth varies from 80mm minimum to 100mm maximum.

The side slopes to the mound shall be protected by good quality stone pitching constructed out of stones of size 225 average and grouted together to form an impermeable finish, all as denoted on the drawings with 1:4 cement mortar for joints. Raised pointing is to be carried out with 1:2 cement mortar.

2.17 Fire Fighting System

Storage facilities for LPG shall be provided with a fire water system.

2.17.1 System Design

- A looped Fire water system shall be provided around the storage and handling portions of an LPG facility;
- Sufficient isolation valves shall be provided in the Fire water grid to prevent loss of the grid due to a single break in the water main. Block valves shall be arranged so that all parts of the plant can be protected by a portion of the Fire water main system when an impaired section is isolated for repair;
- Pipe used for Fire water mains and branch lines to hydrants shall be at least 6 NPS in size. Branch lines to deluge, monitor, or spray systems are permitted to be smaller, provided hydraulic calculations show that the size selected will supply the design demand at the required pressure;
- The Fire water system shall be functional in all seasons and shall be capable of delivering 100% of the design rate for at least 2 hours. The Fire water system shall be suitably protected from freezing where necessary;
- The Fire water system shall be designed to provide water for cooling to the protected equipment within 60 seconds of activation to achieve design water delivery rates within 10 minutes of system activation;
- The Fire water system shall be designed to facilitate testing to assure reliability, adequate flow rate, and adequate coverage of the protected equipment;
- The Fire water systems shall be tested to verify that their performance is as designed. Since the capacity of the water grid can deteriorate gradually as a result of scale build up in the water mains, a Hazen-Williams coefficient no greater than 100 shall be used for unlined steel pipe.

2.17.2 Fire Water Application Methods

LPG mounded vessels shall be protected by water fixed monitor, water spray systems, at loading gantry.

2.17.3 Fixed Monitors

Fire water monitors permanently connected to the fire water grid can be used to apply cooling water to the mounded vessel / LPG bowser. Where protection by means of monitors is selected, the system shall include the design features as described below:

- The entire surface of each vessel shall be reached with streams from the monitors.
- Each monitor shall be accessible during a fire or shall be remotely activated and controlled.
- Monitor nozzles shall be adjustable for fog or straight stream, as required, to provide the most effective coverage of the protected vessel.

2.17.4 Water Spray System at Loading Area

A water spray system uses many spray nozzles arranged in a grid pattern to distribute the water evenly over the LPG bowser. When a water spray system is selected for the protection of cooling purpose, it shall include the design features as described below:

- The system shall be designed so that the water is applied evenly over the entire surface of the vessel that may be exposed to fire. Allowance for rundown is permitted. The adequacy of the water coverage shall be determined by performance tests.
- The spray system shall be an open-head system, with all nozzles supplied from the top of the supply branch line and each branch line shall be from the top of the water distribution main line. Spray orifice size shall be at least 0.25 in larger orifice sizes will reduce the tendency of the nozzles to become clogged.
- The system shall be manually operated from a safe location that is outside the spill containment area and that is at least 50 ft from the vessel being protected. The location of the actuating valve shall be clearly and prominently marked.
- Flush-out connections shall be installed in the system to permit flushing at periodic intervals. Accessible low-point drain connections shall also be provided.
- The sizing of all piping shall be based on hydraulic calculations. Pipe used for main water distribution lines shall have a diameter of at least 3 in. Pipe used for branch lines to spray heads is permitted to not be less than NPS 3/4 in size.
- A full-flow strainer with a valved blow-off connection shall be installed in the main feeder line to the spray system. The maximum size of the opening in the strainer shall be 0.25 in. A full-size valved bypass shall be provided. Galvanized piping shall be considered downstream of the strainers to reduce the potential for rust scale plugging spray nozzles.

2.17.5 Fire Water Application Rates

The minimum required fire water application rate depends on the method of application. In determining fire water application rates, the surface area of the vessel that could be exposed to fire shall be the surface area of the vessel above the level of the liquid contents at the vessels lowest operating level.

Fixed deluge or water spray systems shall be designed to protect against pool fire exposure to the vessel with a minimum fire water application rate of 0.10 gallon per minute per square foot of exposed vessel surface. If there is concern or risk of a vessel being engulfed by flame or subject to substantial flame contact, supplemental cooling streams should be provided or the application rate should be increased to 0.25 gpm/ft^2.

To compensate for losses due to wind and vaporization that occur before the stream reaches the vessel wall, fire water monitor systems shall be designed to protect against pool fire exposure to

the vessel with a minimum water application rate of 0.20 gallon per minute per square foot of exposed vessel surface.

2.17.6 Fire Extinguishers

Portable fire extinguishers shall be used to extinguish an LPG fire only after the source of LPG has been shut off, to prevent the formation of a hazardous vapour cloud. Dry chemical fire extinguishers shall be provided at strategic locations such as those near pumps and loading racks so that they are readily available for operator use.

2.17.7 Fire-Fighting Foam

Fire-fighting foam shall not be used to extinguish LPG fires

2.18 Electrical and Instrumentation

2.18.1 Electrical Design Basis

The electrical system and facilities will incorporate the following:

- Power generation
- Distribution switchgear
- Motor Control Center
- Lighting (For Control Room and MCC Room)
- Instrumentation power supplies
- Power and control cabling
- Earthing
- Fire Alarm System (Control Room and MCC Room)

2.19 Electrical Loads

A list of electrical loads shall be prepared listing all items of equipment which will be connected to the Facility power system.

2.19.1 Process and Utilities Loads

Continuous loads are defined as those items that are required to run without interruption whenever It is running, while intermittent loads are switched on and off automatically or manually in response to process requirements. Items such as pumps on level control are in the intermittent category.

Standby loads are loads that are not normally running. For instance, in a system with two 100% duty pumps, of which only one is normally running continuously, then one pump should be listed as continuous and the other as standby. As per process requirements for pump duty (i.e. continuous/intermittent/stand-by) the following factors shall be considered:

- Continuous loads Demand Factor: 1.00
- Intermittent loads Demand Factor: 0.50
- Stand-by loads Demand Factor: 0.00

When assessing the main generator sizes, the sum of the continuous loads shall be added to the sum of the intermittent loads each of which shall be multiplied by a demand factor of 0.5 to take account of the anticipated duty cycle of these loads. A contingency equal to 20% of the load shall be added to the above total to compensate for the inaccuracies in load estimations and to allow for a degree of load growth during detailed engineering. Existing generators shall be considered working at 70% efficiency of its name plate rating.

2.20 Power System Design

The system shall be configured such that failure of any one major component will not necessitate a long-term reduction in Whole Facility throughout. That is, items such as generators and main feeder cables shall have sufficient installed spare capacity and switchboard busbars shall be sectioned such that the overall system capacity can be maintained in the event of a single component failure.

2.21 System Voltages

The standard frequency of 50 Hz has been adopted for the electrical power system. On this basis the system voltage levels shall be as follows:

AC SUPPLIES

- Generations / Distribution 400VAC 3 Ph.
- UPS 220VAC 1 Ph.
- Motors 400VAC 3 Ph.
- Motor starter control 220VAC 2 Wire
- Lighting and small power 400 / 230VAC 3 Ph.
- Area Lighting (Flood Lights) 220VAC 1 Ph.
- Instrumentation, F&G, ESD 220VAC 1 Ph.

- MCC/Control Room 230V 1 Ph.

2.22 Emergency and Essential Services Power Systems

Emergency power supply system comprising of diesel emergency generators shall be considered in LPG Storage import and handling terminal at KPC terminal for Kenya power system. However, UPS shall be utilized for any critical/emergency power requirement for instrumentation loads. For emergency lighting in MCC and Control Room, light fixtures with 30min battery back-up shall be considered in the design.

2.23 Supply Arrangement

2.23.1 General

As fault levels and current levels will be within acceptable limits, the main switchboard will not be provided with bus tie circuit breakers. An interconnect will be provided between the main switchboard and the emergency / essential switchboard. On detection of fire or gas in any area all socket outlets in hazardous areas shall be isolated.

2.23.2 Emergency / Essential Switchboard

The operating arrangement is for the interconnect circuit breaker to be closed under normal operating conditions. Following loss of main generation, as detected by voltage transformers connected on the emergency / essential switchboard, the interconnect circuit breaker will be tripped. The emergency generator shall automatically start and close onto the dead bus bars after attaining required speed and voltage.

Restoration of supplies back to the main power generators shall be manually initiated at the emergency / essential generator control panel by synchronizing across the main switchboard.

The sequence of operation shall be:

- Start-up main generators to re-establish power
- Operator selects the synchronizing selector to main switchboard.
- Operator selects synchronizing mode to normal.
- Station control panel automatically synchronizes the emergency / essential generator the main power generator and closes interconnect circuit breaker.
- Operator offloads the emergency generator by operating the offload push button switches.
- Operator manually opens emergency / essential circuit breaker and closes down diesel generator.

Following loss of one of the main generators, emergency generator shall not be automatically started. If problem persists and a long period is required for putting tripped gas generator back into operation, emergency generator may be started manually.

2.24 Motor Control

A new MCC for LPG Storage Facility at KPC Terminal, Changamwe, Kenya loads. All TRIP/ESD command shall be communicated to MCC via PLC. No field instrumentation trip (except LCS) shall be incorporated in motors starters. All motor starter circuits will have the following facilities:

2.25 Main Power Generation

2.25.1 Generation Capacity

The main generation system shall employ a Diesel engine powered generator sets of common design and rating generating at 400 volts and a frequency of 50Hz.

Sufficient generation capacity shall be provided to meet the production peak design load.

When assessing the rating and performance requirements consideration shall be given to the transient voltage and frequency conditions which will occur when starting the largest rated motor or group of motors.

2.25.2 Generator Unit Rating

The Diesel engine prime mover output rating shall be based on the maximum site ambient air temperature of 35°C and shall take account of all inlet losses and exhaust ductwork losses, transmission losses and performance variations using Diesel fuel.

Units shall be designed for “continuous service” and shall be suitable for extended periods of idleness in a standby, stopped mode. Continuous service describes equipment designed and constructed to operate for at least 8000 hours uninterrupted site rated duty.

2.25.3 Equipment Specification

Generator unit shall form a self-contained package having unitized auxiliaries, inlet and exhaust ducting etc. Each unit must be capable of operating independently of and in conjunction with the others and with the emergency generator.

2.25.4 Generator

The electrical generators shall be suitable for multi-machine parallel operation, each generator neutral point being connected solidly to earth. The generator rating will be based on a cooling

medium supply temperature of 35°C. The automatic voltage regulator (AVR) shall be provided with automatic and manual control facilities.

2.26 Hazardous Areas

2.26.1 Area Classification

The hazardous area classification will be ascertained in accordance with the requirements of IEC 60079. A safety distance shall be maintained as per practices.

2.27 Earthing and Bonding

2.27.1 General

The objective of the earthing and bonding applied throughout the complex is to eliminate danger to personnel and to minimize disturbance and damage to Facility arising from:

- faults between live conductors and equipment steelwork
- static electricity

Single core stranded copper 95mmsq conductors with a green and yellow sheath shall be used for making all earthing and bonding connections. Where a copper bar is installed it shall be made clearly recognizable by means of identification markers coloured green and yellow. For mechanical strength the minimum size for external connections shall be 16mmsq.

2.27.2 Earth Network

The earthing system shall consist basically of a main earthing ring with multiple earth electrode installations as required. The ring shall be installed around Generator shed, MCC room, control room, process area, structures and other electrical equipment. From the earth ring connections will be established to earth rods. Each earth rod shall have a disconnection and inspection.

The earth ring shall be laid directly in the ground. All joints to the main earth ring shall utilize thermo weld connections. All joints underground shall be suitably protected against direct contact with the soil.

2.28 LV Switchgear & MCC

This section gives the minimum technical requirements for the design and application of LV switchgear, motor control centres and distribution boards constructed as factory-built assemblies.

Maximum use shall be made of standard equipment which has been designed and tested to perform to national standards.

Switchgear and motor control centre sections may from a composite switchboard. Motor control centre sections may be double fronted in order to minimize switchboard overall length. Switchboards shall have been fully type tested and certified for fault and uninterrupted duty ratings.

2.29 Protection

The following protections shall be provided:

- Starters: Overload, MCCB
- Feeders: MCCB/MCB
- Main Incomer: MCCB
- UPS Breaker: MCB

2.30 Degree of Protection

All the Electrical Equipment should have Degree of Protection of IP55 or above.

2.30.1 Lighting

The lighting design can be divided into the following categories:

- Indoor lighting
- Outdoor lighting

2.30.2 Receptacles / Power Sockets

- 220V, 50Hz, 13A Single power outlets for general purpose requirements will be provided in control room and MCC room for both local equipment supplies / work stations. No other voltage level shall be provided for local power supplies.
- Combine switch socket outlets of 220V, 50Hz, 20A single phase shall be used for AC 1.5Ton supplies in MCC/Control Room.

2.31 Cabling

The technical requirements for the different types of cable to be used are given below.

General Requirements

All cables shall strand copper conductors. Sub-circuit cabling within buildings shall run in conduit systems.

Types of Cable

2.31.1 General Use

For all cable applications for fixed installation on the Facility following cable type shall be used:

- XLPE insulation
- Flame retardant

2.31.2 Fire-Resistant Cables

Where required, mineral insulated cables may be used for fire-resistant applications.

2.31.3 Sheath

All cables shall be provided with an extruded overall sheath suitable for withstanding the ambient conditions and handling during construction. The sheath shall be coloured as follows:

- Power Black
- Control Black
- Fire-resistant Power Cable Orange
- Earthing Green/Yellow

2.31.4 Installation

Cables may be installed both above and below ground with the following exceptions:

- Cross-site cabling (e.g. sub-station to process unit) shall be installed below ground wherever possible.
- Cables crossing equipment access areas and roadways shall be installed belowground.

Maximum routing of cables shall be done above ground in ladder type cable trays.

2.32 Instrumentation Design Basis

The intent is to define the basic instrumentation and control system requirements for LPG Storage Facility which is to be followed by the detailed design works and shall be based on the applicable industry international codes and standards.

This design basis provides general guide line for design and technical requirements of instrumentation and control system for the facility.

2.32.1 Integrated Control and Safety System (ICSS)

The objective of the Integrated Control and Safety System (ICSS) is to enable the facility to be operated in an “unmanned mode”, meaning that the ICSS shall facilitate the operation remotely by System Operators, located in the facility Control Room.

The ICSS shall comprise of the Process Monitoring and Control System (PMCS), the Plant combine Emergency Shutdown System (ESD) and F&G Detection System (FGS).

The ICSS system shall provide all necessary control equipment at the facility to monitor and control normal and emergency operational situations.

2.32.2 Process Monitoring And Control System (PMCS)

The PMCS will be part of the ICSS. The PMCS shall be self-containing system, protecting itself and providing minimum facilities for alarm handling and storage of alarms and event logs for later valuation.

The PMCS will collect the main process values. The process values gathering will be performed via appropriate switches, transducers and transmitters.

The main function of the PMCS is to control the process in such a way that proper and safe operation of the process station over any time period is achieved.

In addition, the PMCS will be connected to the following components:

- Field Instrumentation.
- Facility Combine Shutdown (ESD) & Fire and Gas Detection System (FGS).
- Motor Control Center (MCC).
- Package Units Control System.
- Local Control Panels.
- Facility Utility Systems.

2.33 Vent Stack

The proposed system has 8 pumps operating at 50 m3/hr to truck loading and 2 pumps for MGR with a total of 10 loading bays capable of handling 50 m3/hr each, the relief of each pump and loading bays goes to a vent stack from a header. This relieved flow must be properly dispersed in the environment and capable of preventing any cloud formation as LPG is heavier than air which forms a combustible cloud. On the other hand, the vent stack must also be suitable to handle and disperse the LPG so that it is within the permissible limit of exposure as limited by the environment controlling agencies/ authorities.

On the basis of the dispersion modelling analysis attached in Annexure, the following results are concluded for the safe venting of the LPG:

Vent Stack Diameter	0.475 m
Vent Stack Height	15 m
Gas Exit Velocity	149.9 m/s
Safe location for vent stack	100 meters away from any frequent human mobility area

2.34 Construction Phase

2.34.1 Soil Excavation Activities

Soil excavation will take place to facilitate the construction of various components of the proposed Project and other components. A significant amount of soil will be excavated to provide a secure base for placing the 18 LPG Bullets which are 72m long and 8m in diameter. The contractor is going to carry out the soil excavation process with utmost care to ensure that the excavated soil is not improperly heaped or carried away by any surface flows to any nearby surface water courses like the streams on the eastern side causing siltation.

Environmental protection during the construction phase will address management of hazardous materials, dust, erosion and sedimentation control. The site will be maintained in accordance with relevant erosion and sedimentation control standards for construction sites.

2.34.2 Construction Materials

The exact quantities of materials required for the construction of the proposed project as enumerated in other sections of this chapter are not known at this stage of the project As much as possible, the proponent intends to use locally available materials for the construction of the various structures and equipment. Only where such materials shall not be available locally will they be brought in from outside the project area. The Contractor will be in charge for the transport of raw materials to site during construction process.

2.34.3 Commissioning

After the full construction of the additional storage facility, all commissioning procedures shall be followed upon which the facility shall be rendered operational. Commissioning work will include purging air from tank and pipelines with an aim of ensuring that the Facility has been constructed in accordance with the design and that it is ready for operation.

2.35 Operation Phase

The facility shall be receiving LPG via marine. The gas shall then be pumped offshore to the constructed mounded storage tanks using the proposed pipeline. Once in the facility the gas shall be added an odourant to enable it be detected in case of leakage as LPG is odourless.

At the facility the operations shall include loading LPG to the trucks and Rail wagons. The gas shall be loaded to the trucks and wagons by use of pumps of appropriate capacity and LPG vapour shall be handled by use of compressors. In case of any eventuality and a truck or a wagon need to be offloaded of the product, the compressor shall offload the gas back to the storage tanks.

2.36 Project Decommissioning Phase

The proponent owns the land where the Mounded LPG Vessels will be installed. However, should the lease lapse, the proponent shall be expected to decommission & demolish the facility and restore the host environment close to its original state prior to use of the site as a Fuel Storage and Distribution Terminal.

The decommissioning exercise shall involve the following:

- The Mounded LPG Bullets and other LPG holding facilities must be degassed before decommissioning and removal;
    - ✓ First, any remaining Liquid LPG must be removed from the system and storage tanks
    - ✓ After removal, any remaining LPG that cannot be removed must be flared.
    - ✓ Once the flare will no longer burn, the system must be purged of residual vapours.
    - ✓ Purging is typically done using Nitrogen or Air.
    - ✓ Once the tanks have been completely purged, the tanks are excavated (since they will be mounded.
    - ✓ The contractor should verify that all data plates are legible & intact, otherwise the tanks may have to be re-certified, before being resold or reused for pressurized service.
- After excavation, tanks, vaporizers, compressors and other equipment will be dismantled and prepared for transport;
- All piping will be cut and capped;
- Hazardous material like ethylene-glycol and mercury switches, if any, will be collected for appropriate disposal;
- Proper cranes will be used to lift the bullets from their piers onto trucks for transport;

- All concrete works will be demolished;
- Other structures within the plant will also be demolished;
- Careful removal of all the electrical fittings and associated cables will be done; and
- There will be proper handling of the demolished materials and have an authorized and guided transportation and disposal away from human settlement and water bodies in accordance with the County government and NEMA Regulations and guidelines.

The host environment shall thereafter be rehabilitated and restored to its former state through:

- Approved and appropriate landscaping methodology;
- Removal of any soils that may have been impacted by oils for offsite (away from the project area) remediation;
- Bringing in of clean soil to replace impacted soil that has been excavated and removed; and
- Planting of indigenous vegetation and nurturing them to ensure they grow to the status where they can grow to maturity unattended.

2.37 Cost of Proposed Project

The proponent has undertaken a preliminary estimate of the total project cost using experienced consultants. The project is estimated to cost the Proponent Kshs. 17,731,000,000 (Seventeen Billion Seven Hundred and Thirty One Million) to implement. The NEMA License fees is payable at 0.1% of the project cost with a minimum of 10,000.00 whichever is greater. Therefore, the total fee payable to NEMA is Kshs. **17,731,000** (Seventeen Million Seven Hundred and Thirty One Thousand).

3.0 Environmental and Baseline Setting

The baseline environmental condition of the proposed project is described in terms of the existing physical, biological, and social environment.

3.1 Physical Environment

3.1.1 Topography

Mombasa County is located on coastal lowland with extensive low-lying areas rising from an altitude of 8 m in the east to about 100 m in the west. The Island and Kisauni area are basically flat alluvial plains while the Changamwe region consists of Jurassic plains. Near the sea, the land is composed of Pleistocene coral reef which is commercially exploited as a source of limestone for the cement industry, and also as a source of building stone. The town of Mombasa is centered on Mombasa Island, but extends to the mainland. The island is separated from the mainland by two creeks, Port Reitz in the south and Tudor Creek in the north.

3.1.2 Soil and Geology

The seashore has extensive sandy beaches which make the town an attractive tourist destination. The soil types are broadly associated with the geological formations along the physiographic zones in the district. Along the coastal lowlands four soil types predominate.

1. On the raised reefs along the shore well-drained, shallow (< 10 cm) to moderately deep, loamy to sandy soils predominate.
2. On unconsolidated deposits in the quaternary sands zone (Kilindini sands) are well drained moderately deep to deep, sandy clay loam to sandy clay, underlying 20 to 40 cm loamy medium sand.
3. On the Kilindini sands are also found areas with very deep soils of varying drainage conditions and colour, variable consistency, texture and salinity.
4. Also found on the Kilindini sands are well-drained very deep, dark red to strong brown, firm, sandy clay loam to sandy clay, underlying 30 to 60 cm medium sand to loamy sand soils.

On the coastal uplands, composed of the raised areas in Changamwe and western parts of Kisauni, 2 soil types are dominant;

1. Soils developed on unconsolidated sandy deposits in the Magarini formation, composed of sandy to loamy soils. These are well drained, very deep, sandy clay loam to sandy clay, with a topsoil of fine sand to sandy loam.
2. Soils developed on shales composed of heavy textured soils constitute the relatively high agricultural potential area in the district. The soils are dominated by well drained to

imperfectly drained, shallow to moderately deep, firm to very firm clay, and imperfectly drained deep, very firm clay, with a humic topsoil and a sodic deeper subsoil.

The area is underlain by Shales of Jurassic age. The Shales are covered by unconsolidated sediments of Pleitocene age, the Magarini Formation. This superficial cover of Magarini Sediments includes alternating layers of silty sand, clayey silt and silty clay that that together vary in thickness from a few metres to up to a maximum of 15m.

The site area is composed of Arenosols which are excessively drained to well drained, very deep, reddish yellow to white, loose sand to loamy sand. These soils develop gullies quickly. The relatively steep slopes at the site area can accelerate development of gullies when there is surface runoff on bare soil.

The area is underlain by Shales of Jurassic age. The Shales are covered by unconsolidated sediments of Pleitocene age, the Magarini Formation. This superficial cover of Magarini Sediments includes alternating layers of silty sand, clayey silt and silty clay that that together vary in thickness from a few metres to up to a maximum of 15m.

3.1.3 Baseline Soil Sampling

Soil sampling at Kenya Petroleum Refineries Limited - Mombasa for quality testing was carried out on June 10 and 11, 2022 by CSI International Limited, a NEMA registered laboratory for soil testing.

The results indicated that all the parameters tested (heavy metals, TPH and PAH) were within the permissible confines of Dutch guidelines. The summation of the levels of TPH parameters lacked permissible limits from the Dutch guidelines, thus, was represented with initials np which translate to not provided. Considering the levels of parameters analyzed in the soil samples, it is concluded that the activities at Kenya Petroleum Refineries Ltd (KPRL), in Mombasa have not presented any negative effect on the soil at the sampled locations.

The soil is expected to be impacted by construction and demolition activities during decommissioning of the project; however, implementation of the proposed recommended measures will keep the levels within the acceptable limits. Details of the measurements are provided in in Annex 7 of this report.

3.1.4 Hydrology

Mombasa town, like many other towns in Kenya receives its water supply from distant areas. Its main source of water supply is the Mzima springs some 300 km away in the Chyulu hills (Taita Taveta County). These springs are believed to be part of the Kilimanjaro Mountain system but

generally this fall under the Athi River drainage basin, generally referred to as Sabaki in the coastal zone.

Apart from the Mzima springs, Mombasa town and the coastal region in general receives surface water supplies from Baricho, Marere and from the Tiwi boreholes in the south coast area. There is a small stream running starting approximately 400m to the north of the site and passes about 150m east of the site. It drains south-east wards and joins another stream and changing flow direction southwards into Port Reitz Creek. The stream runs for about 1.8km before joining the sea. Surface runoff from the site is likely to flow eastwards to join this stream and eventually end up in the sea.

Water will be needed for construction, for drinking and hygiene purposes. The sources of the water will be from Mombasa Water and Sanitation Company.

3.2 Biological Environment

3.2.1 Vegetation of the study site

The proposed project site consists of highly disturbed secondary vegetation of mixed indigenous and exotic species as a result of old cultivation of cashew nuts, mangoes, guavas and coconuts. Consequently, large patches of open grassland and pockets of isolated trees and bushes dominate the vegetation of the area. The adjacent alternative site has less grasslands and open spaces but more indigenous species compared to the former. The large patches of natural vegetation towards Kenya Pipeline Company are home to different species of fauna and flora,

including three species of mushrooms recorded (the wild edible *Pleurotus sp.* (oyster), *Ganoderma sp.* and *Oudemansiella sp.*).

Plate 1: Vegetation types within the project area

Overall, the alternative project site has more tree density with closed canopy and more indigenous species. Although both sites are dominated by the aforementioned cultivated crop trees, several indigenous ones are extant. Common native trees and shrub species *Trichilia emetica, Spathodea campanulata, Tamarindus indica, Ficus sycomorus, Lannea schweinfurthii, Lannea edulis, Bridelia cathartica, Rauvolfia mannii,* among others. Dominant grasses are mainly *Bothriochloa insculpta, Panicum species and Rottboellia cochinchinensis.*

3.2.2 Species diversity

The rapid vegetation assessment yielded a total of 130 species recorded within the two sampling blocks at the Kenya Petroleum Refineries Limited, Mombasa. These were represented in 44 families and 113 genera. Out of the total species recorded, 69% of them were found within 10 families represented by 4 or more species while the remaining 31% was in 34 families which had 1 to 3 species. The most species-rich families include Fabaceae (19) Poaceae (12), Malvaceaae (9), Euphorbiaceae (7), Asteraceae (7), and Amaranthaceae (5) represented by at least 4 or more species as shown in the figure below.

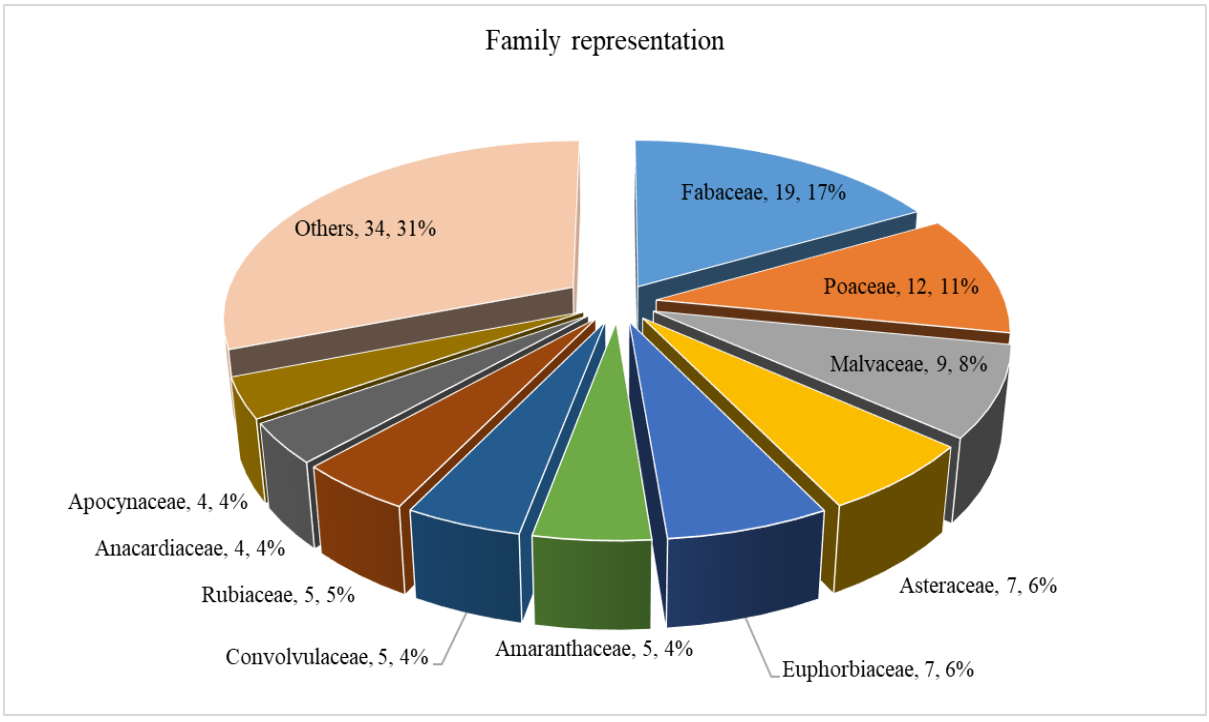


Figure 7: The most diverse families across the two sampling sites

In comparison, the alternative site had the most indigenous species and higher tree density with largely a closed canopy than the proposed project location which was dominated by large patches of grassland and clearings for sludge disposal. Although both sites were previously cultivated, the alternative site had more species (100) compared to the project site (93) which was largely composed of grasses and other herbaceous species.

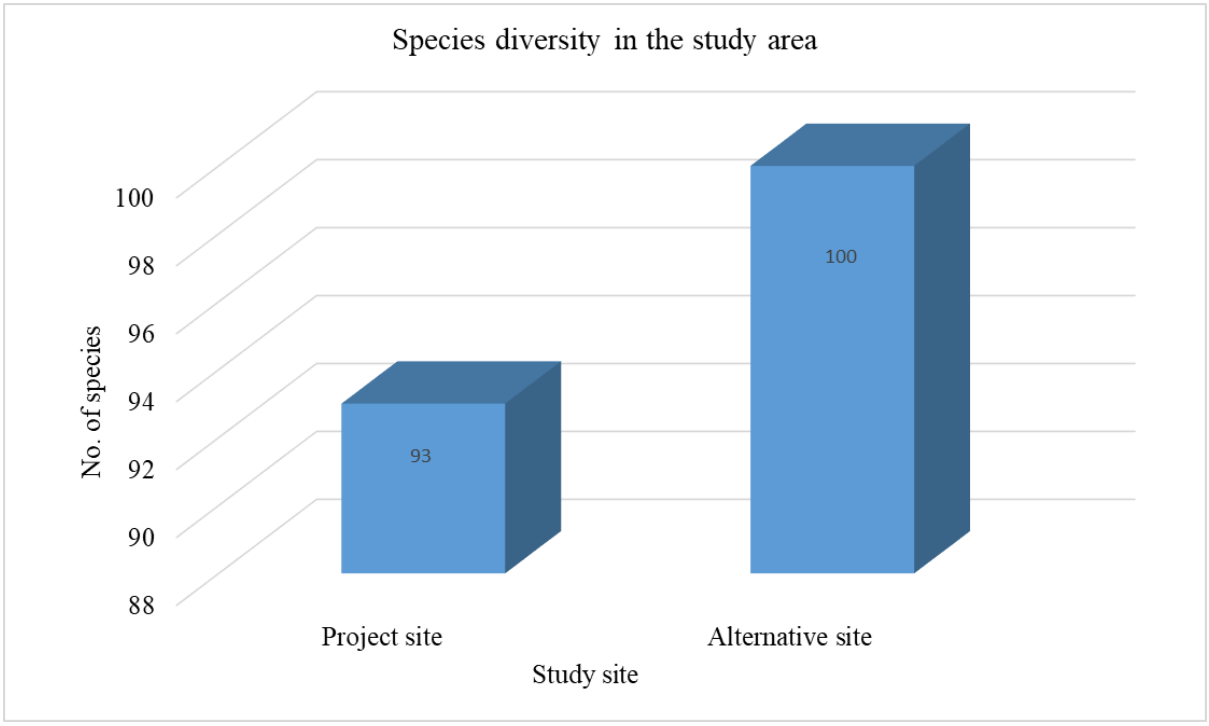


Figure 8: Species composition within the study area

3.2.3 Rare, Endemic or Endangered species

A total of 13 species were recorded as nationally endemic and only restricted to the coastal region of Kenya. However, most of these species are found in other African countries in similar habitats. Nevertheless, none of the species was found to be endangered according to the IUCN Plant Red List (2022) or protected against international trade (CITES, 2015).

Table 3: Coastal Kenya restricted species documented during the study

Family	Genus	Species	Project Site	Alternative Site	Growth Form
Araceae	*Gonatopus*	*boivinii*	1	1	H
Boraginaceae	*Bourreria*	*nemoralis*	0	1	S
Convolvulaceae	*Ipomoea*	*pes-tigridis*	1	0	C
Euphorbiaceae	*Croton*	*bonplandianus*	1	0	H
Fabaceae	*Albizia*	*versicolor*	1	1	T
Fabaceae	*Pseudovigna*	*argentea*	1	0	C
Malvaceae	*Thespesia*	*danis*	1	0	S
Ochnaceae	*Ochna*	*kirkii*	0	1	S
Phyllanthaceae	*Bridelia*	*cathartica*	1	1	S
Rubiaceae	*Agathisanthemum*	*bojeri*	1	1	H
Rubiaceae	*Keetia*	*zanzibarica*	1	1	S
Sapindaceae	*Deinbollia*	*borbonica*	1	1	S
Taccaceae	*Tacca*	*leontopetaloides*	1	1	H

(Growth Form: H = herb, S = shrub)

3.2.4 Invasive species

Eleven taxa were documented as invasive (BioNET-EAFRINET, 2011) and consist of woody and herbaceous species such as *Calotropis procera, Ricinus communis, Psidium guajava, Parthenium hysterophorus, Leucaena leucocephala,* among others (see table below). Notably, most of these species were low in population numbers and restricted along the roadsides and areas with recently disturbed ground.

Table 4: Recorded invasive species

Family	Genus	Species	Project Site	Alternative Site	Growth Form
Amaranthaceae	Achyranthes	aspera	0	1	H
Apocynaceae	*Calotropis*	*procera*	1	0	S
Apocynaceae	*Cascabella*	*thevetia*	0	1	S
Asteraceae	*Parthenium*	*hysterophorus*	0	1	H
Euphorbiaceae	*Ricinus*	*communis*	1	1	S
Fabaceae	*Leucaena*	*leucocephala*	0	1	S
Fabaceae	*Senna*	*occidentalis*	1	1	H
Myrtaceae	*Psidium*	*guajava*	1	1	S
Solanaceae	*Physalis*	*angulata*	1	0	H
Solanaceae	*Solanum*	*campylacanthum*	1	1	S
Verbenaceae	*Lantana*	*camara*	1	0	S

(Growth Form: H = herb, S = shrub)

3.2.5 Birds

During the baseline survey of birds, a total of 30 species belonging to 14 families were recorded. Certain species preferred palm trees and grassland habitats where they feed and breed. These include Collared Palm-Thrush (*Cichladusa arquata*), Zanzibar Red Bishop (*Euplectes nigroventris*) among others.

Table 5: Checklist of all bird species recorded around the project site

Family and Common Name	Scientific Name	Status
Threskiornithidae: ibises and spoonbills		
Hadada Ibis	*Bostrychia hagedash*	
Columbidae: pigeons and doves		
Red-eyed Dove	*Streptopelia semitorquata*	
Feral Pigeon	*Columba livia*	
Tambourine Dove	*Turtur tympanistria*	
Emerald-spotted Wood Dove	*Turtur chalcospilos*	
Pycnonotidae: bulbuls		
Common Bulbul	*Pycnonotus barbatus*	
Zanzibar Greenbul	*Andropadus importunus*	
Cuculidae: cuckoos and coucals		
Klaas's Cuckoo	*Chrysococcyx klaas*	
White-browed Coucal	*Centropus superciliosus*	
Yellowbill	*Ceuthmochares aereus*	am
Alcedinidae: kingfishers		
Mangrove Kingfisher	*Halcyon senegaloides*	
Ploceidae: weavers, bishops and widowbirds		
Zanzibar Red Bishop	*Euplectes nigroventris*	
Golden Palm Weaver	*Ploceus bojeri*	
Grosbeak Weaver	*Amblyospiza albifrons*	
Black-winged Red Bishoop	*Euplectes hordeaceus*	
Malaconotidae: helmetshrikes, bushshrikes, tchagras and puffbacks		
Black-backed Puffback	*Dryoscopus cubla*	
Tropical Boubou	*Laniarius aethopicus*	
Apodidae: swifts		

African Palm Swift	*Cypsiurus parvus*	
Ardeidae: herons, egrets and bitterns		
Cattle Egret	*Bubulcus ibis*	am
Black-headed Heron	*Ardea melanocephala*	
Coraciidae: rollers		
Lilac-breasted Roller	*Coracias caudatus*	am
Estrildidae: waxbills		
Red-cheeked Cordon-bleu	*Uraeginthus bengalus*	
Black-and-white Mannikin	*Spermestes bicolor*	
Black-and-white Mannikin	*Spermestes bicolor*	
Red-billed Firefinch	*Lagonosticta senegala*	
Cisticolidae: cisticolas and allies		
Tawny-flanked Prinia	*Prinia subflava*	
Coliidae: mousebirds		
Speckled Mousebird	*Colius striatus*	
Muscicapidae: chats, wheatears and Old-World flycatchers		
Collared Palm Thrush	*Cichladusa arquata*	
White-browed Robin Chat	*Cossypha heuglini*	
Dicruridae: drongos		
Common Drongo	*Dicrurus adsimilis*	
Corvidae: crows and allies		
House Crow	*Corvus splendens*	
Meropidae: bee-eaters		
White-throated Bee-eater	*Merops albicollis*	AM
Cisticolidae: cisticolas and allies		
Grey-backed Camaroptera	*Camaroptera brachyura*	
Siffling Cisticola	*Cisticola brachypterus*	
Rattling Cisticola	*Cisticola chiniana*	
Phasianidae: quails, francolins, spurfowl and allies		
Crested Francolin	*Francolinus sephaena*	
Viduidae: Parasitic Weaver, indigobirds and whydahs		
Pin-tailed Whydah	*Vidua macroura*	

Accipitridae: diurnal birds of prey other than falcons		
Black Kite	*Milvus migrans*	am
Grey-headed Sparrow	*Passer griseus*	
Sturnidae: starlings and oxpeckers		
Superb Starling	*Lamprotornis superbus*	
Psittacidae: lovebirds and parrots		
Yellow-collared Lovebird	*Agapornis personatus*	

3.2.6 Mammals

A total of 3 mammal species were recorded in all sites, with 213 observations. Order Carnivora (Carnivorans) rodentia and Primates (Primates) were the most abundant. Observation of Vervet monkeys were the most abundant followed by mongoose and genets. If you included an estimated more than 250km that may have been covered travelling to different study sites, cumulatively a total of about 500km may have been covered in the entire survey through wild areas where mammals would be found. However, the areas covered were devoid of small, medium and large sized mammals, with very few records of mammal direct observations. Most the recorded mammals had very low encounter rates and were classified as very rare. Although vervet monkeys had higher observation, most of the sightings were made indirectly, through their latrine half of which were inactive. The few cases where individuals of vervet monkeys were seen, most of them were transitory observations with individuals escaping into the bushes immediately. This probably may suggest that the local people in these forests did not hunt these animals and were tolerant of their existence. The local people through informal interviews confirmed the presence of white-tailed mongoose in the study area.

3.2.7 Reptiles

The project site has considerably high diversity of reptiles and amphibians which has been attributed by the presence of diverse habitat. Diversity of the reptiles appears to be more than the amphibians. The number of lizards appear to greatest when compared to the snakes. Most of the reptiles and amphibians sighted during the survey were of least concern but the snake *Python natalensis* is listed in CITES.

A total of 63 species belonging to different families of Gekkonidae, ranidae, chameleonidae, boidae agamidae, colubridae, elapidae scincidae, pythonidae were observed and recorded. But from the interviews with the community around noted that serpents have been sighted a lot during

night and morning hours e.g. *Python natalensis*, *Naja nigricolis* from other records than the snakes found around that area could be even higher than what was observed during the survey.

Table 6: Reptiles and amphibians species found/sighted around the project site

Amphibians	*Chiromantis Petersii* *Phrynobactrachus acridiodes* *Ptychadena oxyrnhnchus*
Lizards	*Trachylepis planifrons* *Broadleyisaurus major* *Lygodactylus mossambicus* *Varanus niloticus* *Heliobolus spekii* *Triocerus dilepsis* *Hemidactylus mabouia* *Hemidectylus platycephalus* *Trachylepis varia* *Agama agama*
Snakes	*Lamprophis fuliginosus* *Philothamnus battersbyi* *Python natalensis* *Bitis arientans*

3.2.8 Invertebrate

Invertebrates are critical part of both terrestrial and aquatic ecosystems, in Kenya, therefore need for their conservation. They play an important role as bio-indicators of the health status of their habitats and the environment in general (Iwata, 2015). Invertebrate species play key roles in food chains and webs in any ecosystem, including coastal regions. The coastal areas of East Africa contain some of the world's richest ecosystems and provide valuable resources for many people (Mittermier *et al.*, 2011). Some invertebrate species are used as an indicator and flagship species, by conservationists to evaluate quality of natural habitats and hence environmental change (Caro, 2010).

Invertebrates are characterized by high mobility, elevated reproductive ability, species-specific habitat choices and varying degrees of sensitivity to pollutants. For this reason, local species that are closely associated with a specific native environment have been extensively employed as the surrogate species in biodiversity assessments. In terrestrial ecosystems, invertebrates such as butterflies and moths (Lepidoptera), beetles (Coleoptera), bees, ants and wasps (Hymenoptera), true flies (Diptera) and spiders (Araneae) have been used in assessment of impacts of disturbances on environment (Wasonga et al., 2015; Kioko et al., 2016; Iwata, 2018).

3.2.9 Species diversity

A total of 240 species and 1746 invertebrates' individuals distributed across 11 orders were documented within the project area. The order Lepidoptera had the highest number of species (64), followed by Hymenoptera (56) and Coleoptera (37).

Lycaenidae (*Tuxentius cretosus*)

Nymphalidae (*Euphaedra neophron*)

Spirostreptidae (*Archispirostreptus gigas*)

Meloidea (*Coryna ambigua*)

Figure 9: Some of the invertebrate species within the project area

Table 7: Invertebrate orders, families, species richness and abundance

Order	No. of Families	No. of species	No. of individuals
Lepidoptera	7	64	247
Hymenoptera	12	56	363
Coleoptera	13	37	185
Diptera	12	25	604
Araneae	9	22	49
Hemiptera	9	17	76
Orthoptera	3	12	82
Odonata	2	4	7
Mantodea	1	1	1
Neuroptera	1	1	1
Spirostreptida	1	1	3

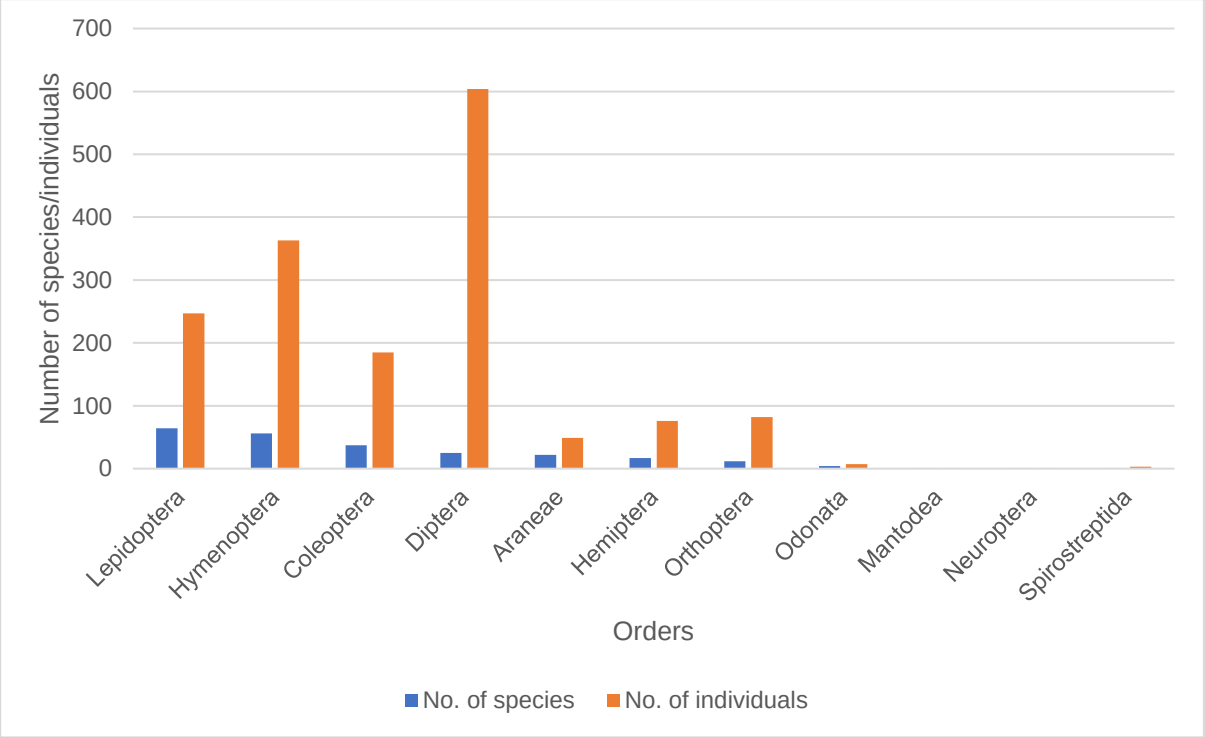


Figure 10: Species richness and abundance recorded within the project area

3.2.10 IUCN Redlist status and CITES listing

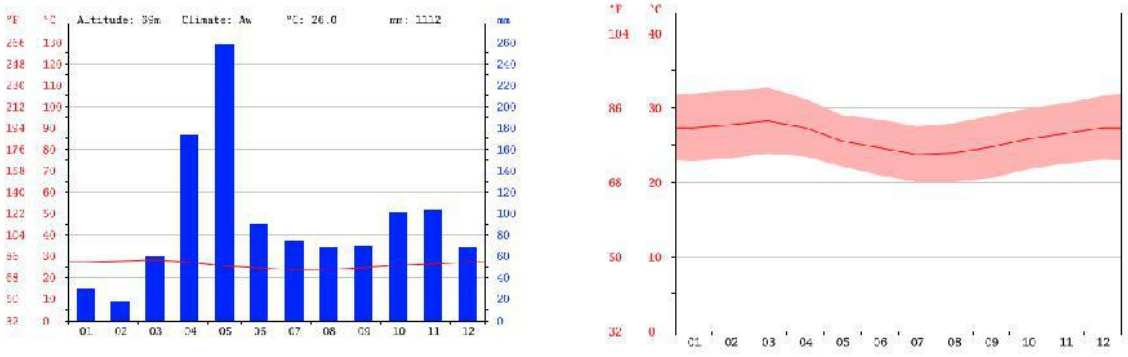
The IUCN Red List is a critical indicator of the health of the world's biodiversity. It is a powerful tool to inform and catalyse action for biodiversity conservation and policy change, critical to protecting the natural resources. It provides information about range, population size, habitat and ecology, use and/or trade, threats, and conservation actions that will help inform necessary conservation decisions. Out of the total 240 species recorded within the project area, 53 species have been recorded of Least Concern (LC), 1 species as Data Deficient (DD) and the remaining, 186 species have not been evaluated. Species are listed under the Convention on International Trade in Endangered Species (CITES) protection when assessments ascertain that populations in the wild are likely to be reduced and even decimated to extinction through over-extraction for international trade. There is no species recorded in this study which is listed under CITES.

3.3 Climate

Climatic condition variations in the County are attributed to South East Monsoon winds (blowing between April and September) and the North East Monsoons (October to March) and oceanic influence. The mean rainfall in the coast region ranges from 1,397 mm in the south decreasing to 889 mm in the north and occurs in two periods. The rains occur during the inter-monsoonal

period, with the long rains starting from March to June, while the short rains occur from October to December.

Changamwe's climate is classified as tropical. In winter, there is much less rainfall than in summer. This climate is considered to be Aw according to the Köppen-Geiger climate classification. The temperature here averages 26.0°C. Precipitation here averages 1112 mm. Precipitation is the lowest in February, with an average of 17 mm. Most precipitation falls in May, with an average of 258 mm. At an average temperature of 28.2°C, March is the hottest month of the year. In July, the average temperature is 23.7°C. It is the lowest average temperature of the whole year.



Rainfall Graph **Temperature Graph**

Figure 11: Rainfall and Temperature Graphs for Changamwe Area (Source: http://en.climate-data.org/location/103615/)

Between the driest and wettest months, the difference in precipitation is 241 mm. The average temperatures vary during the year by 4.5 °C.

month	1	2	3	4	5	6	7	8	9	10	11	12
mm	30	17	59	173	258	90	74	68	70	101	104	68
°C	27.3	27.7	28.2	27.3	25.5	24.6	23.7	23.9	24.7	25.8	26.5	27.3
°C (min)	22.8	23.2	23.8	23.4	22.1	20.9	20.0	20.0	20.5	21.7	22.5	23.0
°C (max)	31.9	32.3	32.7	31.2	29.0	28.4	27.5	27.9	28.9	29.9	30.6	31.6
°F	81.1	81.9	82.8	81.1	77.9	76.3	74.7	75.0	76.5	78.4	79.7	81.1
°F (min)	73.0	73.8	74.8	74.1	71.8	69.6	68.0	68.0	68.9	71.1	72.5	73.4
°F (max)	89.4	90.1	90.9	88.2	84.2	83.1	81.5	82.2	84.0	85.8	87.1	88.9

Figure 12: Changamwe Climate Table

3.4 Physical Infrastructure

3.4.1 Road and Railway Network

The project area is characterized by road and railway network of the newly built Magongo Road, Mombasa-Mariakani A109 Road and the SGR. The pipeline is within the existing wayleave but crosses Airport Road and Magongo road where provisions of tunnels had been made during their construction. Another road serving the project area is the refinery road linking Magongo Road and Mombasa-Mariakani A109 Road.

Plate 2: Wayleave crossing on Airport Road

3.4.2 Sanitation Facilities

The existing KPC site has adequate and modern sanitation facilities for the workers, visitors and truck drivers who come to collect LPG. The proposed project site is located adjacent to the existing facility. The workers at this site shall be provided with sanitation facilities on site and will also have access to the existing ones.

3.4.3 Telecommunication

Changamwe area is well served with proper communication network including mobile network (Airtel, Safaricom and Orange) and land line telephone network from telecom. The communication networks have good signals.

3.4.4 Electricity Supply

The KPC site area is well served with electricity supply from the national grid. The proposed project site will also use the electricity supply to run its operations. A standby generator with the capacity to operate the facility will be installed.

3.4.5 Nearest Fire and Police Response Teams

The existing KPC facility has its own fire station within the site including the County fire station at Changamwe. The nearest police station is located at Changamwe approx. 2km away.

3.5 Health Status

3.5.1 Most Prevalent Diseases

According to the 2015 Kenya National Malaria Strategy, although malaria prevalence has dropped in the country, from 11 to 8 per cent, it has increased from 4 to 8 percent in the coast. In 2015, the county reported 282,000 malaria cases in the health facilities across the county, translating to 23 per cent of all outpatient visits. Source: Daily Nation Tuesday April 26 2016

According to Mombasa County Health at Glance report, HIV/AIDS, Tuberculosis and Malaria are the major diseases in the county as per Table 8 below.

Table 8: Most Prevalent Diseases in Mombasa County (HIV/AIDS, TB, Malaria)

Indicator	County 2012	County (Current)	Kenya (Current)
No. of people tested for HIV	259,638	267,427	7,161,215
No. of people living with HIV on antiretroviral treatment	26,442	28,075	561,225
Mother-to-child transmission of HIV (%)	7.9	9.1	8.5
Malaria test positivity rate (%)	22.9	54.0	41.0
Malaria cases[8] (per 100,000 people)	16,893	14,823	20,252
Malaria admission	3,646	1,287	179,966
Tuberculosis (TB) prevalence (per 100,000 people)	519	444	208
Tuberculosis incidence (per 100,000 people)	222[11]	186	79

Source: Mombasa County Health at Glance report

Diseases common in the three villages surrounding KPC include Respiratory tract infections, Asthma, Ulcers, Diarrhea and Typhoid.

3.6 Measurements and Lab Analysis Results

The following previous baseline measurements were incorporated in the report.

3.6.1 Noise Quality

Baseline noise levels were adapted from recent noise measurements carried out by AIRMET Services Limited at the existing KPRL facility. The scope of work was assessing the noise exposure levels at various existing work stations within the KPRL Terminal, general compound and environmental noise within the proposed expansion site and around the boundary fence of the plant.

Noise levels recorded at the laboratory (next to the octane machine) was the highest of all the measured locations and had a weighted average of 82.3dB (A). this noise ratings surpassed the acceptable limits of 85 dB (A) as stipulated by the Factories and Other Places of Work (Noise Prevention & Control) Rules, 2005.

It was also noted that the noise level at some of the sections measured were above the permissible 60 dB (A) limit specified in the First Schedule to the Environmental Management and Coordination (Noise and Excessive Vibration Pollution (Control) Regulations, 2009.

Recommendations

- Workers should be informed of the noise monitoring results, the minimal risk of hearing loss, and the roles of hearing protection and audiometric testing;
- Make earplugs available at the entrance to these noisy working areas;
- Areas to be posted with signs warning about high noise levels and the requirement to wear hearing protection; and
- Shorter exposure periods can also be considered for the workers at these points.

The construction activities are likely to result in slight increase in noise levels. However, the increase will be intermittent and of short-duration. Details of the measurements are provided in in Annex 7 of this report.

3.6.2 Ambient Air Quality

Recent Results of Ambient Air Quality carried out at KPRL by Labworks East Africa Limited dated 15th February 2021 shows the following:

- Carbon Monoxide (CO) – From the results, the carbon monoxide levels at the LPG and Blending area were within the guideline values as set by EMCA Air Quality Regulations 2014 while the level at the Truck loading and Laboratory exceeded the set guideline values by EMCA Air Quality Regulations.

- Nitrogen Oxides (NOX) and Sulphur Oxides (SOX) – The NOx and Sox analysis results indicate that all the sampling points the levels are within the guidelines values set by EMCA Air Quality Regulations 2014. Sulphur dioxide ranged between <1.57µg/m^3 and 34.28 µg/m^3 while the levels of Nitrogen dioxide ranged between 5.6 µg/m^3 and 11.5 µg/m^3 .
- Particulate Matter – According to the results obtained at all the points in Changamwe sampled for PM10 and PM2.5 have exceeded the limits according to the EMCA Air Quality Regulations 2014, IFC/World Bank Standard and World Health Organisation Air Quality Guidelines. The high dust levels could have been attributed to the ongoing construction activities along the Refinery road during the measurement period. During the measurements, the weather was dry with moderate winds enhancing the lifting and transport of particulate matter.
- Volatile Organic Compounds (BTEX) – The VOC results from the sampling point LPG, Blending Area, Truck loading and Laboratory were recorded as 390, 831, 1,156 and 1,320 µg/m^3 respectively. This indicated that the levels at the blending area, Laboratory and Truck Loading were above the stipulated guidelines in EMCA (Air Quality) Regulations 2014 of 600 µg/m^3 .
- Hydrocarbons (Top 5) – Ambient Air Quality results for hydrocarbons for the sampled points: LPG, blending area, Truck Loading and Laboratory were all within the guidelines set by EMCA Air Quality Regulations 2014.

The air quality is expected to be impacted by construction and demolition activities during decommissioning of the project; however, implementation of the proposed recommended measures will keep the levels within the acceptable limits. Details of the measurements are provided in in Annex 7 of this report.

3.7 The Socio-Economic Profile

Socio economic survey is regarded as one of the most important sources of statistical data on household expenditure and income as well as other data on the status of housing, individual and household characteristics and living conditions.

The study sought to understand the demographic characteristics of households in within Changamwe Sub County in Mombasa County. The survey covered Port Reitz and Changamwe Divisions, 4 locations i.e. Kwahola, Chaani, Changamwe and Port Reitz with a combined total of 90 villages.

192 households were sampled in order to maximize cost-effectiveness of the survey logistics. Each location had 50 different households to be interviewed and this was through random sampling.

The survey toolkit used was survey CTO. Different variables of age, education, energy, household income, employment, sanitation and water were measured.

Plate 3: Enumerators during the survey

3.7.1 Respondents Age

The table below shows a summary distribution of the ages of respondents that were interviewed concerning the LPG project.

Table 9: Age of respondents

Age cut	Freq.	Percent
25 to 34	35	18.23
35 to 44	47	24.48
45 to 54	59	30.73

55 to 64	21	10.94
65 and above	15	7.81
< 25	15	7.81
Total	**192**	**100.00**

Variable	Obs	Mean	Std. Dev.	Min	Max
age	192	43.818	12.883	19	72

According to the above table, the youngest respondent was 19 years old while the oldest was 72 years old. The mean age of the respondents was 43.818. The study further revealed that most respondents (92.19%) were above 25 years old with the majority falling within the age of 45 to 54. The results show that there was a fair distribution of ages during the study. Most respondents were in their middle age where they make a lot of decisions to the family and have the energy to provide for the family's needs.

3.7.2 Education level

The study sought to understand the education level of the respondents. Individual education behavior and outcomes, as well as their aggregate dynamics at the population level, can usefully be studied as demographic events and characteristics. This leads to a substantive focus on the role of education in demographic processes such as fertility/productivity and mortality transition and migration. The table below shows the distribution of education levels among the respondents in this study.

Table 10: Education

Education level	Freq.	Percent
No attended school	11	5.73
Primary	60	31.25
Secondary	78	40.63
Tertiary/University	43	22.40
Total	**192**	**100.00**

According to the above table, most of the respondents (94.27%) had completed at least the Primary level of education, 121 out of 192, (63.02%) had completed at least a secondary level

while 22.4% had acquired a Tertiary level of education. It infers that 94.27% of the respondents were able to read and write while 22.40% were able to get a white color job.

According to a study by (*Semenya and Machete 2019*), the level of education is the second major factor that influences the choice of the type of energy by households. Highly educated people prefer clean fuels compared to their less-educated counterparts. It was, therefore, important to understand the educational background of the respondents. A study from China, confirmed that cooking with clean energy in households increases as family members attain higher educational levels (*Chen et al. 2016*)

3.7.3 Household income

According to the Economic survey 2017 by the Kenya National Bureau of Statistics, the lower income group comprises households with a monthly income of Kshs. 23,670 and below; while middle-income group comprises households with incomes ranging between Kshs 23,671 and Kshs 119,999 and finally the Upper income group enjoys remunerations of above Kshs 120,000. The study used this classification to tabulate the household income of the respondents as shown in table below.

Table 11: Household Income

hh_income	Freq.	Percent
< low income	135	70.31
Upper Income	36	18.75
middle Income	21	10.94
Total	**192**	**100.00**

According to the table above, majority of the respondents (70.31%) were from low-income households followed by upper-income households (18.75%). Household income refers to 'all receipts by all members of a household in cash and in-kind, in exchange of employment or in return for capital investment, or receipts obtained from other sources such as social grants, pensions etc. According to (Africa, S 2017), household income is the leading factor that influences the choice and use of certain forms of energy resources in households. Consequently, high income is associated with urban households' preference for cleaner and more convenient fuels such as electricity.

3.7.4 Employment status

All respondents were the heads (often the mothers and fathers) of the households surveyed. Consequently, their responses about the total income of households and employment status was proxy to and were a direct representative of their households' employment profiles.

The table below shows a tabulation of employment status of the respondents.

Table 12: Employment status

Occupation	Freq.	Percent	Cum.
Employed	31	16.15	16.15
Farming	1	0.52	16.67
Bodaboda/tukutuku	1	0.52	17.19
Trading	92	47.92	65.10
Pastoral	3	1.56	66.67
Jua kali	16	8.33	75.00
Unemployed	45	23.44	98.44
Casual labour	3	1.56	100.00
Total	**192**	**100.00**	

It can be noticed from the results that the employment status of households was ultimately grouped into seven primary categories, during final analysis of the survey results. Cording the result above, most households were into Trade (business) (47%). Only 16.15 % of the respondents were employed. Considerable number of respondents (23.44%) were not engaged into any income generating activity. These results present a serious socioeconomic challenge of unemployment in the study area.

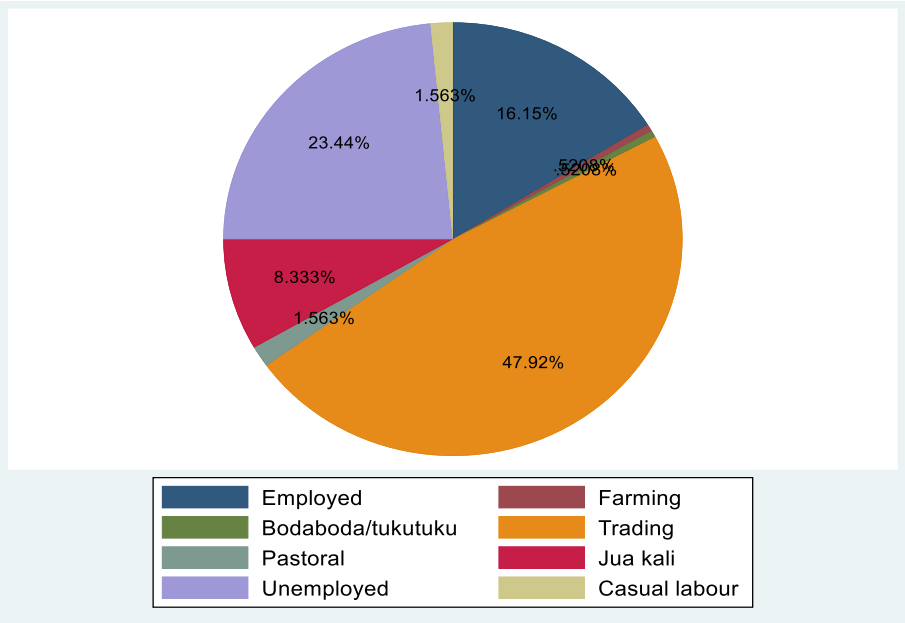


Figure 13: Source of livelihood among the respondents

The employment profiles of this community also confirm the influence of household economic profile of the household choices of fuel. Surely, with a high number of respondents (breadwinners) being involved in considering the monthly amount received by small scale business, it's evident that these households do not have the luxury of alternative energy choices; instead, they prefer any clean affordable source of energy.

3.7.5 Energy

Charcoal manufacture causes deforestation as well as the destruction of land from which the forest has been lost, lower groundwater and landslides. The Kenyan government has been unsure of what countermeasures to take, and has started banning the use of charcoal in recent years. However, the charcoal industry is one of the main exports of Kenya and is said to be at a level of USD 427 million, which equals the tea industry, accounting for the 2nd largest production volume in the world. Therefore, it is unlikely that a favorable outcome can be obtained as it is a source of income for many people, such as farmers and the poor.

The study sought to understand the sources of energy used by the households both for cooking purposes and for lighting. The pie charts below give a visual display of the energy sources used by the respondents. According the pie chart on cooking energy, the results show that the most respondents (43.23%) uses LPG for cooking closely followed by use of charcoal (40.1%). Therefore, the primary sources of cooking energy in the study area are LPG and charcoal. With the LPG coming into course, the cost of gas will reduce and this will definitely reflect on the

operational phase of the project the level of LPG uptake. The choice of source of energy is also influenced by the level of income.

The pie chart on lighting energy reveals that majority (88.02%) of the households under study used electricity for lighting followed by solar energy at 7.29%.

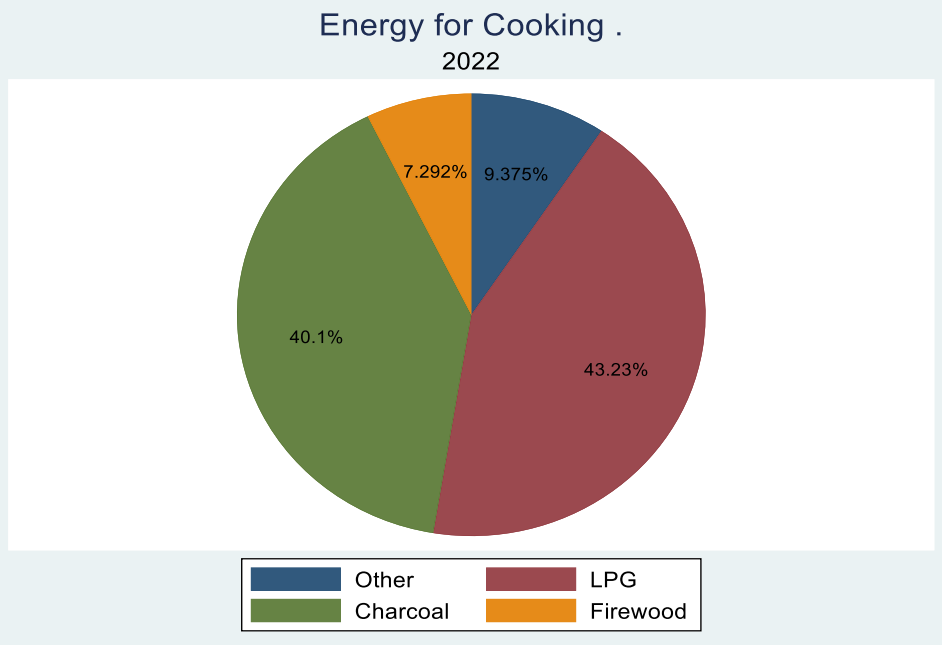


Figure 14: Sources of energy for cooking

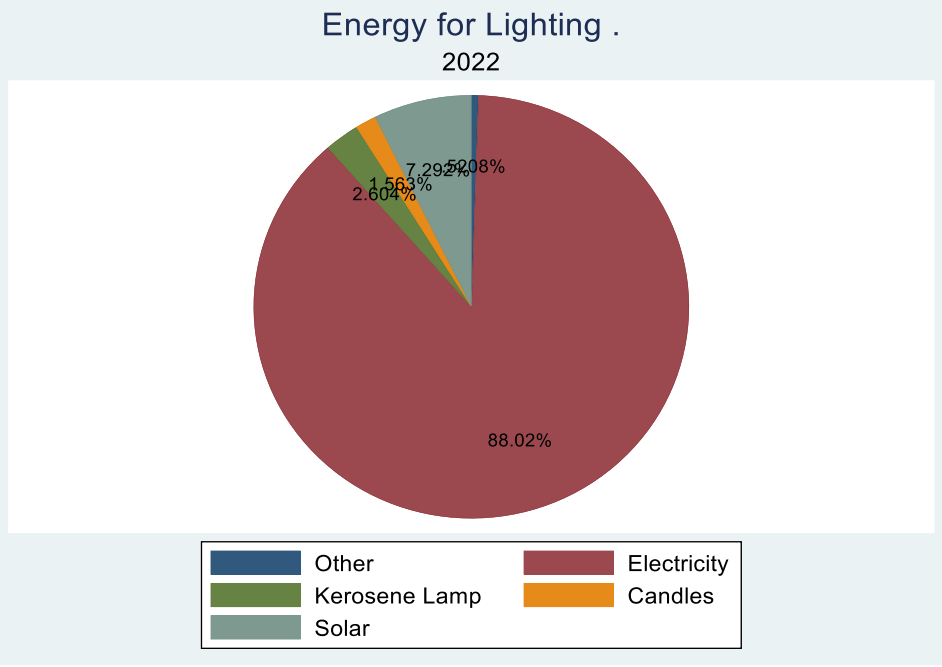


Figure 15: Sources of energy for lighting

The study also sought to understand the number of respondents who had heard about LPG gas. The results are shown below.

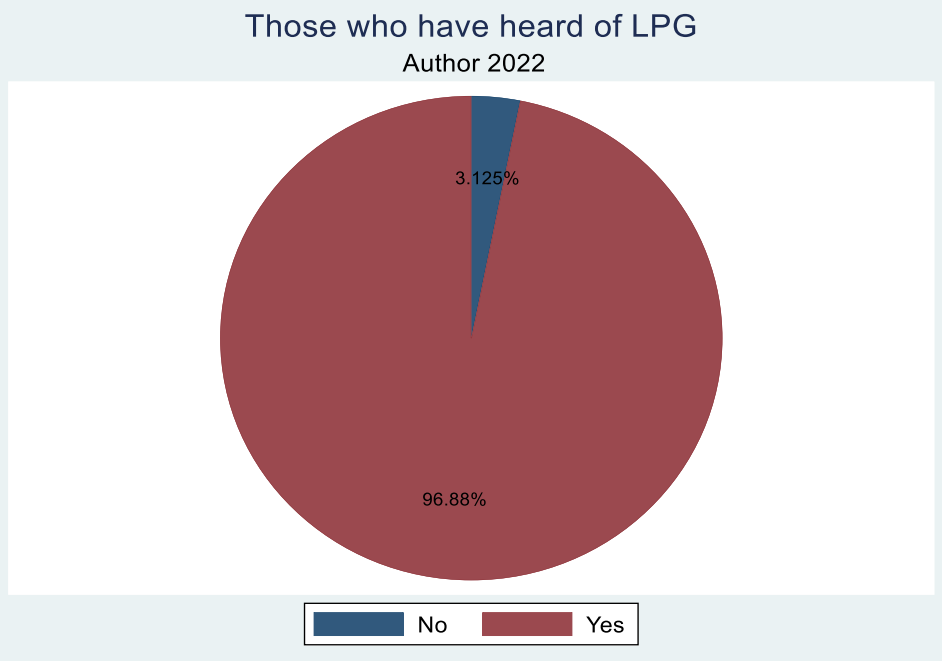


Figure 16: Knowledge of LPG

According to the results above, it is evident that LPG gas is well known to members of Changamwe since majority of the respondents (96.88%) agreed to having heard of it.

3.7.6 Sanitation

Sanitation and hygiene is also vital indicator of socio-economic status of a community. The Study therefore measured sanitation and hygiene of the households in Changamwe Sub County by checking the common latrine/toilet commonly used in the area and doubled checked this by asking for the specific type of Latrine/toilet used by the households sampled for the study. The pie charts below (indicated by title) shows the results on status of latrine use by the households.

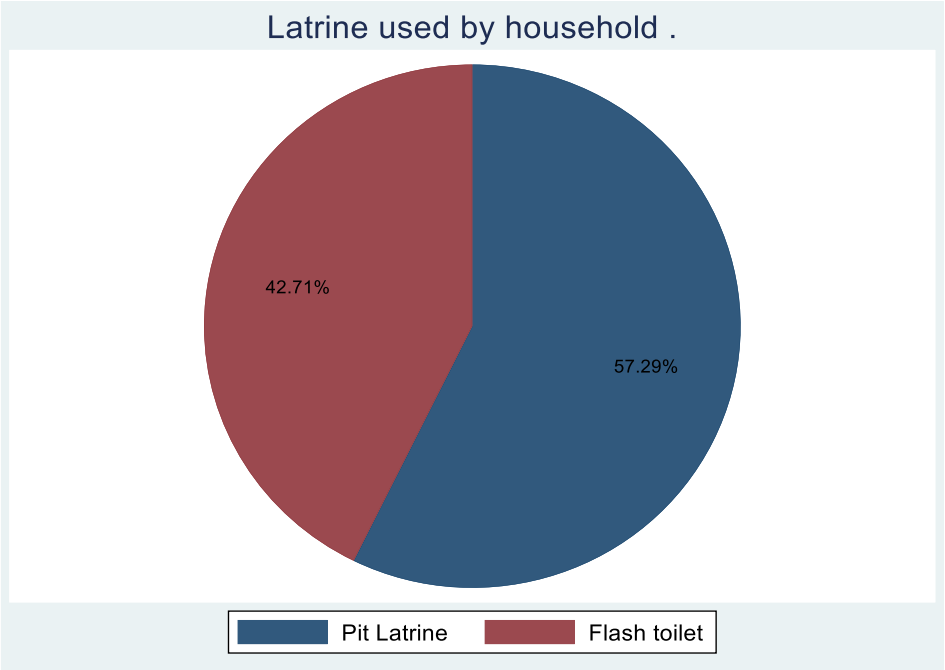


Figure 17: Sanitation type

According to the results, it can be noticed that most households (57.29%) use Pit latrine while 42.71% used flash toilet. It is evident that Pit latrine is the most common latrine in the area. This trend is expected in urban or semi-urban regions with low to middle income households (Raihan, Farzana *et al.* 2017)

3.7.7 Water

The study sought to understand the main sources of water for household consumption. The results are presented in the pie chart below.

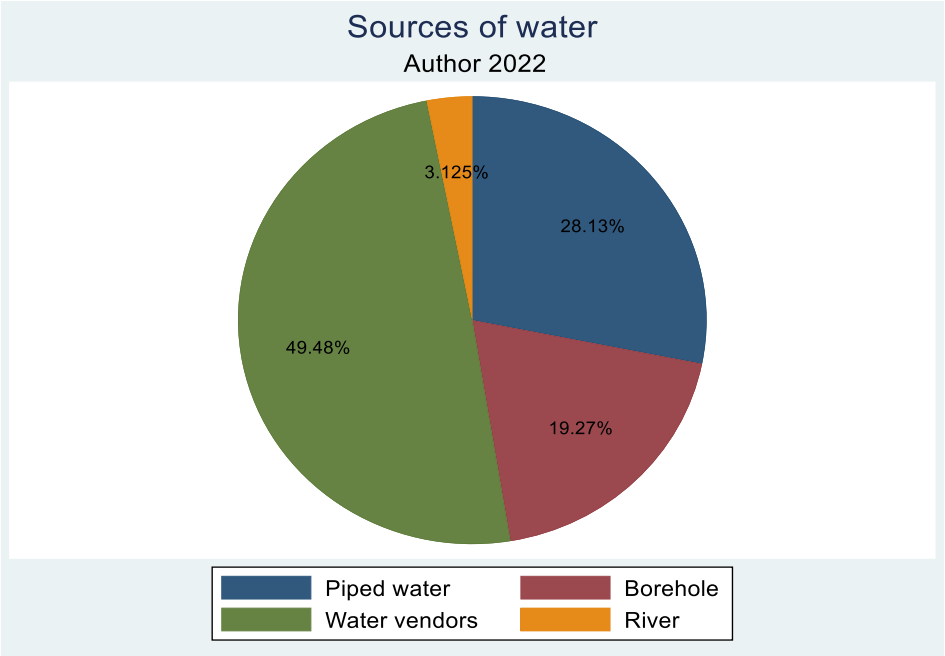


Figure 18: Sources of domestic water

According to the results above, it's evident that majority (49.48%) of the households depend on the water vendors for water. A considerable number (28.13%) of the households have piped water. Very few households (3.125%) of the household depends on storm water drains and seasonal streams for water. This possibly reduces the risk of exposure of the household member to open water source pollutions.

The main crops under cultivation in the county include cassava, cucurbits family, maize, vegetables, millet and sorghum. These are most preferred due to their resistance to diseases and pests. The climatic conditions of the county make plants very prone to diseases and pests and therefore, highly resistant varieties are encouraged. The total acreage under food crop stands at 400 ha while the total acreage under cash crop is 500 ha. The County is generally a net importer of food and other agricultural products and this makes the cost of food high and inaccessible to most of the low-income earners. There is need to invest more in value addition for agricultural products and better post-harvest management systems and facilities. Livestock keeping and fishing is also practiced in the County.

4.0 Policy, Legal and Institutional Framework

This section of the report discusses the policies, applicable EHS legislations and institutional framework governing the Proposed Project.

4.1 National Policies and Regulations

In Kenya there are various sector specific legal instruments that cover environmental and social issues such as public health; soil erosion; protected areas; endangered species; water rights and water quality; air quality, noise and vibration; cultural, historical, scientific and archaeological sites; land use; resettlement; etc.

The main piece of legislation governing environmental management in Kenya is the Environmental Management and Co-ordination Act (EMCA) of 1999, Amended 2015. The main objective of this Act is to provide for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya. EMCA provided for the establishment of a National Environment Management Authority (NEMA), which became operational in July 2002. NEMA has the statutory mandate to coordinate all environmental activities.

The EMCA has given rise to various regulations that govern environmental Impact Assessment and Audit and also regulations governing Water Quality, Air Quality, Noise and Excessive Vibrations, Waste Management, Wetlands, River Banks, Lake Shores and Sea Shore Management and Conservation of Biological Diversity.

The Act makes environmental impact assessment mandatory for activities specified in its Second Schedule, including the installations of LPG Import, Storage and Handling Facility.

4.2 National Policies

Table 13 below shows the National Policies relevant to the Proposed LPG Import, Storage and Handling Facility.

Table 13: Relevant National Policies

National Policy	Community development
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.
National Energy Policy 2018	• The overall objective of this Energy Policy is to ensure affordable, competitive, sustainable and reliable supply of energy at the least cost in order to achieve the national and county development needs, while protecting and conserving the environment for inter-generational benefits.
Sessional Paper No. 4 On Energy, 2004	• Envisions equitable access to quality energy services at least cost while protecting the environment • Requires the government to give legal authority to the Energy & Petroleum Regulatory Authority to permit and license generation, transmission and distribution. EPRA is also given mandate to facilitate issuance of permits and licenses by concerned authorities including NEMA • The Paper tasks the government to ensure environmental rehabilitation on project completion or abandonment • Encourage private sector investment in additional capacity for handling, storage and distribution of LPG; • Consistent with this policy, Government will pursue implementation of:: ✓ Construction of LPG import handling, storage and distribution facilities in the short term. Storage and filling facilities will also be constructed in Nairobi, Kisumu, Nakuru, Eldoret and Sagana and in other parts of the country in tandem with rising incomes and demand. ✓ Promoting wider use of both kerosene and LPG in households, as an alternative fuel to improve the quality of household energy and mitigate demand on woodfuel • Government will continue to promote distribution of petroleum fuels including liquefied petroleum gas (LPG) as part of the energy infrastructure to stimulate both on and off-farm income generating activities, in addition to providing clean energy for rural household use.
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. • It sets out the goal, objectives, guiding principles and policy directions aimed at achieving Kenya‘s health agenda and a comprehensive implementation framework. Also included is the institutional management plan under the evolved system of government taking into

	account the varied roles of the national and county levels of government. • The policy also sets out a monitoring and evaluation framework to track progress in achieving the policy objectives.
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. Strategic interventions have been developed to determine the success of the policy implementation. • One of the key purposes of this policy is to clarify 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. • Sanitation and the Environment: One of the key objectives of the policy is to protect the environment from pollution and its negative effect on human health. The government will seek to minimize negative impacts arising from various types of sanitation systems, and maximize positive effects. • Well-functioning sanitation and hygiene systems are a means of protecting the environment. • The health risks associated with poor ESH increases poverty. The government envisages that this policy is an important step towards poverty reduction.
National Policy on Water Resources Management and Development (Seasonal Paper No.1 of 1999).	• Recognises the need to avoid the pollution of water resources and thus proposes development of strict stream effluent discharge standards for controlling the discharge of wastes into water bodies. Also, recognises the need to make water abstraction and disposal permits dynamic and economic instruments for water pollution control • Proposes a process of water quality monitoring of all water bodies and pollution control inspection of potential polluting sources. Proposes that all factories and other waste water generating concerns be required to incorporate in their designs waste water treatment devices • Proposes the monitoring of water quality parameters to provide baseline data for the purposes of pollution control. Also proposes monitoring of water abstraction and water use to work out naturalised river flows, misuse and over abstraction
Land Policy (Sessional Paper No. 3 of 2009).	• Envisions the efficient, sustainable and equitable use of land for prosperity and posterity • Seeks to secure rights over land and provide for sustainable growth, investment and the reduction of poverty in line with the Government's overall development objectives. • Seeks to offer a framework of policies and laws designed to ensure the maintenance of a system of land administration and management that will provide inter alia, economically viable, socially equitable and

	environmentally sustainable allocation and use of land, efficient and effective utilisation of land and land-based resources. • Commits the government to restoration of the environmental integrity of land and facilitation of the sustainable management of land-based resources. This is through incentives to encourage the use of technology and scientific methods for soil conservation; encouraging use of traditional land conservation methods; establishing measures to control degradation of land through abuse of inputs and inappropriate land use practices; and establishing institutional mechanisms for conservation of quality of land for environmental conservation purposes • Government shall develop a comprehensive and integrated land use policy having regard to fragile areas and the needs of neighbouring communities and individuals in such areas • Government shall ensure that environmental impact assessments and audits are carried out on all proposed projects, programmes and activities on land that have a likelihood to degrade the environment.
The Kenya National Biodiversity Strategy and Action Plan, 2000	The overall objective of the NBSAP is to address the national and international undertakings elaborated in Article 6 of the Convention on Biological Diversity' (CBD). It is a national framework of action for the implementation of the Convention to ensure that the present rate of biodiversity loss is reversed, and that present levels of biological resources are maintained at sustainable levels for posterity.

4.3 National Legislation

The following legislative provisions and regulations are considered key to management of the environmental, health and safety aspects related to the proposed development.

Table 14: Summary of Reviewed National Legislation

No	Legislation/Regulation/ Standard	Provisions	Relevance to the Project/ License or Permit Required/ or Activity requiring regulation
1	The Constitution of Kenya (2010)	• The Constitution has enhanced protection and enforcement of fundamental rights amongst other gains. It provides for a two-tier structure of government, i.e. the National and the County Governments. It distributes the functions and powers between the two levels as detailed in Chapter Eleven and the Fourth Schedule. • Specifically, in relation to the energy sector, Part 1 of the Fourth Schedule provides that the National Government shall be responsible for: - (a) Protection of the environment and natural resources with a view to establishing a durable and sustainable system of development including water protection, securing sufficient residual water, hydraulic engineering and the safety of dams (b) Energy policy including electricity and gas reticulation and energy regulation; and (c) Public investment. • In relation to the County Governments, Part 2 of the Fourth Schedule provides that they shall be responsible for county planning and development including electricity and gas reticulation and energy regulation.	• The project shall be implemented in consultation with both the national government and the county government including the relevant authorities;
2	Environmental Management and Coordination Act 1999, Amended 2015	• Provides for protection and conservation of the environment, environmental impact assessment, and environmental auditing and monitoring. • Provides that all reasonable measures shall be taken to mitigate any undesirable effects not contemplated in the ESIA and an environmental audit report on those measures be prepared and submitted to NEMA	• Project has initiated this ESIA in compliance with regulations
3	Environmental (Impact Assessment and Audit) Regulations, 2003 Amended 2019	• Provides for the procedure for carrying out the Environmental and Social Impact Assessment (ESIA). • Provides for the contents of an ESIA Study Report.	• The ESIA to be carried out in accordance to the regulations.

4	Environmental Management and Co-ordination (Water Quality) Regulations 2006	• Provides for the protection of ground and surface water resources. • Provides for the parameters in the quality of wastewater discharged from any facility/activity into the environment or sewer.	• Any discharges to the surface water courses during operation phases to be monitored for conformance with the standards
5	Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009	• Prohibits the generation of unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. • Provides for the maximum noise levels permissible in various environmental set ups such as residential areas, places of worship, commercial areas and mixed residential. • Provides that where a sound source creates or is likely to emit noise or excessive vibrations, or otherwise fail to comply with the provisions of these Regulations, a license is required	• Sound level limits of 60dB (day) and 35dB(night) to be observed during operations • License to emit noise/vibrations in excess of permissible levels to be acquired if necessary
6	Environmental Management and Co-ordination (Waste Management) Regulations 2006	• Provides for standards for handling, transportation and disposal of various types of wastes including hazardous wastes. • Requirements to ensure waste minimization or cleaner production, waste segregation, recycling or composting. • Provides for licensing of vehicle transporting waste. • Provides for the licensing of waste disposal facilities	• Disposal of generated waste from operations under the Project; • Generation of hazardous wastes such as used oil and oily parts from servicing of equipment and vehicles
7	Environmental management and co-ordination (conservation of biological diversity and resources, access to Genetic resources and benefit sharing) Regulations, 2006	• Provides that a person shall not engage in any activity that may have an adverse impact on any ecosystem; lead to the introduction of any exotic species; or lead to unsustainable use of natural resources, without an Environmental Impact Assessment License • Provides for the imposition of bans, restrictions or similar measures on the access and use of any threatened species in order to ensure its regeneration and maximum sustainable yield • Provides for the inventory and monitoring of the status of threatened, endangered or rare species	• Project activities are within the forested ecosystem

8	Environmental Management and Coordination (Air Quality) Regulations, 2014	• Provides for ambient air quality tolerance limits. • Prohibits air pollution in a manner that exceed specified levels. • Provides for installation of air pollution control systems where pollutants emitted exceed specified limits. • Provides for the control of fugitive emissions within property boundary. • Provides for the control of vehicular emissions. • Provides for prevention of dispersion of visible particulate matter or dust from any material being transported. • Provides for acquisition of an emission license.	• Exhaust/stack emissions from equipment at the Gas facility • KPC vehicles in use by staff
9	The Public Health Act (Cap 242)	• Provides for the prevention of the occurrence of nuisance or conditions dangerous/injurious to humans	• Generation of wastes from operations under the KPC Facility • Handling, storage and disposal of waste at the KPC Facility
10	Occupational Safety and Health Act (OSHA), 2007	• Provides that every occupier shall ensure the safety, health and welfare at work of all persons working in his workplace • Provides that before any person occupies or uses any premises as a workplace, he shall apply for the registration of the premises • Provides that workplace shall be of sufficient size for work to be carried out with ease and shall further have the necessary free space and, having regard to the nature of the work, an adequate amount of air for each employee, the minimum permissible being ten cubic metres per person • Provides that an occupier shall ensure that effective and suitable provision is made for securing and maintaining, by the circulation of fresh air in each workroom, the adequate ventilation of the room • Provides that an occupier shall ensure that effective provision is made for securing and maintaining sufficient and suitable lighting, whether natural or artificial, in every part of his workplace in which persons are working or passing • Provides that sufficient and suitable sanitary conveniences for the persons employed in the workplace shall be provided, maintained and kept clean,	• Site registration as a workplace • Safety measures are required in use of tools and machinery on sites • Protection of the workers and general public with any form of interaction with the sites is necessary

		and effective provision shall be made for lighting the conveniences; and, where persons of both sexes are or are intended to be employed (except in the case of workplaces where the only persons employed are members of the same family dwelling there), such conveniences shall afford proper separate accommodation for persons of each sex • Provides that all plant, machinery and equipment whether fixed or mobile for use either at the workplace or as a workplace, shall only be used for work which they are designed for and be operated by a competent person • Provides that every steam receiver and all its fittings shall be of good construction, sound material, adequate strength, and free from patent defect, and shall be properly maintained • Provides that every steam receiver and all its fittings shall be thoroughly examined by an approved person, so far as the construction of the receiver permits, at least once in every period of twenty-four months or after repairs • Provides that where work has to be done inside a confined space in which dangerous fumes are liable to be present, the confined space shall be provided with adequate means of egress. • No person shall enter the confined space for any purposes without taking measures to remove any fumes which may be present and to prevent any ingress of fumes and, unless it has been ascertained by a suitable test that the space is free from dangerous fumes • Persons entering a confined space shall wear a suitable breathing apparatus. A sufficient number of the persons employed shall be trained and practiced in the use of such apparatus and in the method of restoring respiration; • Provides that in every workplace or workroom, there shall be provided and maintained, and conspicuously displayed and free from any obstruction so as to be readily accessible, means for extinguishing fires	
11	The Factories and Other Places of Work (Noise	• Rules provide for the maximum noise exposure levels for workers in places of work and for the provision of protective equipment for those exposed to	• Noise emitted during the operation of the emergency diesel generator

	Prevention and Control) Rules, 2005	high noise levels. • Provides that an occupier shall also institute noise reduction measures at the source of noise in the workplace.	require provision of PPE to workers and minimization of noise exposure to the public
12	Water Act 2016	• Provides that a permit shall be required for any use of water from a water resource, especially where there is abstraction and use of water with the employment of works.	• Use of water abstracted requires an abstraction permit
13	Water Resource Management Rules 2007	• Provides for application by all those intending to abstract ground water. • Provides that where any borehole or well is intended to be equipped with a motorized pump the application shall be accompanied by a hydrogeological assessment report.	• Depending on the proposed source of water for construction activities, permits may be required
14	The Energy Act 2019	• It sought to consolidate the laws relating to energy, to provide for National and County Government functions in relation to energy, to provide for the establishment, powers and functions of the energy sector entities; promotion of renewable energy; exploration, recovery and commercial utilization of geothermal energy; regulation of midstream and downstream petroleum and coal activities; regulation, production, supply and use of electricity and other energy forms; • Enforcement and review environmental, health, safety and quality standards • Need to promote environmental protection and compliance with environmental, health and safety requirements • Construction permit request to be accompanied by ESIA Study Report	• Applicable for importing, transporting, refining, storing and selling petroleum or petroleum products; • Construction permit shall be sought from EPRA.
15	The Energy (Energy Management) Regulations 2012	• Provides for the development of an energy management policy with inter alia, commitment to improve energy efficiency and conservation, and commitment to provide resources necessary to achieve energy efficiency and conservation. • Provides for maintenance of energy consumption records.	• Development and implementation of an Energy Management Policy by KPC is required since the complex shall be connected to the national grid • Energy audits should also be carried out on the facilities to identify opportunities for improving efficiency

16	Liquefied Petroleum Gas (LPG) Regulations, 2019	• Promulgated for Management of LPG Business in Kenya. It covers on import, export, transport, storage, wholesale and retail of LPG.	The Regulations requires the Proponent to: • Apply for/obtain license from EPRA prior to operating bulk LPG storage facility. Application for the license should be accompanied by the follow: • EIA License issued in accordance with EMCA 1999, Amended 2015 • Proof of compliance with OSHA 2007 and Public Health Act; • Certificate of compliance issued in accordance with Physical and Land Use Planning Act, 2019 • Copy of approved drawing accordance with County Government Act, with specifications and plans in duplicate; • A clearance certificate from Chief Fire Officer; • A declaration of the intended use of LPG that is to be stored • A copy of certificate of adherence to the KS EAS 924(1-6) • Transport LPG by road in accordance with the Act and terms and conditions of a valid license issued by the Commission;
17	Climate Change Act, 2016	• This Act is applied for the development, management, implementation and regulation of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya.	• The project promotes availability and use of LPG that would limit the production of dangerous greenhouse

		• It provides incentives and obligations for private sector contribution in achieving low carbon climate resilient development; • It promotes low carbon technologies, improve efficiency and reduce emissions intensity by facilitating approaches and uptake of technologies that support low carbon, and climate resilient development;	particulate emissions from the use of traditional biomass mostly wood for cooking.
18	Physical and Land Use Planning Act, 2019	• The 2019 Planning Act shall govern matters relating to planning, use, regulation and development of land in Kenya. • It provides for: • The government, at both national and county level, is tasked with the preparation of physical and land use plans. The national, county, inter-county and local plans are required to be integrated, and these plans shall collectively form the basis of how land is to be used in Kenya. • County governments to control development in their respective counties. All applications for development permission shall be made in the relevant county. • Development permission must be sought prior to undertaking any development. A developer who does not obtain such prior permission risks criminal sanctions and demolition of the unapproved works. • Members of the public are given the opportunity to give their views and raise objections to various matters e.g. the suitability of the national and county plans. • The Act lists developments that require development permission. In this regard, developments such as subdivision, amalgamation, change of user, extension of user, extension of lease and approval of building plans require development permission to be issued by the relevant county government. • Processing of easements and wayleaves require express development permission, as siting of educational institutions, base transmission stations, petrol stations, eco lodges, campsites, power generation plants and factories. • Development permission in respect of commercial and industrial use is a	• The proponent will forward plans to the respective offices for approval to obtained development approvals from the County Department of Physical Planning.

		pre-requisite for other licensing authorities granting a license for a commercial or industrial use, or occupation of land.	
19	Land Act, 2012 (Act No. 6 of 2012)	• Provide for the sustainable administration and management of land and land-based resources, and for connected purposes. The Act also provides for the repeal of the Way leaves Act (Cap. 292) and the Land Acquisition Act (Cap. 295).	• The proposed project site is registered and has a title deed
20	National Construction Authority Act. (Cap.449A) National Construction Authority Regulations, 2014	• Regulates construction activities and registration of contractors in Kenya.	• The Project shall seek development approval from the NCA and engage approved contractor during construction phase
21	The Standards Act, Chapter 496	• Provides for establishment of minimum quality specifications, mode, materials and apparatus used in the country	• The Project shall comply with this act in packaging and measurement.
22	The Weights and Measures Act, Chapter 513	• Regulation under which storage tanks and dispensing equipment for sale of petroleum products are calibrated and regulated for accuracy	• LPG Storage tanks
23	KS EAS 924-1:2018	• Handling, storage, and distribution of Liquefied Petroleum Gas (LPG) in domestic, commercial, and industrial installations. • Deals with quantities of LPG storage in relation to the safety distances from other neighbouring facilities.	• The approved safety distances from the neighbouring facilities shall be observed.
24	The Traffic Act, Cap 403	• Relating to traffic on all public roads. Key provisions include registration and licensing of vehicles; driving licenses; driving and other offences relating to the use of vehicles on roads; regulation of traffic; accidents; offences by drivers other than motor vehicles and other road users. It prohibits encroachment on and damage to roads including land reserved for roads	• Many types of equipment and fuel shall be transported through the roads to the proposed site. Their registration and licensing will be required to follow the stipulated road regulations.

25	Public Roads and Roads of Access Act Cap. 399	• Ensure non-interference with public roads when constructing the terminal and the pipeline infrastructure. Provision of safe passage	• The Proponent to apply proposed mitigation measures in the ESIA Study Report to minimize impact and safeguard against explosion and fire.
26	The KMA Act	• The KMA Act domesticates the ability of the Kenya government to implement IMO Conventions related to shipping and maritime safety that it has ratified	• KMA is the designated national competent oil spill authority responsible for the development and provision of guidelines for the management of oil spills in the maritime environment. Under Sec. 5 (i) of the Act, KMA is required to enforce safety of shipping, including compliance with construction regulations, maintenance of safety standards and safety navigation rules.
27	The BMU Regulations, 2007	The BMU regulations were gazette through a legislative supplement No. 67 of 2007 to serve the following purposes: • Strengthen the management of the fish-landing stations, fishery resources and aquatic environment • Support the sustainable development of the fisheries sector • Assist in alleviating poverty and improving fisher community livelihoods • Mainstream gender issues in the management of fisheries resources • Ensure the achievement of quality standards with regard to fish and fishery products • Build local fisher community capacities to effectively engage with other stakeholders in management of fisheries resources • Mitigate conflicts in resource use in the fisheries sector	• KMA is the designated national competent oil spill authority responsible for the development and provision of guidelines for the management of oil spills in the maritime environment. Under Sec. 5 (i) of the Act, KMA is required to enforce safety of shipping, including compliance with construction regulations, maintenance of safety standards and safety navigation rules. • All ships operating at the jetty shall be registered and licensed by KMA • BMUs in the area are key stakeholders of the project as they crisscross the

			area to access fishing grounds and land their catch. Decisions taken by the proponent should be undertaken in consultation with the fishermen
28	Employment Act No 11 of 2007	• Prohibition Against Forced Labor • Prohibition of child Labor	• Project proponent undertakes to abide by the requirements of the Act
29	KS EAS 924:2020	• Code of practice for by KEBS for handling, storage and distribution of LPG in domestic, commercial and industrial installations • Part 3: LPG installation involving storage vessels of individual water storage capacity exceeding 500L.	The Standard provides guidelines for: • Design pressure; • Fire protection; • Construction and initial (production) testing of LPG vessel; • Filling ratio and volumes of storage vessel; • Storage vessel location; • Installation of LPG vessels; • Installation of vaporizers; • Periodic inspection and retesting; • Electrical equipment and other sources of ignition; • Filling point for bulk storage vessel; • Filling of portable containers; • Container storage areas; and • Filling shed for portable containers.
World Bank Safeguard Policies			
1.	Environmental Assessment: OP/BP 4.01	• Used to identify, avoid, and mitigate the potential negative environmental impacts associated with a project	• Project has potential to impact the environment through pollution of soil and water and social impact to local community

2.	Involuntary Resettlement: OP/BP 4.12	• The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts	• Involuntary Resettlement is not triggered since the proposed project will not result into displacement.
IFC Performance Standards			
1.	Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts	• Establishes the importance of integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects.	• The nature of the project and the existing local regulation since the proposed project falls in the category listed in the Second Schedule of the Environmental Management and Co-ordination Act (EMCA), 1999 Amended 2015 under Management of hydrocarbons including—the storage of natural gas and combustible or explosive fuels.
2.	Performance Standard 2: Labour and Working Conditions	• Recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers as guided by the ILO Conventions.	• The proposed project is expected to create job opportunities for both skilled and unskilled Labor during construction and operation phases.
3.	Performance Standard 3: Resource Efficiency and Pollution Prevention	• 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.	• The proposed project is anticipated to generate negative impacts during its life cycle, however the significance of the impacts will range between minor to moderate before mitigation and will further reduce after implementation of mitigation measures.
4.	Performance Standard 4: Community Health, Safety, and Security	• Recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts.	• The proposed project pauses great public concern especially in the event of a major disaster such as explosions and fire outbreaks. Liquefied

			Petroleum Gas is a highly flammable product and can be detrimental to the public safety if measures are not put in place.
5.	Performance Standard 5: Land Acquisition and Involuntary Resettlement	• Recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land.	• The proposed project will not create displacement since the project site is already developed with similar facility.
6.	Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	• Recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development.	• The existence of plant biodiversity in the Project area even though according to the IUCN plants Redlist (2014), no threatened species were recorded.
7.	Performance Standard 7: Indigenous Peoples	• Recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population.	• There are no Indigenous persons affected by the proposed project and hence this performance standard will not be triggered
8.	Performance Standard 8: Cultural Heritage	• Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that Proponents protect cultural heritage in the course of their project activities.	• There is no protected cultural heritage within the project area hence this performance standard will not be triggered.

4.4 Institutional Framework

Table 15: Relevant Institutional arrangements

Institution	Role in proposed project	Project cycle stage required
NEMA	• Issuance of EIA license • Inspections and monitoring compliance with license and approvals conditions • Protect public interests	Throughout the project cycle.
Directorate of Occupational Health and Safety	• Registration of the facility as a work place • Enforce compliance with OSHA No. 15 of 2007 • Registration of the construction site as a work place • Enforcing compliance with Occupational Health and Safety Regulations at the construction site	Throughout the project cycle
Kenya Maritime Authority (KMA)	• Development and provision of guidelines for the management of oil spills in the maritime environment	Throughout the project cycle
Ministry of Energy and Petroleum (MOE&P)	• MOE&P is in charge of formulating and implementing policies so as to create an enabling environment for efficient operation and growth of the sector. It sets the strategic direction for the growth of the sector and provides a long-term vision for all sector players	Throughout the project cycle
The Petroleum Institute of East Africa (PIEA)	• The Petroleum Institute of East Africa (PIEA) is the professional body for the oil and gas industry in the East Africa region. The mission of the PIEA is to provide a forum for expertise and excellence in the oil industry, promote professionalism and free enterprise in the petroleum business supported by the highest operations and business standards.	Throughout the project cycle
Energy & Petroleum Regulatory Authority (EPRA)	The EPRA is established under the Energy Act, 2019 with the following objectives and functions: • Regulate the electrical energy, petroleum and related products, renewable energy and other forms of energy. • Protect the interests of consumer, investor and other stakeholder interests. • Maintain a list of accredited energy auditors as may be prescribed. • Monitor, ensure implementation of, and the observance of the principles of fair competition in the energy sector, in coordination with other statutory authorities.	Throughout the project cycle

5.0 Analysis of Project Alternatives

During the course of formulating the proposed project, several project alternatives were considered to ensure that the best option of project development was adopted. The consideration of alternatives is one of the more proactive approaches of environmental assessment. This process serves to enhance the project design through an examination of other feasible options instead of only focusing on the more defensive task of reducing adverse impacts of a single design. Project alternatives have been evaluated by the ESIA team to achieve project objectives while having least adverse environmental impacts. The alternatives assessed during this process include;

5.1 Storage Type alternatives

During the initial conceptualization stages of the project, multiple storage mediums were considered based on several factors such as spacial constraints, environmental factors and economic benefits. The first step in selecting the storage type was to begin between determining which of the two below options would be utilized.

i) Refrigerated Storage Tanks or
ii) Pressurized Storage Tanks

As per applicable standards and codes, refrigerated tanks are ideal for large capacities of approximately 50,000MT or more. Pressurized storage tanks are applicable for capacities less than 50,000MT. Following the selection of the pressurized tanks, the next stage was to determine the ideal storage type within the proposed project site. Due to several factors such as large communities based in close proximity i.e. within 1km, to the site, as well as available space considerations, the following storage types were considered:

- Caverns;
- Spherical Tanks;
- Aboveground Tank; and
- Mounded Bullets.

The cavern type of storage was not considered in great detail due to the required capacity not meeting the minimum threshold to utilise this form of storage. As for aboveground bullets, the site limitations in terms of space and excessive requirement of firefighting capacity mean that this too was eliminated before further analysis. The assessment was then left between LPG spherical tanks and mounded vessels. Below is a comparison of the two, discussing both the benefits and shortcomings of either form of storage.

Figure 19: Image showing LPG Storage Types

Image showing LPG spheres, LPG aboveground bullets, Model showing LPG cavern and a Model showing LPG mounded vessels complete with piping network

5.1.1 LPG Spheres or LPG Mounded Bullets

The choice between a bullet and a sphere is a matter of economics and project logistics. So, one is better than the other only in the matter of which has a cheaper overall installed cost and

less of an environmental impact on the community. The sphere of course uses less material than a bullet for the same amount of liquid storage but is somewhat more difficult to fabricate. The diameter for shipping of a storage tank is in the order of 10 to 14 feet depending on the method of transport. This would limit a sphere's storage capacity if it is shop fabricated. For a 10-foot diameter tank, you can get 10 or more times the storage in a bullet than a sphere. For this reason, you usually only see spheres used for very large volumes (maybe in the order of 1,500m^3 or more) because they must be field fabricated to compete with the bullet in cost. For smaller storage capacities, the bullets are preferred because they can be shop fabricated and more easily transported. Although the storage capacity here is greater than 1500m^3, which allows for a further comparison, the effects on the environment and community should also be taken into consideration.

5.1.2 Advantages of LPG Mounded Bullets over LPG Spheres

a) Lower initial investment and financial risk in case of LPG mounded vessels/storage tanks as compared to sphere of similar or larger volume;

b) LPG sphere of similar volume requires more construction time as compared to LPG mounded vessels;

c) LPG mounded vessels take lesser implementation time making the project more economical, easier to install and operate thus making turnaround time from designs to operation shorter than for spheres;

d) LPG mounded vessels are much safer since their weight is distributed evenly over a larger area thus reducing chances of collapse as compared to spheres. This rings true for areas prone to earth quakes, cyclones and Tsunami;

e) Furthermore, LPG mounded vessels an added advantage that the load is distributed over a larger area thus the problem of uneven settlement /collapse is diminished;

f) In case of installations with mounded LPG vessels, if there is any problem/maintenance/repair/ breakdown of any one tank, then the tank can be isolated via shutting of relevant valves, allowing for operation to continue unimpeded, albeit with lesser capacity. Product can also be easily transferred from one tank to another thus increasing safety of the plant. In the case of spheres if there is any problem with the sphere or its valves or pipeline, then the entire plant comes to a standstill; and

g) Though there is a common notion that for the same volume a sphere has the least surface area and least thickness and hence lesser weight and less cost, it has been established that the weight saved whilst construction spheres is negated due to the wastage in the development of various sections (petals and crown) thus leaving little or no benefit of the weight saved.

5.2 LPG Storage Technology alternatives

Project has advocated the procurement of environment friendly LPG through import, in order to meet the primary and secondary demands of energy sector. Currently, the majority in the rural regions prefers inefficient wood fuel and charcoal for supply of heat energy. The technology alternatives for importation, refining, storage, handling and transportation of LPG are limited and have been greatly reduced after the only refinery in the region, Kenya Petroleum Refineries Limited (KPRL), ceased operations a couple of years ago. This therefore means that the only source of supply for LPG in the region is through imports. This is widely viewed as the most cost-effective option.

5.3 Alternative to the Pipeline Design

Alternative designs for various components of the pipeline and other infrastructure components have been subjected to cost benefit analysis to select the best option considering safety, environment and cost. The contractor will incorporate the LPG line with appropriate modifications. This will include enhanced monitoring, leak detection, fire suppression and firefighting. Enhanced evacuation mechanism will also be included in the safety procedures to be put in place to address occurrence of disaster.

5.4 Alternative to the proposed location of the LPG Storage and Handling facility

The proposed project site consists of highly disturbed secondary vegetation of mixed indigenous and exotic species as a result of old cultivation of cashew nuts, mangoes, guavas and coconuts. Consequently, large patches of open grassland and pockets of isolated trees and bushes dominate the vegetation of the area.

The adjacent alternative site has less grasslands and open spaces but more indigenous species compared to the former. Overall, the alternative project site has more tree density with closed canopy and more indigenous species. Although both sites are dominated by the aforementioned cultivated crop trees, several indigenous ones are extant.

Biodiversity loss is therefore more pronounced in the alternative adjacent site than on the proposed project site.

5.5 The “No Action” Alternative

Under the ‘No Action” Alternative, the proposed project will not proceed.

The no action alternative would mean that: Limitations of product transfer to the newly built storage will persist since there will be

- No additional storage facility
- No cost saving on demurrage charges due to lack of efficient LPG offloading services with no downtime.
- No creation of employment during design and construction stages
- No additional revenue to the government agencies tasked with necessary licensing
- Less LPG product to the market.

From the analysis above, it becomes apparent that the No Project Alternative is not a viable alternative to KPC, the investors and the community at large.

6.0 Public Participation and Consultation

6.1 Purpose of Consultations with Community/Key Stakeholders

The main purpose of carrying out consultations with community and key stakeholders was to obtain views and concerns of the project area community and other interested parties regarding the project so as to incorporate their contribution into the project development to safeguard the environment and the interest of key stakeholders particularly the local community and project area leadership and agencies directly or indirectly affected by the project.

Stakeholder consultation was conducted to take the opportunity to elaborate the essence of the project, to inform the stakeholders of any potential negative impacts and elaborate on the positive aspects so that informed decisions are made by the stakeholders.

The public consultation meeting was aimed at achieving the following specific objectives:

- Collection of additional baseline data/ information on the project area community;
- Conduct further stakeholder and community consultations and sensitization; and
- Provide the project area community and stakeholders with an opportunity to directly interact with the project developer through the ESIA Consultants and ask questions, raise issues and concerns pertaining to the proposed project and contribute to the identification of project impacts, mitigation measures and project alternatives.

6.2 Approach to Consultations with Community/Key Stakeholders

The Consultant visited key stakeholders in their offices and discussed the proposed project and administered questionnaires with them. For the community stakeholders, the Central Government Administrators led by Mombasa County Commission, Changamwe Deputy County Commission, Assistant County Commissioners from Port Reitz and Changamwe together with Local Area Chiefs helped organize for a public meetings (Barazas) where the community was informed of the project and also sensitized on the benefits and dangers of LPG. A one-week public notices were pinned at various chiefs' offices inviting the public to attend the various meetings at their respective locations.

The ESIA employed three main methods of consultations to get the data presented in this report. These are:

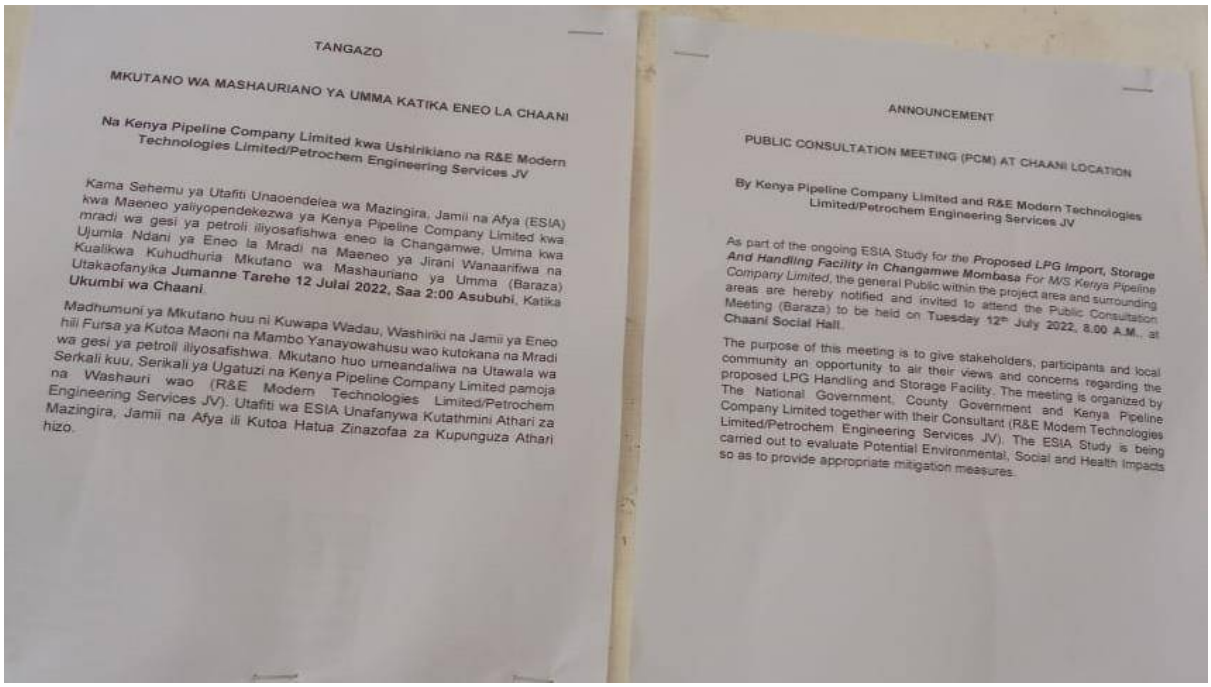
- Meetings and discussions with Key Stakeholders;
- Questionnaire administration and interviews; and

- Convening of Public Consultation Meetings (PCMs) within the project area.

Key informants included local leaders and representatives from various Government Departments Private establishments.

Upon the conclusion of the meetings they filled questionnaires airing their views.

The team undertakes to make continuous consultation throughout the ESIA process.



TANGAZO

MKUTANO WA MASHAURIANO YA UMMA KATIKA ENEO LA CHAANI

Na Kenya Pipeline Company Limited kwa Ushirikiano na R&E Modern Technologies Limited/Petrochem Engineering Services JV

Kama Sehemu ya Utafiti Unaoendelea wa Mazingira, Jamii na Afya (ESIA) kwa Maeneo yaliyopendekezwa ya Kenya Pipeline Company Limited kwa mradi wa gesi ya petroli iliyosafishwa eneo la Changamwe, Umma kwa Ujumla Ndani ya Eneo la Mradi na Maeneo ya Jirani Wanaarifiwa na Kualikwa Kuhudhuria Mkutano wa Mashauriano ya Umma (Baraza) Utakaofanyika **Jumanne Tarehe 12 Julai 2022, Saa 2:00 Asubuhi**, Katika **Ukumbi wa Chaani**.

Madhumuni ya Mkutano huu ni Kuwapa Wadau, Washirki na Jamii ya Eneo hili Fursa ya Kutoa Maoni na Mambo Yanayowahusu wao kutokana na Mradi wa gesi ya petroli iliyosafishwa. Mkutano huo umeandaliwa na Utawala wa Serkali kuu, Serikali ya Ugatuzi na Kenya Pipeline Company Limited pamoja na Washauri wao (R&E Modern Technologies Limited/Petrochem Engineering Services JV). Utafiti wa ESIA Unafanywa Kutathmini Athari za Mazingira, Jamii na Afya ili Kutoa Hatua Zinazofaa za Kupunguza Athari hizo.

ANNOUNCEMENT

PUBLIC CONSULTATION MEETING (PCM) AT CHAANI LOCATION

By Kenya Pipeline Company Limited and R&E Modern Technologies Limited/Petrochem Engineering Services JV

As part of the ongoing ESIA Study for the ***Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa*** *For M/S Kenya Pipeline Company Limited*, the general Public within the project area and surrounding areas are hereby notified and invited to attend the Public Consultation Meeting (Baraza) to be held on **Tuesday 12th July 2022, 8.00 A.M.**, at **Chaani Social Hall**.

The purpose of this meeting is to give stakeholders, participants and local community an opportunity to air their views and concerns regarding the proposed LPG Handling and Storage Facility. The meeting is organized by The National Government, County Government and Kenya Pipeline Company Limited together with their Consultant (R&E Modern Technologies Limited/Petrochem Engineering Services JV). The ESIA Study is being carried out to evaluate Potential Environmental, Social and Health Impacts so as to provide appropriate mitigation measures.

Plate 4: Chaani Location notice for public participation

6.2.1 Public Consultation Meetings

A total of 4 Community Public Consultation Meetings were convened within the locations where the project area communities reside namely Kwahola, Chaani, Changamwe and Port Reitz. One key stakeholders' meeting was also held within the project area to collect views on the proposed project while one virtual meeting with KCAA was done for further clarification about the project scope. The meeting schedule were as follows:

Table 16: Public participation meeting schedule

#	Location	Venue	Date
1.	Kwa Hola	Kwa Hola Pry Sch. Hall	Mon 11th July 2022
2.	Chaani	Chaani Social Hall	Tue 12th July 2022
3.	Changamwe	Changamwe Social Hall	Wed 13th July 2022
4.	Port Reitz	Bomu Pry School Hall	Thurs 14th July 2022

5.	Key Stakeholders	Jambo Village Hotel	Fri 15th July 2022
6.	KCAA Meeting	Virtual	Fri 2nd September 2022

Table 17: Summary of community public participation responses

Concern/Comment	Response
Will there be disruption of the market on the wayleave?	The Kenya Pipeline Refineries Ltd wayleave is clear. The due protocols will be followed incase relocation/displacement will be needed.
Apart from employment how else can the resident s benefit socially?	Kenya Pipeline Cooperation has the Cooperate Social Initiative unit responsible for social issues. The unit does different projects in health, education, water and sanitation. Kwahola Primary School is one of the beneficiaries of the education sector.
Can we get employment and what is the procedure?	Depending on the type of job, priority is always given to the locals within the project. The contactors will liaise with the chief to ensure people within the area are considered for employment
What effects will the LPG pipeline have on the area residents	There will be no danger since the pipeline will be buried on the ground. Leak detection will also be installed that can notify the control room of any leakage and the system shut down and danger averted.
Can Kenya Pipeline Company offer training for inside jobs like firefighting despite not going to school	There are no trainings that are currently offered by Kenya Pipeline Company
There has been an issue of insecurity along the wayleave and dumping of solid waste, is the Kenya Pipeline Company aware?	The issue of insecurity is a national government mandate and should have been channeled through the office of the chief
Can solid waste in the area be useful in production of biogas in relation to this project?	No. In this project, the gas will be imported
Why should the public participation be done in a hall and not on the site where Kenya Pipeline is intending to set up the proposed project?	Majority of the work will be done inside the refinery, there are dangers that can be caused without adequate HSE induction and PPEs therefore it was best to be done in the community since the way leave also passes across the locations
Is it possible for the LPG pipeline to pass somewhere else that is not that is not near where people leave?	No. This project requires the Kenya Pipeline Company to use the existing way leave.
Why is the sample size for this public participation small yet it is a big project?	The total number public participation meetings are five and still it will be gazzetted, advertisement from two national newspapers and radio station. Furthermore, it is voluntary and open for everyone to attend

Can Kenya Pipeline Company offer training for inside jobs like how oil and gas management?	Yes, there is a school that offers trainings on oil and gas management that is currently sponsored by Kenya Pipeline Company
Is there an immediate fire response team in case of fire?	Yes. There are fire stations inside the refinery and five fire trucks. There are also regular inspections. There will be no danger since the pipeline will be buried on the ground. Leak detection will also be installed that can notify the control room of any leakage and the system shut down and danger averted.
Where is the final layout design?	Environmental Impact Assessment has to be done first and public participation can also have an influence on the final design. A draft will be placed in the chief's office in case anyone want to look at it
What is the criteria that will be used to ensure the price of the gas reduces?	before the project plan, the landing cost and the profits have already been calculated and based on the economy of scale the proposed project will be able to withstand bulk storage
Apart from the employment opportunities how else can the residents benefit from the proposed project?	Kenya Pipeline Company has been involved in many social projects, but they have to be vetted before implementation. Therefore, all the needs should be channeled through written proposals
How will Kenya Pipeline Company ensure there is no gender-based violence among workers during the implementation of the Project?	Kenya Pipeline Company will ensure public awareness and measures will be taken if need be.
Can Kenya Pipeline Company consider laying the LPG pipeline more than 1.2 m deep in the ground?	There are international standards and API standards that have been considered before the decision to lay the pipeline at that specific depth
What mitigation measures will be put in place to ensure the gas is not released to the atmosphere?	There is a LPG relief system. Currently the plan is still at the design stage but there are optimum ways and provisions that will be put in place to ensure gas is not released to the atmosphere
Can we get employment and what will be the criteria used?	Depending on the type of job, priority is always given to the locals within the project. The contactors will liaise with the chief to ensure people within the area are considered for employment
What can happen when the pipes expand due to heat?	There is thermal expansion relief valve provision that will be put and gas leak detectors to curb the issue of expansion and maybe explosion.
Can Kenya Pipeline Company consider liaison with the county government to upgrade the nearest dispensary in case of fire incidence?	The recommendation has been noted and it will be discussed

Can the youth in partnership with Kenya Pipeline Company plan flowers along the way leave?	That is a good recommendation and Kenya Pipeline Company was thinking along the same line, youths will be involved once that project is set to commence
Who are the people that are required to attend such public consultation meetings?	Everybody within the proposed project area is invited. There was a notice that was given through the office of the chief to allow everyone to participate
What effects will the LPG pipeline have on the area residents?	There will be no danger since the pipeline will be buried on the ground. Leak detection will also be installed that can notify the control room of any leakage and the system shut down and danger averted
Will there be disruption of the market that is currently operational along the wayleave?	The Kenya Pipeline Company's way leave is from Kipevu Oil Terminal (KOT) to the Kenya Pipeline Refinery Limited. Protocols will be observed in case there will be need for displacement. This may only be temporary during the laying of the LPG pipeline
Can we get employment and what will be the criteria used?	Depending on the type of job, priority is always given to the locals within the project. The contactors will liaise with the chief to ensure people within the area are considered for employment
Is Environmental Impact Assessment an independent body?	Yes, in this project the contractors are from R&E Modern Engineering Technologies Ltd
Is there an immediate fire response team in case of fire?	Yes. There are fire stations inside the refinery and five fire trucks. There are also regular inspections. There will be no danger since the pipeline will be buried on the ground. Leak detection will also be installed that can notify the control room of any leakage and the system shut down and danger averted
Does this proposed project have any influence from politics?	No. The project is not related to any politics, it is just a coincidence that the election process is around the corner
Apart from the employment opportunities how else can the residents benefit from the proposed project?	Kenya Pipeline Company has been involved in many social projects, but they have to be vetted before implementation. Therefore, all the needs should be channeled through written proposals




Minutes of the above meetings were recorded and are attached as Annex 4 while the filled stakeholder questionnaires have been given as Annex 5 of this report.

Plate 5: Photos of PCMs at the four locations

6.2.2 Analysis of Community/Key Stakeholder Feedback

Acceptance of the Project

Generally, the project is accepted by all those attending the meeting since there is potential for job opportunities and the lowering of the price of gas. However, they called upon the proponent to ensure that employment opportunities are given first to youths from the community. They also urged the proponent to involve the community in Corporate Social Responsibilities such as building hospitals/clinics, sponsoring needy bright students from the area etc. Another aspect was to ensure safety measures are top notch and have in place a disaster response plan.

The responses for concerns raised by the key stakeholders during preparation of ESIA Study report are provided in Table 18 below.

Table 18: Summary of Comments raised by Stakeholders

#	Stakeholder Name	Positive aspects	Negatives Impacts	Suggestions/Mitigation measures
1	Abdulsalam Omar	• Economic empowerment will be fostered. • There will breakdown of LPG monopoly in the country. • The will be both control and accessibility of the. gas • It is affordable.	• There would occur leakage which would be flammable. • There would be alteration of the environment due to the gas.	• There needs to have a traffic management plan. • There needs to have occupational health safety policy introduced • KPC needs to ensure safety for the nearby residents.
2	Baraka A. Juma	• Will create job opportunities. • Awareness of the dangers of misusing gas will be introduced.	• There will be force relocation of market traders. • In case on negligence there might occur a case of gas leakage.	• There needs to be transparency embraced in recruiting the youths in different job roles.
3	Abdalla Kondo	• There will employment	• It will lead to business being affected	• Help business not to collapse • Ensure no leakage of the gas.
4	Rose Ngugi	• Residents will be enlightened and enhanced with the gas benefit. • It is cheaper more than charcoal or electricity.	• Some of the residents that have invaded the area around KPC will be evicted in case of leakage.	• Involve all the stakeholders in public participation.
5	Minam Tilas	• It lowers the increasing cost of living gas wise • Will ensure a cleaner environment.	• Any leakage may be disastrous especially it may attempt.	• More residents should be informed about the project. • Markets along the project should be informed about the project plan. • Capacity building initiatives on the means of cooking to be introduced.
6	Omar Swaleh	• The gas is cheaper • It will provide employment	• Will cause air pollution • Will lead to displacement of	• Ensure there is proper plan in project. • Ensure maximum clarity from the

		• Will in away bring business growth	business people along the line.	residents to be informed about the project.
7	Harim Katers	• Will provide employment • Will promote environmental conservation • Will promote community conservation	• Will cause air pollution • Will lead to business effects	• Ensure proper handling of the gas to avoid any gas leakage
8	Sharon Mbusiro	• Creation of employment • Sufficient gas supply	• The gas plant or pipes might be tragic when it explodes due to leakage of the pipes	• A proper environmental impact assessment should take place before the project kicks off to ensure that the citizens around the project are not affected in any way • Ensure displaced people do get compensation
9	Omar Khamis	• Will create job opportunities	• Might lead to noise pollution • Might trigger explosion • The gas is dangerous especially to children	• There should be awareness and to the people living along the area • The area should be secure
10	Koreaso Farsala	• Will lead to economic growth • Will create job opportunities	• Fire explosion	• There should be proper measure put in place to ensure no trigger of fire explosion
11	Abdulkadir Khalid	• Will create employment opportunities • KPC being creating a lot of facilities	• It will be muddy during the digging of the plot line this might even be dangerous for kids	• There should be surveillance to ensure maximum security of the facility • Ensure more job opportunities for the youth
12	Khadija Khamis	• Will create job opportunities • Will lead to limited supply of gas • The gas is environmentally	• Will lead to demolition of settlements • Will lead to destruction of properties	• There should be awareness on how to use the gas • There should be health policies set up encase of emergency

		friendly		
13	Abushir Abdalla	• Will provide employment • It is environmentally friendly.	• LPG gas can cause health complications	• Harmful gas not to be allowed in the market
14	Zablon Juma	• It is cheaper. • It is more reliable.	• There will be massive loss of properties • There will be noise pollution	• The villagers should be walked through about the gas project. • They should be compensated due to eviction process.
15	Alex Jambo	• Will lead to job opportunities. • Will lead to improvement of the residents' lives.	• Will lead to air pollution.	• Ensure safety to avoid fire outbreak.
16	Suleiman Malie	• There will be increase supply of gas. • The prices will be stable.	• There could be an increase fire outbreak.	• Ensure that there is management of traffic along the project.
17	Kenny K.	• Would bring about more C.S.R projects. • Will bring more job opportunities. • Will help economically.	• The LPG gas could be harmful to one's health.	• Work on health safety policies. • Monitor weak areas and address them.
18	Mungai Boniface	• No comment	• No comment	• N/A
19	Amos Mungai Lumiti	• Would bring about jobs. • Would economically boost the area. • The gas is reliable.	• Will cause air/noise pollution. • Would increase waste disposal affecting the environmental. • Would be risky to people's health.	• Workers at site to be provided with PPES, HESQ toolbox during meetings. • There should be an emergency response plan put in place. • The contractor to work on disposal of waste and waste management system.
20	Anthony Kenga	• Will provide employment. • Will help boost business. • Will lead to favorable gas price.	• Will lead to displacement of people along the area line.	• There should be set different measures put in place to ensure assessment of any risk, threat or challenge during the project.

21	Shee Juhuni	• The gas is cheaper • Will provide job opportunities	• Can result in environmental pollution. • Can trigger ecological disaster.	• Quality sensing machines that detect gas leaks to be introduced as early as possible to prevent unwanted damages caused by the leak. • Effective measures should be taken to avoid such leakages like placing LPG pipeline deeper.
22	Shabani Matano	• The gas price will be favorable • Clean energy to the people. • Will provide an alternative from other gases.	• Might lead to fire outbreak	• There should be proper evaluation of the risks and measures to ensure no threat risks happen.
23	Alex Ria	• Will provide job opportunities. • Will provide a cheaper alternative than other providers.	• The gas could cause damage.	• People should be taught on how to handle the gas.
24	Erastus Wani	• Reduced product cost due to economics of scale. • Will provide job opportunities. • Will lead to reduced environmental pollution.	• The line lease and storage fees might ad to the product cost making marketers using the facility. • Clearing of vegetation noise pollution due to heavy machine use.	• They should consider favorable rates for leasing and storing fee.
25	Hagi Mama	• Will create job opportunities • Will provide clean energy	• Will lead to risk of due to labour influx • Would lead to fire outbreak • Would cause air pollution	• They should involve all the stakeholders during the project implementation
26	Kipkemoi Rono	• Will bring improved livelihood standards. • Will create jobs opportunities. • Would reduce deforestation.	• Will lead to increase traffic on the road.	• They should engage land owners within the area during the process

27	Athumani Mwero	• None	• The project will affect the community.	• There should be adequate consultation with the land owners before the project begins.
28	Edwin Odhiambo	• Will create employment • The LPG gas will be cheaper	• Will lead to air pollution. • It will trigger fire.	• Proper EIA to be done and implemented during the entire process.
29	Patrick Kamau	• It will reduce gas emission thus conserving the environment. • Will reduce toxic gas in homes improving people's health. • The gas is cheaper.	• There might be crazy traffic along the area.	There should be increased vigilance and enforcement of safety standards towards logistics and use of the product.
30	Sammy Movai	• Will create job opportunities • Will improve livelihoods • Will reduce charcoal use	• Would increase fire outbreak due to gas leaks. • Would cause monopoly and dictatorship in the market.	• Ensure policies that ensure no unhealthy business practices that lead to monopoly and misuse of resources.
31	Suleiman Mwinyi	• Will create job opportunities • It will increase revenue • Will economically boost the area	• Will cause displacement of settlements in the areas involved • Any leakage would cause an explosion thus risky to human life • It would affect fisherman to	• Fiber cables should be installed under the water to mitigate any leakage.
32	Benard Matuku	• The project will provide employment. • Will be a sour of revenue or the government. • Will help in LPG gas price regulation.	• Will be a huge fire risk. • Might increase drug abuse by the youth who will waste their salaries. • There will be increase in traffic flow.	• Ensure a proper fire risks mitigation channel.
33	Chrispine Ojijo	• Will create employment • Will help in environmental conservation • Will help in health risk	• Will cause air pollution. • Might cause fire outbreak. • Will cause displacement of the land owners.	• There should be plans to avoid air pollution and gas emission. • There should fire risks plan to avoid explosion.

		mitigation		
34	Michael Nazo	• It will economically empower the area to business.	• Could lead to displacement of people from there settlements. • The project could harm the environment.	• Find an alternative site to set up the project.
35	Eliakim Ouma	• It is cheaper and reliable alternative for most homes. • It is environmentally friendly.	• It would cause a fire explosion which would destroy properties. • To some it might be expensive	• There should acquisition of bulk water storage for firefighting in case of explosion.
36	Edwin Odhiambo	• Creation of jobs. • The prices of the gas will be favorable.	• Will lead to pollution.	• There needs to e be done a proper environmental assessment to mitigate issues like pollution or fire outbreak risk.

7.0 Environmental and Social Impact Assessment

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

7.1 Assessment of impacts

Section one of this report presents the methodology used in assessing the potential impacts of the proposed project. The key impacts identified for the proposed project are highlighted according to the relevant project phases. The Consultant utilized precautionary principles to establish the significance of impacts and their management and mitigation.

7.2 Potential impacts of the proposed project

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

- Soil Impacts
- Air quality Impacts
- Noise Impacts
- Impacts of waste generation
- Impacts on water resources
- Impacts on Biodiversity
- Socioeconomic impacts
- Health and Safety Impacts

7.2.1 Impacts on Soil

The proposed development is anticipated to have minimal impact on soil. The anticipated impacts are soil contamination by oil spills; and disturbance of project site top soil and geology during excavation activities leading to soil erosion. Construction vehicles and equipment are likely to release fugitive spills to the soil. Depending on the size and source of the spill, liquid and gaseous phase petroleum hydrocarbons may remain mobile for long periods of time, and

can potentially pollute groundwater. Exposed soil during construction and decommissioning phases are likely to be exposed to agents of erosions mainly water and wind.

During operation phase impact on soil is not anticipated because of the presence of the concrete paved surface over the LPG storage which will protect soil from agents of erosion as well prevent any potential contaminant from reaching the subsurface layers, and is thus not assessed.

Table 19 and Table 20 below present summary of characteristics and significance respectively of impacts on soil during the project cycle.

Table 19: Summary of soil quality impacts

Project Phase	Impact	Significance
Construction Phase	Soil contamination; Soil erosion	minor negative
Operation Phase	Not anticipated	n/a
Decommissioning Phase	Soil contamination and soil erosion	Minor negative

Table 20: Summary of Soil Impact significance

Nature	Construction and Decommissioning activities will result in negative soil quality impact
Impact Magnitude –Low	**Extent**: The extent of the impact would be site specific as it is not likely to extend beyond the site boundary, **Duration**: the impact will be short-term during construction and decommissioning phases. **Intensity**: The intensity of the impact will be low
Likelihood	There is likelihood that the impact will occur

Mitigation Measures

The mitigation measures proposed for managing soil resources are:

- Minimise the areas to be excavated;
- Ensuring that vehicles/equipment used during construction and decommissioning phases are serviced regularly;
- Use excavated soils for backfilling while carry away excess soil for appropriate disposal.
- Carry out slope protection along the steep slopes to rehabilitate areas where excavation has taken place to prevent future collapse and erosion;
- Re-vegetating disturbed areas once construction and demolition works are completed during construction and decommissioning phases respectively.

7.2.2 Air quality

The existing air quality at the Project Site is influenced by industrial and traffic sources of air pollutants within the vicinity. The activities that influence air quality in the area include:

- Vehicle movement at the Plant and nearby roads; and
- Current emissions from operations of current facility and the neighboring industries

The potential sources of emissions from the project during construction stage will include exhaust emissions from vehicles and equipment; odour from paint work; dust released from construction materials and excavated grounds.

During operation phase minimal exhaust emissions will be generated by trucks coming for bulk LPG from the facility and other company vehicles.

During decommissioning phase will be exhaust emissions from vehicles and equipment used in demolition work and dust and odour from demolished materials/waste.

The above sources are anticipated to temporarily increase the local concentrations of particulate matter and exhaust gases but are likely to be short-term and localised. Dust generated during construction will be a health hazard to workers and project area community and could lead to chest problems, coughs, flu and have serious effects on asthmatic and sinus sufferers. Table 21 below present significance of air quality impacts during construction and decommissioning and operational phases, respectively of the project.

Table 21: Significance of Air Quality Impacts

Nature	Construction, Operation and Decommissioning activities will result in negative air quality impact
Impact Magnitude – Low	**Extent:** The extent of the impact would be local as it is likely to extend beyond the site boundary, but not beyond a 1 km radius from the site. **Duration:** the impact will be short-term during construction and decommissioning phases but long-term operation phase as it will last life time of the Facility which is anticipated to be approximately 50 years. **Intensity:** The intensity of the impact will be low
Likelihood	There is likelihood that the impact will occur

Mitigation Measures

The mitigation measures proposed for managing air quality are as follows:

- Relevant legislative and Kenya Standard design requirements will be adhered to where appropriate;
- Vehicles and machinery will be regularly maintained;
- The speed of construction vehicles is to be controlled to avoid excess dust and smoke generation;
- Idling of vehicles and machinery is to be prohibited to avoid excess smoke generation;
- Water is to be sprayed during the construction phase on areas under excavation and dusty roads to reduce dust emission;
- Install standard leak detectors for hazardous area installations; and
- Any detected leaks will be repaired as a high priority.

7.2.3 Noise and vibration

The existing background noise environment at the Facility is typical of a commercial set up with moderately low levels of background noise dominated by noise from operational areas of the pump house, compressor shed and the standby generator areas where elevated noise levels were recorded.

Noise generated during the construction stage will be largely associated with heavy vehicles delivering and removing construction materials, welding and fabrication of LPG tanks and the operation of vehicles and equipment on-site. This will result in intermittent short-duration increases in noise levels within the immediate vicinity of the Facility during the daytime. Table 22 below presents impact of noise during construction phase.

Table 22: Noise Impacts during construction phase

Nature	**Construction activities will result in negative noise impact**
Impact Magnitude – Low	**Extent:** The extent of the impact would be local as it would likely extent beyond the site boundary, but not beyond a 1 km radius from the site. **Duration:** the impact will be short-term as it will only last the duration of mounded tanks installation and removal respectively. **Intensity:** The intensity of the impact will be low since ambient noise level are fairly high
Likelihood	There is likelihood that the impact will occur

Operation phase

Noise during operational phase is expected to come from vehicle coming to load LPG from the facility and is expected to be low and therefore not considered further in this section.

Decommissioning phase

Decommissioning phase of the Project will be mainly demolition of the facility and offsite disposal of removed materials. Noise generated during the decommissioning stage will be largely associated with the transit of heavy vehicles carting away materials, and the operation of vehicles and equipment on-site. As is the case with the construction phase, it will result in intermittent short-duration increases in noise levels within the immediate vicinity of the Site during the daytime.

Mitigation Measures

The following hierarchy of noise management will be applied to the extent that it is reasonable to do so:

Avoid (e.g. locating an activity in an area that is not near a sensitive receptor). Minimise, in the following order of preference:

- Instruct machinery operators to avoid raving of engines;
- Carry out site preparation activities during the day;
- Use best available technology (e.g. noise abatement barriers or enclosures) and
- Post signs warning about high noise levels and the requirement to wear hearing protection.

KPC and the Contractor will address noise nuisance, in the first instance, through complaints-based process. Management and mitigation measures will be adopted to avoid environmental nuisance at any sensitive place. The mitigation measures proposed for managing acoustic quality are:

- Construction activities near sensitive places shall be restricted to normal working hours (typically 7.00 am to 6:00 pm, 7 days a week) unless otherwise agreed with the potentially affected stakeholder(s);
- Relevant legislative and Kenya Standard design requirements will be adhered to where appropriate;
- Adequate community notice of any scheduled, atypical noise events will be provided; and
- Equipment will be fitted with noise control devices where possible and appropriate.

7.2.4 Impacts of waste generation

A review of the construction methodology and LPG facilities was carried out to identify the wastes likely to arise from the construction of the proposed project and potential environmental impacts associated with the handling and disposal of the identified wastes. Waste streams anticipated during construction phase will include: excavation spoil, general waste; metal fabrication wastes, construction waste and sewage and wastewater.

Waste anticipated during operation phase will include redundant pipes replaced during maintenance; empty paint containers and waste packaging from maintenance and repair material. And during decommissioning phase, the anticipated waste will be included redundant equipment, decommissioned LPG tanks and piping, concrete boulders, and scrap metals. Table 23 and

Table 24 below present characteristics and significance, respectively, of impact of waste generation during the project phases.

Table 23: Waste Impact Characteristics

Project Phase	Project Aspect/activity	Impact type	Stakeholder /Receptor Affected
Construction phase	• Waste generated from construction activities: domestic waste from construction works; and excavation waste	negative	Surrounding areas
Operation phase	• domestic waste from operation personnel; • waste generated from maintenance works such as redundant equipment, metal parts • waste water from cleaning operations	negative	negative
Decommissioning phase	• Waste generated from demolition activities:	negative	Surrounding areas

Table 24: Waste Generation Impacts

Nature	Waste generated during construction, operation and decommissioning of the proposed development would result in a negative direct impact if not managed properly.
Impact Magnitude – Low	**Extent:** The extent of the impact is site specific. **Duration:** The duration would be short-term for construction and decommissioning phases waste as the impacts will not persist after construction and decommissioning phases respectively. However, impact of

	waste generated during operation will be long term- lasting the life of the project. **Intensity:** the intensity can be considered low as the work will be short term. Similarly, intensity of impact of waste generated during operation is low as they are not anticipated to occur on a daily basis or frequently
Likelihood	There is a definite likelihood of waste generation throughout project cycle.
Impact significance	Moderate

Mitigation Measures

The waste management will be based on the objects and principle of waste and resource management hierarchy, that is that is, avoidance, re-use, recycling and disposal of waste. The mitigation measures proposed for managing waste generated from the project are:

- Develop strategies (waste management plan) for management of specific waste streams prior to construction phase.
- Provision of toilet facilities for use by the contractor staff and other workers during construction and operation phases respectively;
- Provision of solid waste collection bins to all the operation areas; the waste is segregated and collected for disposal at a designated site approved by Mombasa County Government and NEMA;
- Sensitization of the contractor staff and other workers on the appropriate usage of the bins including a programme for regular disposal;
- Stockpile and salvage reusable and recyclable wastes, such as timber skids, fibre/nylon rope spacers, pallets, drums and scrap metals.
- Store hazardous wastes such as used oils and other chemicals in bunded areas away from watercourses.
- Collect and remove (via NEMA approved waste handler) waste from site for recycling, reuse or disposal at facility licensed to accept such wastes.
- All personnel will be instructed in project waste management practices as a component of the environmental induction process.
- All litter and general waste disposal will be at a local municipal landfill utilising an approved waste contractor.
- Records of all controlled wastes stored, and removed from site will be maintained.
- Safety and response training will be provided for all personnel.
- Materials and equipment for responding to hazardous spill incidents will be provided and maintained.

Residual Impacts

If wastes that can be reused or recycled are recovered, if all those that are supposed to be disposed are disposed of correctly and if the quantity of the remaining wastes that need to be deposited at the landfill/dumpsites can be minimised, the residual impact associated with wastes generated the project should be of minor significance and of a short-term duration. The Proponent also undertakes to comply with IFC Performance standard 3 of Resource efficiently and pollution prevention throughout the project's life cycle. Project has advocated the procurement of environment friendly LPG through import and storage in mounded LPG Bullets in order to meet the primary and secondary demands of energy sector. The reliability and adequacy of the supply of LPG shall guarantee sustainable development and reduced reliance on wood fuel attributed to increased indoor air pollution causing Upper Respiratory Tract Infections (URTI) thus protecting the environment from overexploitation and degradation.

7.2.5 Water resources

The impact on water resources during project cycle are likely to arise through the following ways: use of water during construction and operation; and contamination of water during the entire project cycle. Water will be required during construction phase to provide: drinking water for construction staff; concrete batching and dust suppression. Contamination of water during construction project phase may be caused by:

- Oils and grease from vehicles and equipment/machines used at the construction sites;
- Left over materials and waste containers that may have been holding classified materials for construction;
- Petroleum products and other chemicals released by trucks; and
- Sanitary and domestic waste from the construction camp.

During operation phase, water will be required for firefighting, welfare and hygiene and cleaning. Water contamination during this phase could arise from waste storage and handling and releases occasioned by abnormal events such as fire. There will be a potential for oil and fuel spills during the operations of the pipeline. Fuel handling equipment will be required for refuelling of boats visiting the jetty and inspecting the pipeline. Oil and fuel spills have a negative impact on marine ecosystems for example oil spills cause hypothermia, poisoning and internal damage, increased predation, bio-accumulation in food chains and fouling of habitats. Outboard engines mounted on boats have long been associated with polluting of waterways through passive discharge of fuel and lubricants.

During decommissioning of the facility, the decommissioning of vessels and associated pipework; and removal of piles and foundation could cause contamination of water resources.

Table 25 and Table 26 below present characteristics and significance, respectively of impact of the proposed project on water resources.

Table 25: Characteristics of Impact on water resources

Project Phase	Project Aspect/activity	Impact type	Stakeholder /Receptor Affected
Construction phase	Water usage – drinking, concrete batching and dust suppression Water contamination	negative	Local water resources
Operation phase	Water usage – firefighting, drinking and cleaning	negative	Local water resources
Decommissioning phase	Contamination of water by demolition waste	negative	Local water resources

Table 26: Significance of Impacts on Water Resources

Nature	Some activities during construction and decommissioning phases would result in contamination of water resource.
Impact Magnitude – Low	**Extent:** The extent of the impact is site specific. **Duration:** The duration would be short-term for construction and decommissioning phases and long term for operation phase. **Intensity:** the intensity can be considered low as the work will be temporary.
Likelihood	There is a definite likelihood of impact on water resources.
Impact significance	Low

Mitigation Measures

- Develop strategies for management of water resources;
- Regular checking and maintenance of all plant and machinery to minimize the risk of fuel or lubricant leakages;
- Storing hydrocarbons, fuels, lubricants and chemicals to be used in bunded and lockable oil storage tanks, with hoses and gauges kept within the bund;
- Preventing wet concrete and cement from entering watercourse;
- Prepare a spill contingency response plan and procure appropriate equipment for oil and fuel spill management;

- Develop a water quality monitoring programme for the channel in collaboration with relevant lead agencies; and
- Procure an oil spill response kit and build capacity of staff to respond effectively to potential oil spills.

Residual Impacts

With the application of the mitigation measures described previously, *no significant impacts* are likely to occur during construction, operation and decommissioning phases.

7.2.6 Impacts on Biodiversity

The proposed project site consists of highly disturbed secondary vegetation of mixed indigenous and exotic species as a result of old cultivation of cashew nuts, mangoes, guavas and coconuts. Consequently, large patches of open grassland and pockets of isolated trees and bushes dominate the vegetation of the area.

The adjacent alternative site has less grasslands and open spaces but more indigenous species compared to the former. The large patches of natural vegetation towards Kenya Pipeline Company are home to different species of fauna and flora, including three species of mushrooms recorded (the wild edible *Pleurotus sp*. (oyster), *Ganoderma sp.* and *Oudemansiella sp*.).

Overall, the alternative project site has more tree density with closed canopy and more indigenous species. Although both sites are dominated by the aforementioned cultivated crop trees, several indigenous ones are extant.

The construction of the LPG Mounds and associated facilities will result in the loss of biodiversity. Preparatory work for excavations for the placement of the LPG Mounds will result in clearance of vegetation thus impacting negatively on the integrity of ecosystems that serve as critical habitats to a wide range of faunal organisms. However, given the high disturbance, low tree density and lower species diversity in the proposed project site, the implementation of the project on this block would have lower impacts on the vegetation and biodiversity loss compared to the adjacent alternative block.

Table 27 and Table 28 below present characteristics and significance, respectively of impact of the proposed project on biodiversity.

Table 27: Characteristics of Impact on biodiversity

Project Phase	Project Aspect/activity	Impact type	Stakeholder /Receptor Affected

Construction phase	Cutting down of vegetation and habitat destruction	negative	Biodiversity
Operation phase	Introduction of invasive species	negative	Biodiversity
Decommissioning phase	Trampling of vegetation	negative	Biodiversity

Table 28: Significance of Impacts on Biodiversity

Nature	Some activities during construction and decommissioning phases would result in loss of biodiversity.
Impact Magnitude – Low	**Extent:** The extent of the impact is site specific. **Duration:** The duration would be long-term for construction and decommissioning phases. **Intensity:** the intensity can be considered low as no threatened species were recorded in the proposed project parcel.
Likelihood	There is a definite likelihood of impact on biodiversity.
Impact significance	Low

Mitigation Measures

- Important species such as rare, endemic or endangered should be moved to safe grounds which are not likely to be affected by the project activities;
- Plant nurseries of the key species should be established for species restoration in other areas to avoid complete loss of rare species;
- Large trees which store a lot of carbon stocks should be spared from destruction where possible;
- Invasive species should be controlled as soon as they germinate to avoid their population explosions as a result of seeds deposition in the soil;
- An invasive species management programme should be developed for monitoring and control of the species; and
- Construction work will be localized to the identified project area.

Residual Impacts

With the application of the mitigation measures described previously, *no significant impacts* are likely to occur during construction, operation and decommissioning phases.

Compliance with IFC Performance standard 6: Biodiversity conservation and sustainable management of living natural resources

This performance standard shall be triggered since there exist biodiversity in the Project including species of flora and fauna and their habitats that are expected to be lost permanently during the construction phase. Clearing of vegetation will destroy or reduce the suitable habitats for animal species such as birds, reptiles, small mammals and insects. The most affected taxa would be the species with a limited distribution range (endemics) or the rare ones. The Proponent is urged to establish plant nurseries of the key species for species restoration in other areas to avoid complete loss of rare species to enhance the project area biodiversity. Local community will also be sensitized on the importance of environmental protection and conservation of the natural vegetation.

Moreover, the proposed project aims to increase the supply capacity of LPG to industrial, commercial and residential customers throughout Kenya and East Africa thereby promoting reliance on LPG as opposed to wood fuel and charcoal in order to enhance the biodiversity and environmental conservation.

7.2.7 Health and safety

Occupational health and safety

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

- Exposure to excavation dust;
- Hazards of falling objects; and
- Occupational hazards when working at height and hot works.

The potential occupational health and safety impacts anticipated for operation phase include: injuries to workers from preventive and corrective maintenance especially of electrical equipment and work at heights.

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

Table 29 and Table 30 below present characteristics and significance, respectively of impact of the proposed project on Health and Safety.

Table 29: Characteristics of Impact on Health and Safety

Project Phase	Project Aspect/activity	Impact type	Stakeholder /Receptor Affected
Construction phase	Construction activities, operation of construction equipment and tools.	negative	Construction workers
Operation phase	Undertaking preventive and corrective maintenance.	negative	Operation phase personnel; contractors hired to undertake maintenance
Decommissioning phase	Demolition activities, operation of demolition equipment and tools	negative	Local water resources

Table 30: Significance of Impacts on Health and Safety

Nature	Some activities during construction, operation and decommissioning phases would result in health and safety impacts.
Impact Magnitude – Low	**Extent:** The impacts will be affecting the personnel involved in the respective phases of the project **Duration:** The duration would be short-term for construction and decommissioning phases and long term during operational phase. **Intensity:** the intensity can be considered low.
Likelihood	There is a definite likelihood of impact on health and safety.
Impact significance	Low

Mitigation Measures

In order to mitigate health and safety impacts associated with the project, the Proponent will develop and implement occupational health and safety plan. Mitigation measures shall include the following:

- Appropriate lighting shall be deployed at night marking the boundaries of the construction area to avoid accidents;
- The contractor and proponent will comply with the Occupational Safety and Health Act No. 15 of 2007 i.e. by insuring the construction workforce and providing training and PPE; and
- First aid services and an emergency vehicle to be readily available at site;

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

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

Compliance to IFC Performance standard 4: Community Health, safety and security

This performance standard has been triggered by the nature of the proposed project that pauses great public concern especially in the event of a major disaster such as explosions and fire outbreaks. Liquefied Petroleum Gas is a highly flammable product and can be detrimental to the public safety if measures are not put in place. The Proponent in conjunction with the Contractor and the community shall implement a health and safety plan that shall include:

- Adherence to OSHA 2007 Act and its subsidiary legislations to ensure that health and safety of immediate neighbours and the public is not threatened;
- The Contractor to ensure that construction work is undertaken in manner not likely to pose risks to community health and safety;
- The Proponent to undertake an independent quantitative risk assessment prior to operation of the facility. The findings of this assessment will inform the development of an emergency safety plan;
- The Proponent to create awareness among the neighbours on the community safety and security procedures; and
- The Proponent will also assist and collaborate with the neighbouring Communities, County government and the neighbouring facilities in their preparations to respond effectively to emergency situations.

7.2.8 Socioeconomic Impacts

Positive

The proposed project will generate job opportunities (skilled and unskilled Labour) during construction, operation and decommissioning phases. It is anticipated that proposed project will provide opportunities for local employment and service provision, such as the use of local transport companies and sourcing of some construction materials locally. There is also likely to be trickledown effect results from the employment opportunities as well as services provided by the facility. The positive socio-economic impacts of the project are identified in the Table 31 below:

Table 31: Positive Socio-Economic Impacts

Project Phase	Project Aspect/activity	Impact type	Stakeholder /Receptor Affected
Construction phase	• Creation of employment • Creation of business opportunities	Direct, indirect induced positive impacts	Construction personnel and Local and internal suppliers
Operation phase	• Reduction in Deforestation • Reduced cost of LPG gas • Catalyst for development	Direct, indirect induced positive impacts	Operation personnel Local suppliers
Decommissioning phase	• employment	Direct, indirect induced positive impact	Demolition personnel

Negative

It is anticipated that proposed project will result in behavioral change among the construction crew and the residents as they socialize. The result may be upsurge in prostitution, family break ups, and sexually transmitted diseases including HIV/AIDS. Employment of "outsiders" rather than local residents, may create tensions causing disruptions thereby affecting project implementation. The negative socio-economic impacts of the project are identified in the Table 32 below:

Table 32: Negative Socio-Economic Impacts

Project Phase	Project Aspect/activity	Impact type	Stakeholder /Receptor Affected
Construction phase	• Prostitution, family break ups, and sexually transmitted diseases including HIV/AIDS • Employment of "outsiders"	Indirect induced negative impacts	Construction personnel Local host community
Operation phase	• Employment of "outsiders" in skilled areas	Indirect induced negative impacts	Operation personnel Local host community
Decommissioning phase	• Employment of "outsiders" in skilled areas	Indirect induced negative impacts	Demolition personnel Local host community

Mitigation Measures

In order to mitigate socio-economic impacts associated with the project and to avoid negative impacts and to comply with Bank policy, the Proponent will develop and implement socio-economic plan including the following mitigation measures:

- Carrying out sensitization on health issues facilitation of preventive measures to site workers and truck drivers for protection against diseases that can be transmitted through sexual contacts;
- Maximise local employment. Local residents are looking forward to employment opportunities, especially women and youth; and
- Ensure meetings to discuss and address emerging issues are held regularly (every week and at the beginning then monthly when the project has picked up.

Compliance to IFC Performance standard 5: Land acquisition and involuntary resettlement:

No land acquisition and involuntary resettlement shall be carried out prior to this project since the project site is currently an active site with similar development. Hence this Performance standard will not be triggered.

Compliance to IFC Performance standard 2: Labour and working conditions

The Proponent undertakes to observe International Labour Organization (ILO) and the United Nations (UN) labour laws in addition to compliance which has been domesticated under the Employment Act, 2007. The Proponent shall seek:

- To promote the fair treatment, non-discrimination, and equal opportunity of workers;
- To establish, maintain, and improve the worker-management relationship;
- To promote compliance with national employment and labour laws such as non-engagement of child labour;
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain;
- To promote safe and healthy working conditions, and the health of workers;
- To avoid the use of forced labour; and
- During construction phase, the Contractor will be encouraged to source where possible labour from the local community.

7.2.9 Cumulative impacts

Cumulative impacts are impacts of an activity that in themselves may not become significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area. The proposed construction of the Proposed Project facility will attract people to the project area. The area going to experience improved economic activity. This will include gradual increase of project area population seeking opportunities. The potential cumulative impacts will include:

- Progressive increase in demand for water for operations;
- Progressive congestion and constraints to the few available health facilities in the Project area;
- Potential Progressive increase in impacts from trucks collecting LPG from the facility;
- Progressive increase in persons visiting the facility;
- Progressive increase in the quantity of generated waste; and
- Potential increase in water and air pollution.

Mitigation Measures

In order to mitigate cumulative impacts associated with the project and to avoid negative impacts, the Proponent will develop and implement Corporate Social Responsibility plan in consultation with the relevant authorities and institutions operating in the area including the following:

- There is need to facilitate the putting up of a health facility in the project area so as to assist the workers and the community;
- The largest contribution to respiratory disease occurrence is the use of wood, charcoal or kerosene as a source of cooking energy and kerosene lamp as source of lighting energy due to the amount of smoke produced and the presence of excessive dust in the project area. The local community need to be sensitized on the dangers of using fire wood a source of cooking energy and kerosene lamp for lighting. The benefits of using clean energy for lighting like solar energy for lighting and LPG for cooking need to be highlighted; and
- The community need to be encouraged to promote regular tree planting to enhance project area biodiversity.

8.0 Environment Management Plan

The Environment Management Plan is an important process of ensuring project sustainability and environmental and social protection. Whereas efforts are usually made to develop mitigation measures for a proposed project, it is during the operation lifespan of the project that actual impacts are noted or experienced.

It is therefore important to integrate in the environmental and social impact assessment process, an environment monitoring and management plan that includes the monitoring of the progress of mitigation measures being implemented while also monitoring the project for any new negative impacts that were not earlier considered or anticipated.

The proponent shall ensure that the Contractor understands and implements all specified mitigation measures during the construction period. The proponent's Supervising Engineer is responsible for assessing the Contractor's Environmental and Social Management Plan and internally implements the Management Plan to ensure that the Environmental and Social Impacts are monitored and managed in an environmentally and socially acceptable manner.

Monitoring systems should be set up by the Proponent during the operational phase, so that potential environmental problem areas can be detected well in advance and the appropriate remedial action carried out. The Proponent shall have a checklist of items that need to be monitored as a matter of routine or periodically over agreed intervals, depending on the nature of the aspect to be monitored. The types of parameters that can be monitored may include proposed mitigation measures or design features, or actual impacts. Depending on the nature of impact or aspect to be monitored, monitoring can be done as part of routine or periodic maintenance. However, socio-economic and ecological parameters can be effectively assessed over a longer time span.

8.1 Environmental and Social Management Plan

Environmental monitoring is an integral part of the environmental management process.

It rationally completes the process that begins with establishing the environmental baseline condition followed by carrying out the Environmental and Social Impact Assessment then Implementation of Mitigation Measures and Monitoring the success of those measures.

The Environmental and Social Management Plan (ESMP) is provided in Table 33.

Table 33: Environmental and Social Management Plan (ESMP)

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
Design Phase						
1.	Proposed Project	Landscape visual impact	• Design of infrastructure that conforms with the project site features (topography and aesthetics)	• KPC • Design Consultant	• Site infrastructure design blending with host environment	Approx. 500,000/=
2.	Proposed Project Sanitation Facilities	Soil and water contamination	• Design appropriate containments for oils/other construction chemicals and sanitary waste from the contractor's camp.	• KPC • Design Consultant	• Availability of sanitary facility and paved containments in the design	Approx. 500,000/=
3.	Proposed Project Site Vegetation Cover	Removal of existing Vegetation	• Design of appropriate construction that provides for incorporation of existing vegetation cover at the alternative site	• KPC • Design Consultant	• Site infrastructure incorporating vegetation	Approx. 200,000/=
Pre-Construction Phase						
1.	KPC Project Facts	Potential lack of support from project area community	• Timely dissemination of project facts to community and stakeholders • Convening of meetings with Community and Stakeholders to carry out sensitization and disseminate project facts	• KPC • PR Firm	• Feedback information and forms from project area community	Approx. 500,000/=
2.	Clearing of Proposed Project site vegetation	Biodiversity damage, and invasion by exotic species	• Important species such as rare, endemic or endangered should be moved to safe grounds which are not likely to be affected by the project activities.	• KPC • Contractor	• Rare, endemic or endangered species moved to safe grounds	Approx. 600,000/=

3.	Clearing of Proposed Project site vegetation	Generation of Solid Waste	• Contractor to provide strategically located solid waste collection container (skip); • Collect together all generated waste from site clearing; • Transport and dispose all waste away from site; • Liaise with the County government on suitable dumping site for spoils.	• KPC • Contractor	• Presence of waste collection bins • Contract with NEMA Registered Waste Disposal Firm	Approx. 100,000/= for waste collection bins 10,000/= per month for Waste Disposal
4.	Clearing of Proposed Project site vegetation	Noise pollution (excess noise and vibration)	• Use of noise reduction/ hearing protection devices when working with noisy equipment; • Use of serviceable chain saws (low noise emission); • Instruct machinery operators to avoid raving of engines; • Carry out site preparation activities during the day.	• KPC • Contractor	• Records of machine and vehicle maintenance • Availability and use of Ear Muffs	Approx. 200,000/= for provision of noise pollution
5.	Clearing of Proposed Project site vegetation	Sanitary and other Domestic Waste	• Provide site clearing workers with solid waste bins for their use; • Ensure site has toilet facilities; • Sensitize workers on site cleanliness and hygiene	• KPC • Contractor	• Presence of waste bins and Toilets for use by workers	Approx. 400,000/= for provision of Sanitary and waste collection facilities.
Construction Phase						
1	Soil Excavation at Proposed Project site	Soil Erosion	• Excavated soil is to be used for backfilling excavated areas while excess soil is disposed of off-site;	• KPC • Contractor	• Ground cover in constructed areas	Part of Construction Obligation

			• Soils are not to be left exposed to wind/water.			
2.	Construction of the Proposed Project site	Air Pollution (dust, fuel and smoke emissions)	• Control speed of vehicles and Prohibit idling; • Spray water during construction; • Maintenance vehicles & equipment regularly; • Provision of dust masks for use in dusty conditions; • Use serviceable vehicles/machinery to reduce smoke.	• KPC • Contractor	• Records of machine and vehicle maintenance • Availability and use of Noise Masks • Low dust generation during construction	Approx. 500,000/= for air pollution prevention
3.	Construction of the Proposed Project site	Excess noise and vibration	• Use noise hearing protection devices when working with noisy equipment or noisy environment; • Use serviceable equipment with low noise emission; • Instruct truck/machinery operators to avoid raving engines.	• KPC • Contractor	• Records of machine and vehicle maintenance • Availability and use of Ear Muffs	Approx. 300,000/= for provision of noise pollution
4.	Construction of the Proposed Project site	Generation of Solid Waste	• Provide communal solid waste collection containers (skip) for the collection and storage prior to appropriate disposal; • County Government/NEMA to provide waste dumping site; • Engage a NEMA Registered Waste Collection Firm;	• KPC • Contractor • NEMA Registered Waste Collection and Disposal Firm	• Clean, Organized, Neat Site	Approx. 200,000/= for waste containers

			• Excavation activities to be done during the dry season to avoid soil erosion and siltation of streams; • Site soil to be used to backfill excavated sites.		• Presence of waste collection receptacles • Contract with NEMA Registered Waste Disposal Firm	10,000/= per month for waste collection and disposal
5.	Construction of the Proposed Project site	Generation of Liquid Waste – used oil and other Chemicals (Hazardous Waste)	• Construct a paved containment for storage of oils and other liquid chemicals being used in the construction site; • Provide containers for storage of used oils from vehicles /machines/equipment being used at the construction site; • Engage a NEMA Registered Firm for the collection, transportation and appropriate disposal of used oil.	• KPC • Contractor • NEMA Registered Used Oil Collection and Disposal Firm	• Presence of a paved area for storage of oils and other chemicals • Presence of used oil containers.	Approx. 400,000/= for paved containment & used oil containers. 10,000/= per month for collection and disposal of used oil.
6.	Construction of the Proposed Project site	Risk of fire	• Provide firefighting equipment at the construction site area; • Contractor staff to be sensitized on firefighting equipment use; • No burning of materials is to be permitted at the site.	• KPC • Contractor	• Performance records • Presence of Fire Extinguishers at construction site	Approx. 300,000/= for fire extinguishers
7.	Construction of the Proposed Project site	Potential Pollution of Surface and Groundwater	• No disposal of domestic waste at the project site;	• KPC • Contractor	• Water Quality Reports	Approx. 50,000/= for communal

			• Provision of used oil containers at a central point; • Use of waste bins/proper waste management; • Pave parking area for trucks and direct drainage to containment; • Analysis of water at the site area 2 times a year		• Presence of Waste Bins	waste containers 200,000/= per year
8.	Construction of the Proposed Project site	Safety of Workers and other visitors to construction site	• Use of construction site barrier tapes to isolate the site(working) area to bar intruders from accessing the area in case of a dropping object; • Appropriate head, hand and foot protection (PPE) during the manual clearing of vegetation and construction activities; • Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa. Maintain work productivity; • Construction site visitors require appropriate safety Gear.	• KPC • Contractor	• Workers have Safety Gear • Medical records • Emergency contacts for Hospital and Police available	Approx. 300,000/= for safety gear
9.	Construction of the Proposed Project site	Working at heights	• Testing of structures for integrity prior to undertaking work; • Implementation of fall protection including induction on climbing techniques and use of fall protection measures, • Provision of harnesses and scaffolds for working at heights; • Inspection, maintenance, and replacement of fall protection equipment; • Use of helmets and other protective devices that are going to mitigate against scratches,	• KPC • Contractor	• Medical Records and Training records • Availability and use of proper PPE • Availability of Fall Protection Equipment	Approx. 500,000/= for special safety equipment

			bruises; lacerations and head injuries due to dropping objects • Provide first aid facilities at the site.		at the Construction Site	
10.	Construction of the Proposed Project site	Health issues of construction workers and Community	• Sensitize workers and community on sexually transmitted diseases especially STIs and HIV/AIDS which is spread through socialization and unprotected sex; • Sensitize workers on use of protection facilities like mosquito nets appropriate gear when working in waterlogged areas to avoid Bilharzia; • Provide workers and community with condoms. • Facilitate the development of a Health facility at the project area together with Ministry of Health and interested Donor Agencies.	• KPC • Contractor • Ministry of Health • NGOs and Donor Agencies • Local Administration	• Pamphlets on Health Matters • Records of disease incidences /prevalence	500,000/= for sensitization and provision Of condoms. Health facility cost to be determined
11.	Construction of the Proposed Project site	Community misconception	• Awareness creation amongst the Community on project facts; • Community issues to be responded to promptly; • Project progress reports and monitoring reports to be prepared and recommendations implemented;	• KPC • Local administration • Local Leaders	• Records of Meetings with Community • Records of community issues recorded and responses.	Approx. 100,000/= for convening meetings
12.	Construction of the Proposed Project site	Increase in social vices/ Security Concerns	• Conduct Information Education and Communication; (IEC) amongst the community and the project staff; • Hold meetings between Contractor Staff and Community;	• KPC/Ministry of Education • Local Police • Local Administration • Local Leaders	• Meeting reports	Approx. 300,000/= for convening meetings

			• Have regular police patrols at the beginning of project development; • Collect information on persons coming into the project area to settle during project implementation.		• Police records on project area security	
13.	Construction of the Proposed Project site	Surface run off and sedimentation from construction activities	• Construction of effective drainages and culverts; • Plant soil binding grasses and other native plants	• KPC • Contractor	• Surface runoff water impact protection facilities in the project area	Construction Obligation
14.	Construction of the Proposed Project site	Sanitary facilities for construction workers	• Installation of appropriate sanitary facilities; • Having a monitoring programme for the septic tanks to ensure no overflow takes place	• KPC • Contractor	• Presence of Toilet Facilities for Workers and Visitors to the Construction Site.	Construction Obligation
15.	Construction of the Proposed Project site	Dangers of having Child Labour issues arising	• Contractor to be strictly advised not to engage any underage persons (under 18 years of age) to perform any form of work at the site during construction • Contractor will be required to comply with the Employment Act, 2007	• KPC • Contractor	• List of workers that does not contain underage persons	Construction Obligation
Operational Phase						
1.	Operation of Proposed Project Facility	Maintenance of facilities Working at heights	• Use of barrier tapes to isolate the maintenance areas; • Provide harnesses/scaffolds for working at heights; • Inspect and maintain fall protection equipment; • Use of protective devices to mitigate against injury;	• KPC • KPC Site Manager	• Use of Proper PPE and Equipment • Handouts on safety	Approx. 200,000/=

			• Provide first aid facilities at the site.			
2.	Operation of Proposed Project Facility	Risk of Fire	• Sensitization of Workers on Fire Safety Risks; • No burning of any materials near or in the site	• KPC Site Manager • County government	• Handouts on Fire Hazards and Safety	Routine Site Operation Activity
3.	Operation of Proposed Project Facility	Pollution of surface water and Waste management	• Ensure solid waste is collected and appropriately disposed of; • Ensure that used oil from trucks are not released to the ground; • Used oil is to be put into containers and appropriately disposed of by a NEMA approved agent; • Provision of used oil containers for use by truck drivers.	• KPC Site Manager	• Presence of solid waste containers • Containers for storage of used oil recovered from trucks	Approx. 20,000/= for provision of used oil containers
4.	Operation of Proposed Project Facility	KPC Site Solid Waste Management during Operation	• Provision of communal solid waste containers (skip); • Provision of secured solid waste collection containment where waste container (skip) is to be placed; • Regular disposal waste depending rate fill up.	• KPC Site Manager	• Waste Collection and Disposal Reports • Presence of Waste Bins	Approx. 20,000/= for Waste Containers 10,000/= per month for waste disposal by NEMA Approved Firm
5.	Operation of Proposed Project Facility	Health issues of Facility Workers, Truck Drivers and Community	• Sensitize workers and community on sexually transmitted diseases especially STIs and HIV/AIDS which is spread through socialization and unprotected sex; • Provide workers and community with condoms.	• KPC • Ministry of Health • Local Administration	• Presence of a HIV Programme at the Facility	100,000/= for sensitization and provision Of condoms.

			• Encourage Workers, Truck Drivers and Community to go for HIV Testing and Counselling in order to live a productive life.		• Records of disease incidences /prevalence (URTI, HIV/AIDS, etc.	
6.	Operation of Proposed Project Facility	Monitoring and Evaluation of the effectiveness of project Mitigations	• Implementation of monitoring of facility operations • and success of proposed mitigations • Health Trends (URTI, Malaria, STIs and HIV/AIDS); • Livelihood and socio-economic status of project area community; • Community perception on the KPC Facility • Any new emerging issues, threats and benefits of the LPG Storage Facility	• KPC Site Manager • Local Administration	• Quarterly Reports on Facility performance	Routine Operation of the Facility
Decommissioning Phase						
1.	Decommissioning of Proposed Project Facility	Air Pollution (dust, smoke, fuel emissions)	• Control of demolition vehicle speeds; • Prohibition of idling of vehicles; • Water is to be sprayed on building undergoing demolition during decommissioning o reduce dust emission; • Regular maintenance of vehicles and equipment; • Provision of dust masks for use in dusty conditions. • Use of serviceable vehicles and machinery to avoid excessive smoke emission.	• KPC • Decommissioning Contractor	• Decommissioning Records	Approx. 200,000/= for nose protection equipment (dust masks)
2.	Decommissioning of Proposed Project Facility	Noise pollution	• Noise reduction/ hearing protection devices when working with noisy equipment; • Use of serviceable equipment with low noise level;	• KPC • Decommissioning Contractor	• Decommissioning Records	Approx. 200,000/= for noise pollution mitigation

			• Instruction to truck/machinery operators to avoid raving engines; • Use of noise protection (ear muff) during demolition.			
3.	Decommissioning of Proposed Project Facility	Potential Injury to Workers	• Use of appropriate head, hand and feet protection (PPE) during demolition of structures • Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa while maintaining a balance with productivity.	• KPC • Decommissioning Contractor	• Availability of appropriate gear/Records • Use of Proper PPE	Approx. 200,000/= for PPE and other safety equipment
4.	Decommissioning of Proposed Project Facility	Working at heights	• Use construction site barrier tape to isolate the site to guard site visitors from accidents and injuries; • Implement a fall protection program that includes training in climbing techniques and use of fall protection measures, Provide Harnesses; • Use of helmets and other protective devices i to mitigate against injury, • Provide first aid facilities at the site.	• KPC • Decommissioning Contractor	• Availability of appropriate Safety Gear/Records • Proper use of PPE	Approx. 100,000/= for PPE and other safety equipment
5	Decommissioning of Proposed Project Facility	Site area rehabilitation and restoration	• Remove all demolished waste material; • Repair and restore project area site • Evaluate site contamination • Plant trees and other appropriate vegetation.	• KPC • Site Restoration Contractor	• Site Pollution Report • Well restored site	1,000,000/= for site Pollution assessment
	Contingency					**1,000,000/=**

	Total Cost of EMP Implementation	**9,030,000/=**

8.2 Management Programmes

This section presents the programmes for managing the identified impacts. It is worth noting that the use of management programmes to manage the impacts is necessitated by the fact that most of the mitigation measures cannot be implemented as discrete, isolated actions because there are spatial, temporal and casual interactions among impacts. The programmes recommended for managing the potential impacts of the proposed project include:

- Air quality management programme
- Noise management programme
- Occupational Health and Safety

The implementation of the EMP is also linked to a series of comprehensive management plans. Management and mitigation measures should comply with legislative requirements. Where no legal guidance is provided, industry and/or international good practices should be applied as far as is practicable.

8.2.1 Air quality management programme

The aim of this programme is to ensure that air quality is maintained through construction, as well as operation phases. The air quality management programme includes the following:

Dust management

- Dust abatement measures shall be implemented to control dust generated from construction activities. Refer to the construction control plan and construction management plan for dust abatement measures;
- A complaint register and protocol will be drawn up as a means for surrounding establishments, workers and neighbouring community to voice their issues and concerns, particularly those relating to the nuisance effects of dust and noise the register will be set up prior to the commencement of construction activities. These public complaints should be responded to as a matter of urgency and where possible, measures taken to minimize the cause of dust and noise.

Emissions

- The Contractor shall ensure that the construction machinery and equipment are appropriate and fit to prevent fugitive emissions, as per national standards or international practices. The Proponent shall ensure the regular maintenance of this equipment.
- A maintenance plan for the construction machinery and vehicles shall be implemented to prevent excessive emissions during the construction phase of the project.

8.2.2 Noise management programme

- This programme aims to ensure that noise generated by construction and operation activities is kept to a minimum and adheres to relevant noise standards. The noise management programme includes the following:
- The Contractor shall ensure that construction activities are limited to working hours (i.e. between 06h 00 and me 18h 00 daily) from Monday to Saturday, or as required in terms of legislation and/or negotiated with the neighbouring community;
- Noise generating equipment will be designed to control and dampen noise emissions, and will be located at a distance far enough from the nearest noise sensitive development, to ensure that the increase in ambient noise level will comply with ISO standards; and
- The surrounding establishments, workers and neighbouring community shall be able to register their complaints and concerns about noise through complaints register set up prior to the commencement of construction activities. These public complaints should be responded to as a matter of urgency and where possible measures must be taken to minimize the noise.

8.2.3 Occupational Health and Safety Programme

The aim of this programme is to ensure that the Safety and Health of the employees' quality is maintained through construction, as well as operation phases. The OHS management programme includes the following: Undertaking S&H risk assessments, S&H audits, Provision of adequate and appropriate firefighting equipment, Provision of Personal Protective Equipment to the workers and Issuing of work permit systems for hot jobs at the site.

8.3 Management Plan

8.3.1 Overview

The following management plans will be implemented during construction, operation, and decommissioning phase of the proposed project:

- Construction management plan
- Construction control plan
- Labour and human resources plan
- Workplace health and safety plan
- Community safety plan
- Emergency management and response plan
- Rehabilitation and closure management plan

8.3.2 Construction Management Plan

The construction management plan for the proposed project shall include the following:

Management of fuels and other hazardous materials

- The Contractor shall comply with all applicable laws, regulations, permit and approval conditions and requirements relevant to the storage, use, and proper disposal of hazardous materials;
- The Contractor shall manage all hazardous materials and waste in a safe and responsible manner, and shall prevent contamination of soils, pollution of water and/ or harm to people or animals as a result of the use of these materials;
- The Contractor shall prepare a hazardous materials and waste management plan for inclusion in the site-specific environmental plan to be submitted to the Proponent prior to establishment on site. The plan shall include, but not limited to, measures to prevent safe siting and storage;
- The contractor shall place on-site tools and equipment, such as generators, compressors on bunded impermeable sheeting to prevent oil spills/leaks from causing subsurface contamination;
- The contractor shall ensure oil spills/leaks are prevented or minimized. This can be achieved through: instructing employees not to overfill diesel bowsers and equipment tanks; regular auditing to verify that no leaking or defective equipment is brought/used onsite; any oils or lubricants discharged during servicing of the machinery or vehicles are contained in dry trays or other appropriate containment measures;
- The Contractor shall ensure that fuelling and repairs are carried out by trained personnel familiar with spill containment and clean-up procedures; and
- The Contractor shall ensure that all the employees working onsite are trained on good housekeeping practices.

Management of the construction site

- The contractor shall prevent littering and the random discard of any solid waste on or around the construction site;
- The contractor shall manage hazardous waste; and
- The Contractor to determine safe traveling speeds for the construction site and ensure that restrictions are enforced.

Emergency Preparedness

- The Contractor shall develop an emergency plan that will enable rapid and effective response to all types of environmental emergencies in accordance with recognized national and international standards. The emergency plan shall include establishment of a network of communication between the Contractor and emergency services including police, ambulance services, and fire brigades among others; and

- The Contractor shall test emergency preparedness with drill operations and shall review drills, conduct mock emergencies and remedy shortcomings to ensure a high level of emergency readiness to deal with environmental and third-party incidents.

Fire Prevention and management

- The Contractor shall take all necessary precautions to prevent fires caused either deliberately or accidentally during construction process;
- The Contractor shall prepare a fire prevention and fire emergency plan as a part of the;
- Environmental Plan to be submitted to KPC;
- The Contractor shall provide adequate firefighting appliances at specified localities on the worksite to meet any emergency resulting from ignition of a fire; and
- The Contractor shall ensure that hot work is prohibited under specified meteorological conditions with high fire risks and that appropriate and adequate firefighting equipment would be required to be on standby at all times where hot work is being carried out.

Management of air quality

- The Contractor shall institute appropriate measures to minimize or avoid air quality impacts. This can be achieved through formulation of air quality management plan;
- The Contractor to minimize/control emission of dust due to traffic movement and wind erosion of stockpile material and exposed soil;
- The Contractor to mitigate emissions of gases vapours and odours by conducting initial risk assessment and the installation of procedures to control the risk; and
- The Contractor to ensure that all equipment used and all facilities erected on site are designed and operated to control the emission of smoke, dust, fumes and any other air impurity into the atmosphere.

Noise Management Programme

The noise management programme is geared towards minimizing the amount of noise generated by the construction and operation activities as well ensure adherence to the relevant noise standards. The noise management programme includes the following:

- The Contractor shall comply with the legal requirements for the management of noise impact specified in the noise quality regulations; and
- The Contractor shall formulate noise management plan for minimizing the generation of noise and vibration from construction activities occurring on site and its impact on surrounding residents, businesses and workers.

Complaints register

The Contractor shall establish and maintain a register for periodic review by the Proponent that logs all the complaints raised by the neighbours or the general public about construction

activities. The register shall be regularly updated and records maintained including the name of the complainant, his/her domicile and contact details, the nature of the complaint and any action taken to rectify the problem.

Health management

- The Contractor shall comply with all relevant legislative requirements governing worker health and safety (e.g. OSHA 2007 and its subsidiary legislations); and
- The Contractor shall prepare and implement a programme to minimize diseases likely to be contracted by the construction workers as a result of the proposed project such as HIV Aids.

8.3.3 Construction Control Plan (CCP)

The CCP for the proposed project shall cover on the following:

Control of access

The contractor shall ensure that the construction is not accessed by authorized persons.

Control of top soil and subsoil

- The contractor shall store topsoil excavated from the site in a wind row or stockpile which shall be discernibly separate from wind rows or stockpiles of any other excavated materials;
- Top soil shall be protected from any contaminant that might impact on vegetation;
- The Contractor shall temporarily stockpile topsoil in a location that will minimize any loss due to erosion or mixing with other material; and
- The Contractor shall ensure that topsoil is stockpiled in a manner and for a period of time that does not result in deterioration in its plant support capacity.

Control of material supply and burrow areas

- The Contractor shall, as far as possible, source all material needed to construct the proposed project from the licensed mines;
- In instances where materials are to be obtained from a new borrow area the Contractor shall comply with relevant legislations; and
- The Contractor shall prepare a method statement including plans, detailing the expected quantity of excavation, temporary and permanent drainage control, the final contouring of the borrow pit and the proposed method of rehabilitation.

Rehabilitation

- After completion of construction activities, the Contractor shall clear the site of construction materials and dispose wastes in appropriate disposal sites; and

- The Contractor shall remove all temporary works on the construction site and grow grass on the sloppy areas where retaining wall will not be constructed to control soil erosion.

8.3.4 Labor and Human Resources Plan

In designing the Labour and human resources plan Contractor shall:

- Comply with the provisions of Employment Act, 2007; and
- Wherever possible, give priority to qualified local people when hiring employees.

8.3.5 Workplace Health and Safety Plan

The workplace health and safety plan to be implemented by KPC and Contractor shall include the following key measures:

- All relevant national legislation, including the OSHA 2007 and related regulations, shall be adhered to ensure that health and safety of proximate communities and the public at large are not threatened during construction and operational phases of the Project;
- The Proponent shall ensure workplace health and safety during the operational phase of the facility; and
- Health and safety performance will be continuously monitored and procedures reviewed with the aim of eliminating risk as far as reasonably practicable.

8.3.6 Community health and safety plan

The community health and safety plan to be implemented by the Contractor and KPC shall include:

- Adherence to OSHA 2007 Act and its subsidiary legislations to ensure that health and safety of immediate neighbours and the public is not threatened;
- The Contractor to ensure that construction work is undertaken in manner not likely to pose risks to community health and safety;
- The Proponent to undertake an independent quantitative risk assessment prior to operation of the facility. The findings of this assessment will inform the development of an emergency safety plan; and
- KPC to create awareness among the neighbours on the community safety procedures.

8.3.7 Emergency Management and Response Plan

The Proponent shall rollout and implement their documented emergency response plan at the completed footprint. The EMRP shall include:

Emergency management planning

The components of the Emergency management planning shall include:

- Structure and operation of the emergency management team;
- Establishment of an emergency management centre;
- Information retained by the emergency management team;
- Incidents requiring activation of the plan;
- Incident severity classification; and
- Process to be followed in the event of an emergency.

Information pertaining to emergency management shall be reported through the HSE reporting process. A quantitative risk assessment report will be compiled by an independent company prior to commissioning of the facility.

Emergency Response Plan

The Proponent shall implement a community health and safety plan which shall include the following measures:

KPC will compile a comprehensive safety emergency management plan (SEMP) for the facility. The SEMP will cover the following aspects:

- Kenya's Safety regulations;
- Scope of the SEMP;
- Notification of local authorities;
- Details of the facility's system;
- Aim of the SEMP;
- Objectives of SEMP;
- Roles and responsibilities in the event of an emergency;
- Information requirements in the event of an emergency;
- Evacuation of people;
- The role of local communities;
- Regular testing of the SEMP;
- Planning for the eventuality of failure on the facility;
- Causes of the facility's failure;
- Probability of facility's failure;
- Size and duration of the facility;
- Hazards and effects of facility's failure;
- Hazard range and emergency planning distances; and

- Anticipation of worst credible incidents.

8.3.8 Rehabilitation and decommission management plan

The rehabilitation and decommissioning management plan include the following:

Planning for closure

- The Proponent shall develop rehabilitation and decommissioning plan in conjunction with relevant stakeholders at least one year before the end of facility's operations;
- The Proponent shall investigate practical options for closure of the facility at least one year before decommissioning and submit a report to relevant authorities NEMA included; and
- The Proponent to explore options of re-use and recycling of the facility's components/structures.

Decommissioning

- The Proponent shall take into consideration the health and safety of personnel, contractors, neighbors and the public during the planning and implementation of the demolition process; and
- The Proponent shall undertake a further survey to identify any contaminated areas remediate them accordingly.

Post Closure

The Proponent shall ensure that the facility's site is free of impacts associated with the abandonment/closure. The Proponent shall develop, rollout and implement a monitoring plan that includes:

- Monitoring of the rehabilitated site to confirm whether progress is satisfactory; and
- Outline of how land improvement and future land use will be affected by the past operation and decommissioning of the Proposed Project.

8.4 Monitoring

The proposed programmes and plans will be subjected to monitoring. Monitoring will have two elements: routine monitoring against standards or performance criteria; and periodic review or evaluation. Monitoring will often focus on the effectiveness and impact of the programme or plan as a whole. During construction phase, the Proponent shall monitor the Contractor's activities in order to verify that the management measures/procedures/specifications are implemented as contained in the EMP.

Compliance will mean that the Contractor is fulfilling their contractual obligation.

During operation phase, the Proponent will monitor facility's operations to ensure compliance with management measures in the EMP and operation procedures. As part of this monitoring, the Proponent will undertake statutory initial environmental audit as required by the EIA/EA Regulations, 2003 Amended 2019 and subsequent annual self-environmental audits.

8.4.1 Programme Monitoring

The Proponent shall regularly monitor programme implementation. The process will include the regular monitoring of:

- Erosion of soil resulting in the immediate surroundings of the facility caused by the presence of facility or impacting on structures associated with the facility;
- Air quality and ambient emissions, including dust generated by construction activities; and
- Noise generation during construction and operation phases.

8.4.2 Plan Monitoring

All of the management plans make provision for monitoring and evaluation. Special attention should be given to the monitoring arrangements relating to biophysical impacts, occupational health and safety, facility operational and emergency response.

During the construction phase of the project, the Contractor's HSE Officer shall report all environmental impacts as well as accidents and incidents to the Proponent's HSE Officer. The reported impacts and incidents will be captured on a database to ascertain trends and track progress in the implementation of preventive and corrective actions, and benchmarking against other, similar operations.

Depending on the level of severity, accidents and incidents will be investigated by the Contractor's HSE division, with key input from the line management to ensure accountability.

During operation, the Proponent's HSE department will monitor the health and safety of personnel and contractors, in compliance with legislative requirements. Emergency incidents should be reported to the relevant authorities. The reported impacts and incidents will be captured on a database to identify weakness in the emergency response plan and track progress in the implementation of preventative and corrective and benchmarking against other similar operations.

The above information is vital for the smooth running of the facility and therefore KPC is encouraged to ensure that the contractor and monitoring staff are able to monitor all activities and keep records for review by KPC and other Authorities.

A monitoring Plan is provided in Table 34.

Table 34: Proposed Project Facility Monitoring Plan

#	Environmental Component	Activity	Standard/ Reference	Location	Frequency	Implementation	Supervision
Pre-Construction Phase							
1.	Project Design	Provision of Solid and Liquid Waste	NEMA Guidelines	Proposed Project Facility	Quarterly until Design is ready	• KPC • Design Consultant	• KPC • Supervision Consultant
2.	Vegetation cover	Monitor clearing to ensure consistent with ESMP	ESMP	Proposed Project Facility	As required during site preparation	Contractor	Supervision Consultant
Construction Phase							
1.	Noise levels	Noise levels on dB (A) scale from excavation and construction areas not to exceed the Maximum Noise Level Permitted (Leq) in dB(A) of 75	NEMA guidelines	Noise level meter kept at a distance of 30m from source	When noisy construction activities are in progress. Or as directed by Supervision Consultant	Contractor	Supervision Consultant
2.	Air Pollution	Dust and Smoke Emission	NEMA guidelines	Construction area of Proposed Project Facility	As required by the Supervision Consultant	Contractor	Supervision Consultant
3.	Accidents	Accident reports, community consultations	ESMP	Construction area of Proposed Project Facility	Monthly	Contractor	• KPC • Supervision Consultant
4.	Health	URTI, HIV/AIDS, Malaria and Water borne disease prevalence	ESMP	Construction area of Proposed Project Facility	Monthly	• Contractor • Local Public Health Centre	• KPC • Supervision Consultant
5.	Construction waste	• Quantity and Type of solid waste generated by construction	NEMA guidelines	Construction area of Proposed Project Facility	Monthly	Contractor	KPC

		activities. • Waste Segregation					
6.	Sanitary waste	Contractor toilet facilities operation/performance	NEMA guidelines	Construction area of Proposed Project Facility	Monthly	Contractor	Supervision Consultant
7.	Project Area Population	Change in Community Population next to facility	ESMP	Construction area of Proposed Project Facility	Quarterly	• KPC • County government	Supervision Consultant
Operation Phase							
1.	Solid Waste	• Quantity and Type of solid waste generated during operation • Segregation	NEMA guidelines	Designated Waste Collection points at the site	Monthly	Waste Collection Firm Registered with NEMA	KPC Officer
2.	Health	• Changes in health trends • Presence of Mosquitoes etc • Records of Malaria and Water borne disease occurrence • HIV/AIDS cases/prevalence • Respiratory Diseases	ESMP	Proposed Project Facility	Monthly	• Local Public Health Facility • New Health Centre Set up for Project area Community	• KPC Officer • Ministry of Health
3.	Sanitary waste	Site toilet facilities operation and performance	NEMA guidelines	Proposed Project Facility	Monthly	KPC	Appointed KPC Officer
4.	Performance of Proposed Project Facility	• No of LPG Tankers Loaded every month • Recorded safety incidences	ESMP	Proposed Project Facility	Monthly	KPC	Appointed KPC Officer
5	Fire Fighting Equipment and	• Regular checking as required by Safety Data	OSHA 2007	Proposed Project Facility	As recommended	• KPC • Appointed	Appointed KPC Officer

	Emergency Response Warning Facilities	Sheets				Agent	
6.	Socio-economic status of Project Area Community	• Records of Community income generation/livelihood	ESMP	Proposed Project Facility	Quarterly	KPC	Appointed KPC Officer

Source: *ESIA Field Survey Activity –Proposed Project Faciity - KPC*

9.0 Incident Prevention and Hazard Communication Action Plan

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

9.1 Construction Phase

The full scope of this phase includes the following;

- Civil works including stabilization, R.C. foundations, R.C retaining wall, Inspection tunnel, and sand compaction;
- Construction of mounded tanks which will involve rolling and welding;
- LPG equipment and piping network complete with compressor units, pumps, blending and refrigeration units, piping, valves, and other mechanical accessories;
- Compressed air network and/or hydraulic network;
- Firewater network with pump, piping, valves, and equipment;
- Electrical network complete with L.V. switchboard, MCC, cables, and accessories.

Below are some of the works expected to be carried out and some of the precautions expected to be taken in their execution.

9.1.1 Civil works

Trenching and excavation work presents serious hazards to all workers involved. Cave-ins pose the greatest risk and are more likely than some other excavation-related incidents to result in worker fatalities. An unprotected trench can be an early grave. Employers/ Contractors must ensure that workers enter trenches only after adequate protections are in place to address cave-in hazards. Other potential hazards associated with trenching work include falling loads, hazardous atmospheres, and hazards from mobile equipment.

It is intended that the contractor will adhere to the requirements of the Occupational Safety and Health Act, 2007 which requires that that employers protect workers from cave-ins by:

- Sloping and benching the sides of the excavation;

- Supporting the sides of the excavation; or
- Placing a shield between the side of the excavation and the work area.

In addition to cave-ins and related hazards, workers involved in excavation work are exposed to hazards involving falling loads and mobile equipment. To protect workers from these hazards, OSHA requires employers to take certain precautions. For example, employers must:

- Protect workers from excavated or other materials or equipment that could pose a hazard by falling or rolling inside the excavation by placing and keeping such materials or equipment at a safe distance from the edge and/or by using a retaining device to keep the materials or equipment from falling or rolling into the excavation;
- Provide a warning system (such as barricades, hand or mechanical signals, or stop logs) when mobile equipment is operated adjacent to an excavation, or when such equipment must approach the edge of an excavation, and the operator does not have a clear and direct view of the edge;
- Protect workers from loose rock or soil that could fall or roll from an excavation face by scaling to remove loose material, installing protective barricades at appropriate intervals, or using other equivalent forms of protection;
- Institute and enforce work rules prohibiting workers from working on faces of sloped or benched excavations at levels above other workers unless the workers at the lower levels are adequately protected from the hazards of falling, rolling, or sliding material or equipment.
- Institute and enforce work rules prohibiting workers from standing or working under loads being handled by lifting or digging equipment.
- Require workers to stand away from vehicles being loaded or unloaded to protect them from being struck by any spillage or falling materials. (Operators may remain inside the cab of a vehicle being loaded or unloaded if the vehicle is equipped, to provide adequate protection from the operator.

In practice, it is required employers to provide ladders, steps, ramps, or other safe means of egress for workers working in trench excavations 4 feet (1.2 meters) or deeper. The means of egress must be located so as not to require workers to travel more than 25 feet (7.62 meters) laterally within the trench.

Any structural ramps used solely for worker access or egress must be designed by a competent person. Structural ramps used for access or egress of equipment must be designed by a competent person qualified in structural design. Also, structural members used for ramps or runways must be uniform in thickness and joined in a manner to prevent tripping or displacement.

It is expected that employers share the details of their safety and health programs with workers and should emphasize the critical role workers play in keeping the jobsite safe. Employers also need to emphasize specific practices that will help reduce the risk of on-the-job injuries at excavation sites. Such practices can include the following:

- Know where underground utilities are located before digging;
- Keep excavated soil (spoils) and other materials at least 2 feet (0.61 meters) from trench edges;
- Keep heavy equipment away from trench edges;
- Identify any equipment or activities that could affect trench stability;
- Test for atmospheric hazards such as low oxygen, hazardous fumes, and toxic gases when workers are more than 4 feet deep;
- Inspect trenches at the start of each shift;
- Inspect trenches following a rainstorm or other water intrusion.
- Inspect trenches after any occurrence that could have changed conditions in the trench;
- Do not work under suspended or raised loads and materials;
- Ensure that personnel wear high-visibility or other suitable clothing when exposed to vehicular traffic.

9.1.2 Mechanical assembly, electrical and instrumentation works

a) Molten metal - Provision and use of appropriate PPE in form of hand gloves, overalls, welding aprons and feet cover;

b) Arc flash - Provision and use of goggles and screens;

c) Seclusion of welding works that shall be ongoing simultaneously in the mound bullets;

d) Falls - Erection and use of working platforms;

e) Electrocution - Earthing done on all equipment and parts being welded together. Tools shall be wired appropriately.

f) Equipment for lifting shall be positioned on stable ground. Operators shall be competent. Clear vision for the operators is required.

g) All equipment shall have trained and competent signalers/banksmen.

h) Stable platforms shall be utilized. Erection of platforms shall be done by trained and competent personnel.

i) All electrical installations should and will be done by competent personnel according to the electric special rules.

9.1.3 Safety during construction

To be able to perform these functions in a safe, healthy and environment friendly/ acceptable environment there requires to be continuous supervision of the works.

The contractor will be required to prepare safe working methods for approval by the consultant before execution of the works. To make sure the operations conform to the approved plans the consultant's safety coordinator will require to be physically present during the works, the contractor will be expected to remit a daily EHS report to the consultant. In this way the chances of any deviations from approved methods will be minimised. This will enhance the EHS standards during the construction works.

Safety & Health impacts on the environment and community during Construction:

Dust

- During Construction it is expected that the earthworks will produce dust. The contractor will be expected to mitigate the dust by water spraying. The intervals will depend on the weather on a particular day and may also be affected by the frequency of soil disturbance;
- The construction workers shall be provided with respiratory protection in form of dust masks.

Noise

- Construction equipment are expected to be either new or serviceable. A noise survey will be carried out to determine the noise levels. This is expected to help the contractor come up with a hearing conservation programme especially where noise levels exceed 85 dB (A);
- Workers will be provided with ear defenders and exposure to noise over long periods will be reduced by frequent periodic breaks;
- The community will be protected by planned maintenance/servicing programme of construction equipment. Construction works are also a distance away from the community except for a few families which are expected to be resettled before construction works commence.

Emissions

Equipment use produces emissions. This is not expected to cause pollution as the equipment will either be new or serviceable and they will be serviced periodically as per the manufacturers' specifications.

9.2 Operation Phase

The key hazards during operation include exposure to asphyxiant gases and unplanned ignition of gas causing fire. The risks are asphyxiation, poisoning and skin freezing. It is recommended that the following be used to minimize the exposure risks:

- Hand Gloves (gauntlets)
- Eye protection
- Safety footwear
- Skin barrier cream

The following measures should also be taken into consideration:

- Fix spark arrestor to LPG tanker exhaust pipe before the tanker enters the LPG filling yard;
- Park the tanker on hard stand and apply hand brakes. Put wheel chokes on all the four wheels and then position the Dry Powder fire extinguisher near loading point;
- Ensure proper earthing connections for tank and truck body;
- Install gas monitors and keep them in serviceable condition.

Special consideration shall be given requirements of the Law governing Occupational Safety and Health and especially legal notice: LN 59; The Factories and Other places of work (Fire Risk Reduction rules), 2007.

> Rule 4. A person wishing to set up or operate a facility for the use on or storage of highly flammable substance shall ensure that such facility is located in the designated area.
>
> 6. (1) Every occupier shall ensure that highly flammable substances are stored–
>
> (a) In suitable fixed storage tanks in safe positions, or
>
> (b) In suitable closed vessels kept in a safe position in the open air, and where necessary, protected against direct sunlight;
>
> Rule 9 is obeyed on handling of flammable vapours; it states as follows;
>
> 9. (1) Every occupier shall ensure that no means likely to ignite vapour from any highly flammable substances, are present where a dangerous concentration of vapour from flammable substances may reasonably be expected to be present.

Rule 10. (1) Every occupier shall continuously monitor the work place with a view to assess any possible fire risks and mitigate against them. This rule will be observed and fire marshals have been appointed and trained. This comply with rule 21. (1) Every occupier shall ensure that all workers are instructed in the safe use of firefighting appliances.

(4) Every occupier shall ensure that every member of the fighting team undertakes the basic fire safety training course within three months from the date of appointment into the firefighting team.

Fire drills shall also be conducted least once in every period of twelve months and a record of such drills kept available for inspection.

Two assembly points have already been identified and more will be identified during the operations of the new plant.

Fire alarms will alert all workers and visitors in case of emergency. At the gate all lighters are surrendered. Fire detection systems including smoke and gas leak detectors have been installed.

Gas leak detectors shall be connected to a localized alert alarm, emergency shut-off valve. The gas supply safety shut-off valve system shall also be interlocking with the automatic fire suppression system and fire water system through the fire sprayers.

Fire safety provisions like, hose reel, fire extinguishers, indication of sprinkler protection, gas leak detectors, mechanical ventilation, exhaust systems and fire suppression systems, where applicable must be known.

It is the intention of KPC to continue operating in a safe manner with protection of the environment as they have been doing before. This will include:

1. Mitigating against operational hazards created by trucks driving into and out of the terminal by continuous training and surveillance of conformance to instructions. Among these are the following;

    - Safety and health induction carried out to truck personnel as they enter the terminal;
    - Signage at the gate on entry and exit will be maintained;
    - A notice on need for passengers disembarking at the main gate shall be placed;
    - Visitors to the terminal will be guided to the offices/induction room at the first instance;
    - Repeat inductions maybe decided for frequent visitors;
    - Emergency preparedness and evacuation via security team;

- Trucks that are parked waiting to be filled outside the terminal and inside the terminal awaiting clearance shall have their wheels chocked;
- Fire preparedness shall be emphasized.

2. The workers safety and health will be taken care of by strictly following the requirements of the Occupational Safety and Health Act of 2007 which includes among others;

- Occupational diseases and medical examinations for workers are carried out by Designated Health Practitioners (DHP). The recommendations by DHP are then implemented;
- Operation manuals and permits to work are utilized by workers;
- Contract documents shall include a clause on observance of safety and health during the carrying out of the sub contracted work/process. Supervision by KPC shall be emphasized. This maybe sub contracted out if lack of capacity necessitates;
- Machinery safety and Chemical safety shall follow all instructions on material safety data sheets and safe work procedures for the various machinery;
- Air receivers will continue being examined by approved persons periodically as required;
- An electrical maintenance programme shall be established and maintained;
- A team of fire marshals/firefighting team is formed and trained. This will be enhanced;
- An agreement has should be drawn with the Mombasa County Government fire brigade for provision of firefighting and rescue services;
- Independent water storage for firefighting should be provided;
- Gas leak detectors will be provided;
- Fire and smoke detectors/alarms will be installed;
- An emergency response plan including instructions, contacts of fire responders, “No - Smoking signs” will be posted and maintained;
- An automatic fire/sprinkler system including hydrants will be provided. Equipment/ hoses and attachments will be provided in cabinets.

3. Personal Protective Equipment to be provided include;

- Safety Boots
- Hand gloves
- Welding goggles,
- Khaki Overalls/Uniforms
- PPE for visitors are provided in form of reflective jackets, and helmets.

- PPE will be replaced as per need.

4. A noise level survey will be carried out to determine the levels and hence draw a hearing conservation programme for the LPG storage plant.
5. Welfare facilities shall be provided in form of sanitary facilities, first aid kits, drinking water, and clothing accommodation.

9.3 Decommissioning Phase

Dust

- During Decommissioning it is expected that the demolition will produce dust. The contractor will be expected to mitigate the dust by water spraying. The intervals will depend on the weather on a particular day and may also be affected by the frequency of soil disturbance.
- The decommissioning workers shall be provided with respiratory protection in form of dust masks

Noise

- Decommissioning equipment is expected to be either new or serviceable. A noise survey will be carried out to determine the noise levels. This is expected to help the contractor come up with a hearing conservation programme especially where noise levels exceed 85 dB (A).
- Workers will be provided with ear defenders and exposure to noise over long periods will be reduced by frequent periodic breaks.
- The community will be protected by planned maintenance/servicing programme of decommissioning equipment.

Emissions

- Equipment use produces emissions. This is not expected to cause pollution as the equipment will either be new or serviceable and they will be serviced periodically as per the manufacturers' specifications.

10.0 Emergency Response Plan

10.1 Background Information

Emergency Response Plan was developed in accordance with current laws and regulations. It is intended as a guide for the effective and consistent application of prevention, preparedness, and response and recovery measures to be implemented in an emergency situation at our facilities.

To ensure public safety, this emergency response plan is designed to ensure that all response personnel are familiar with their roles and responsibilities. In terms of industrial risk, this plan describes the organization and training required to control emergency situations and gain experience.

Planning and response should encompass every stage of the distribution chain as well as LPG in storage and in use.

An emergency at an LPG plant may have an impact beyond its boundary fence and the APELL (Awareness and Preparedness for Emergencies at a Local Level) process should be employed for preparedness at local level.

APELL is a programme developed by UNEP in conjunction with governments and industry with the purpose of minimizing the occurrence and harmful effects of technological accidents and environmental emergencies.

Although proposed Facility and vehicles are equipped with safety devices and meet the minimum safety requirements, it is essential that we be prepared for emergencies in all our planned facilities.

This document covers several types of incidents, caused by both human activity (fires, spills) and natural or weather conditions. In any event, all operations must be conducted in accordance with the highest standards for the protection of the health and safety of employees, the public and response personnel, as well as the preservation of the environment. This document also details alert measures for emergency assistance to the public.

10.2 Purpose

This manual describes the procedures to be followed by company personnel in the event of an emergency at company facilities or during transport by tanker truck.

10.3 Objectives of the emergency response plan

The emergency response plan has the following objectives:

- Preserve the health and safety of employees, contractors, visitors, response personnel, and the public;
- Minimize the risk of damage to or destruction of property;
- Minimize environmental impacts;
- Ensure that employees at all levels plan and work in a safe manner;
- Ensure that emergency response personnel are aware of all risks associated with the facility and its operations;
- Guide response personnel in deciding which measures to take and in implementing them quickly and efficiently;
- Minimize the amount of time and money required to resume normal operations;
- Inform citizens who may be affected by the event;
- Liaise with the city in the context of public safety.

10.4 General

Emergency planning and response is one component of an overall safety management programme. The concept and procedures have been integrated into regulations for the control of major industrial hazards, prompted by initiatives which specify 'planning for emergencies' as part of the safety management system.

In these Guidelines, emergency planning and response process for LPG plants of a size to be classified as 'major hazards' and LPG in bulk transport will be discussed. The Proponent plans to utilize the APELL Process recommended by UNEP Industry office.

10.5 The APELL Process

APELL is the acronym for Awareness and Preparedness for Emergencies at Local Level, a process developed by the UNEP Industry and Environment Office in co-operation with industry and governments. With its emphasis on preparedness at local level, the APELL process recognizes that the extent of an industrial accident's impact depends heavily on the immediate response to an emergency at the plant site and in its immediate vicinity.

Alongside this emphasis on local preparedness APELL recognizes the role of government authorities in formulating regulations and in providing the resources which local communities

need. APELL neither replaces nor interferes with established emergency response provisions but seeks to increase awareness of such provisions and activities.

At local level there are three very important partners who must be involved if APELL is to be successful; local authorities, industry and local community/interest groups.

APELL acknowledges the need and the right of the local community to be informed about and to participate at all times in response planning for hazardous installations.

Details of the APELL process can be found in the publication APELL - Awareness and Preparedness for Emergencies at Local Level: A Process for Response to Technological Accidents, published by the United Nations Environment Programme, Industry and Environment.

10.6 Identified Risks and Risk Mitigation

The key hazards and risks associated with the operation of the facility has been assessed in the development of AS 1596 and may be grouped into a number of categories. These are listed below together with a statement on how the risks are being managed. Where these risks are relevant to this site the box will be initialed.

10.6.1 Gas Leak

LP Gas is heavier than air and will “gravitate” to the lowest point. Leaks can occur at storage vessels, fittings, valves, pipelines and appliances. Should a gas leak find an ignition source, it can “flash back” to the leak point.

- All storage bullets containing gas are maintained and tested within statutory guidelines.
- The storage bullets shall be buried in mounds.
- All the mound areas have been laid out to ensure that they do not in any way impedes or jeopardizes the escape of people in the case of emergency.
- Storage, handling and transport procedures incorporate activities (leak tests, site inspections) designed to identify gas leaks.
- Decanting equipment contains fail safe devices designed to minimize sudden increased changes in flow rates (excess flow valves)
- All storage bullets are fitted with pressure relief valves (PRV’s). These valves are at all times engaged with the vapor space.
- Staff is trained to manage gas leaks.

10.6.2 Fire & Explosion

These may be caused by ignition of an uncontrolled gas leak.

- All storage bullets are buried in mounds away from ignition sources.
- Ignition sources are strictly controlled in proximity to LP Gas storage mounds.
- All the mound areas have been laid out to ensure that they do not in any way impedes or jeopardizes the escape of people in the case of emergency.
- All storage vessels are fitted with valves that will actuate automatically to reduce internal pressure caused by fire (PSV's).
- This site has been designed to approved standards that minimize the effects from this type of event
- Staff have been trained in Emergency Management procedures
- Combustible material and rubbish is removed from gas storage areas regularly.

10.7 Notices

The following signs shall be installed:

- NO SMOKING - FLAMMABLE GAS on Bulk Storage Fence
- EMERGENCY INFORMATION PANEL on Bulk Storage Fence
- EMERGENCY PROCEDURES in Office
- WARNING NOTICE PROHIBITING SMOKING AND IGNITION SOURCES
- HAZCHEM NOTICES
- EMERGENCY PHONE NUMBERS on LP Gas vessels and at front gate of enclosure.
- HAZMAT MANIFEST

10.8 Gas Leak

In the event of a gas leak or a fire, a brief summary of emergency procedures to be initiated is as follows:

Minor

1. Safely close all valves of storage containers and bulk vessels.
2. No smoking. No naked lights.
3. No engine to be started.
4. Keep bystanders away and upwind of gas leak.

Major

1. Safely close all valves of storage containers and bulk vessels.
2. No smoking. No naked lights.
3. No engine to be started.
4. Keep bystanders away and upwind of gas leak.
5. Phone Fire Service (999).
6. Where appropriate, contact SUPPLIER on emergency response numbers detailed above
7. Isolate power at main switchboard, subject to Site Manager's approval

10.9 Fire & Explosion

- Staff should only attempt to fight small fires that can be safely put out by extinguishers or fire hoses. All other firefighting should be left to the Fire Service.
- Where releasing gas has ignited, no attempt should be made to extinguish the flame unless an isolation valve can be readily turned off thus stopping the gas flow.
- Cylinders or tanks impacted by fire may often be accompanied by loud noise or whistling. This is the vapour rushing through the Safety (Pressure) Safety Valves as it relieves the excessive internal pressure
- Jet flames impinging on other cylinders or tanks can cause a catastrophic failure resulting in a boiling liquid expanding vapour explosion (BLEVE)
- Should this occur, initiate an immediate full evacuation of all personnel, actuate all Emergency Stop devices and call the Fire Service

1. Phone Fire Service (999).
2. Contact your immediate Supervisor/Manager.
3. Phone SUPPLIER on emergency response numbers detailed in above
4. If safe to do so, close all storage vessel valves.
5. Keep bystanders away.
6. Isolate power at main switchboard, subject to Site Manager's approval.
7. Follow firefighting instructions where safe to do so.

10.10 Fire-fighting Principles, Procedures

The most effective way to fight an LPG fire is to shut off the LPG supply. If this cannot be done, it may be safer to allow the fire to burn itself out, i.e. to burn until the LPG supply to it has been exhausted, unless the continuing fire will result in an escalation of the emergency.

Dry powder or carbon dioxide fire extinguishers are effective against LPG fires.

Water is effective in cooling LPG vessels during a fire and in helping to keep the temperature of tanks and their contents below critical levels. Water spray can be useful in protecting fire-fighters attempting to close LPG supply valves in heat-affected areas and in dispersing LPG vapour.

Emergency response teams drawn from the plant staff should represent the first line of defence and should be trained for quick decisive action to contain emergencies before they develop and be trained to assist emergency personnel as any escalation of the emergency demands.

Emergency response to a fire on or close enough to threaten an LPG road tanker depends critically on the driver operator. Therefore, the quality of the equipment and training in its use are crucial to recovering control and mitigating the impact of the emergency situation.

10.11 Internal, External Responses

Most in-plant emergencies begin in a small way or as a result of failure to deal promptly and effectively with a minor incident. Owners and managers should recognise the value of rapid response by trained teams confident in their ability to deal with emergencies. Good equipment, a team spirit and regular training are essential for the commitment and confidence which ensures an effective internal response.

External response may be from local authority emergency services or from a mutual assistance group set up to respond to emergencies.

The effectiveness of both internal and external response depends initially on the seriousness of the event and then on resources, preparedness and timing. Fire drills and rehearsals for emergencies are an essential part of safety management and should be practiced regularly. External response will be most effective when the team is totally familiar with the plant, its hazards and its defenses.

Internal and external communications are important factors in determining the effectiveness of emergency response. The slightest delay in reacting to an emergency can make the

difference between success and failure. No one should be criticised for over-reacting to an emergency.

Investigation, Corrective Action, Follow-up

The purpose of post-incident investigation is to determine the causes, both immediate and underlying, in order that lessons can be learned and corrective action taken. The investigating team should include an independent expert and should report to the owners, or to senior management. The licensing authority may wish to participate or to make an independent investigation.

An investigation may disclose the need for corrective action in respect of plant layout, equipment, systems, procedures or personnel. While the team should guard against developing an unrealistic 'wish list' senior management should be prepared to sanction their recommendations.

Senior management should be prepared to discipline anyone who causes or contributes to an incident by disregarding safety rules and procedures. They should also recognise those who respond well in an emergency.

Follow-up should include information feedback to the APELL partners. If relevant information has to be withheld or delayed for legal or other good reason this should be made clear to the partners.

If equipment or system defects contributed to an incident then equipment suppliers, installers and other plants known to be similarly equipped should be alerted.

Authorities responsible for re-licensing should pay particular attention to any LPG facility where a reportable incident has occurred or any facility which closely resembles a facility which has suffered a serious accident or incident.

Following a serious incident, plant management should set about maintaining and improving relationships with employees and the community and recognize that this may take time.

10.12 Basic guidelines on emergency response

Follow these basic guidelines to develop an effective emergency response plan for your workplace:

Determine the conditions under which an evacuation would be necessary.

Designate primary and secondary evacuation routes and emergency exits. Make sure they are clearly marked and well lit. Post signs. Install emergency lighting in case a power outage occurs during an evacuation.

Ensure that evacuation routes and emergency exits are:

- Wide enough to accommodate the number of evacuating people
- Clear and unobstructed at all times
- Unlikely to expose evacuating people to additional hazards
- Coordinate your plan with the local emergency management office.
- Designate “evacuation wardens” who will help others during an evacuation and account for employees. (Establish specific evacuation procedures and a system for accounting for evacuated employees)
- Hold emergency drills at least once a year to ensure that employees know what to do in an emergency and to test the effectiveness of emergency exit routes and procedures. Keep records of such drills.
- Consider the transportation needs of employees.
- Post evacuation procedures where employees can read them.
- Establish procedures for assisting people with disabilities and people who do not speak English.
- Consider how you would access important personal information about employees in an emergency (for example, contact numbers for their home, next-of-kin, and medical care). You could store emergency contact information for employees in sealed envelopes or on CD-ROMs.

10.13 Assembly areas and accountability

Following a site evacuation, you should gather employees and other evacuees at a designated assembly area and account for each person to make sure everyone has been evacuated safely.

Accounting for evacuees takes planning and practice. Follow these guidelines:

1. Designate assembly areas where people should gather after evacuating.
2. Establish a head-count system for employees at the assembly area. The emergency operations coordinator should receive a list of the names and last-known locations of missing employees as soon as possible after arriving at the assembly area.
3. Establish a method of accounting for nonemployees such as suppliers and customers.

4. Establish procedures for further evacuation in case the incident expands. This may consist of sending employees home by normal means or providing them with transportation to an off-site location.
5. Identify shelter space in your facility and the surrounding community.
6. Establish procedures for sending evacuees to shelter.
7. Develop a list of necessary emergency supplies such as water, food, and medical supplies.
8. Coordinate plans with local authorities.

10.14 Education and Training

Educate your employees about the types of emergencies that may occur, and train them in the proper course of action for emergency situations. Make sure they understand:

- The components of your emergency response plan
- Who will be in charge during an emergency

Emergency response training for employees should address the following:

- Individual roles and responsibilities
- Potential threats, hazards, and protective actions
- Notification, warning, and communications procedures
- How to locate family members in an emergency
- Emergency response procedures
- Evacuation, shelter, and accountability procedures
- Location and use of common emergency equipment

Emergency information necessary includes:

- Providing employees with information such as checklists and evacuation maps.
- Post evacuation maps in strategic locations and consider the information needs of customers and others who visit the store.

Training sessions should be conducted at least once a year or whenever you:

- Hire new employees
- Designate evacuation wardens or others with special assignments
- Introduce new equipment, materials, or processes
- Find, through exercises, that employee performance needs to be improved

10.15 First aid

After a disaster or emergency situation, emergency services (fire, police, and medical) may be disrupted or unavailable for some time. It may be necessary to provide immediate care for an injured person if medical professionals cannot be reached. It is important to have a complete first aid kit and first aid training.

10.16 Employee support

Employees are your most valuable asset. Providing support for them after an emergency will help them, which will in turn help your business continue to run as smoothly as possible. The range of services that you might provide or arrange for employees includes:

- Crisis counseling
- Reduced or flexible work hours
- Cash advances
- Salary continuation
- Care packages
- Day care

11.0 Conclusions and Recommendations

11.1 Conclusions

The project, including the construction and operation of the Proposed Project is anticipated to provide efficient and seamless transfer of LPG from the receiving KOT-2 Jetty to the storage terminal in addition to the provision of sufficient stock of LPG to augment KPC's current LPG storage capacity at KPRL thereby increasing the supply capacity of LPG to industrial, commercial and residential customers throughout Kenya and East Africa. This will also reduce the deficit and meet the increasing demand of LPG and therefore promote LPG as environment friendly fuel source.

The potential adverse impacts associated with the proposed project are possible to mitigate successfully. The impacts before implementation of mitigation measures are assessed as low to medium and the ratings are expected to improve further with the implementation of the proposed mitigation measures. In particular, the LPG facility will be designed, constructed and operated according to the latest industry norms and standards. Programs and plans developed and implemented through the EMP will be monitored and audited to ensure compliance with current regulations and cleaner production practices. The total cost of implementing the EMP is estimated at Kshs. 9,030,000/= (Nine Million and Thirty Thousand Shillings)

11.2 Recommendation

The Consultant recommends that the proposed development should be allowed to proceed considering the implementation of the proposed Mitigation Measures and Environment Management Plan (EMP). An environmental audit is recommended upon the completion of construction works to corroborate the implementation of the proposed mitigation measures. Any unforeseen project impacts shall be identified and addressed through annual environmental audits.

12.0 ESIA Team Members

The Environmental and Social Impact Assessment was undertaken by a team of consultants from R&E Modern Technologies Limited/Petrochem Engineering Services JV that included the following:

- Kennedy Kijana McAbon'go – Environmental Lead Expert;
- George Wandera – Sociologist;
- Fredrick Maseno – Health & Safety Expert;
- Simon Abiero – Project Director
- Victor Kungu – Project Site Agent;
- Flora Akinyi – Associate Expert;
- Vallery Siwo – Enumerator;
- Ann Njoki – Enumerator;
- Kennedy Matheka – Vegetation Expert;
- Duncan Kioko Mwinzi – Invertebrates Expert;
- Alex Mutati Syingi – Birds Specialist;
- Justus O. Ochong – Reptiles Expert;
- Joseph Lesantanguny – Mammals Expert.

The Lead Environmental Expert, the Sociologist and the Associate Expert are registered and licensed by NEMA as Environmental Impact Assessment and Audit Lead and Associate Experts. Current practicing licenses for the experts are attached in Annex 9 of this Report.

13.0 References

1 Agnew A.D.Q. (2013). Upland Kenya Wild Flowers and Ferns: A flora of the Flowers, Ferns, Grasses and Sedges of Highland Kenya. Third edition, Nature Kenya – The East African Natural History Society, Nairobi.

2 Beentje H.J., (1994). Kenya, Trees, Shrubs and Lianas. National Museums of Kenya, Nairobi.

3 Foreman, L. and Bridson, D. (1989). The Herbarium Handbook. Whitetable Litho Printers Ltd. Great Britain, 214p.

4 Government of Kenya: Fossil Fuel Emission Control Regulations, 2006 – Legal Notice No. 131

5 Government of Kenya: National Development Plan

6 Government of Kenya: The Environment Management and Coordination Act 1999, Amended 2015

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

8 Government of Kenya: The Physical and Land Use Planning Act, 2019

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

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

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

12 Government of Kenya: Water Quality Regulations, 2006

13 Government of Kenya: Waste Management Regulations, 2006

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

15 Government of Kenya: The Safety and Health Committee Rules 2004

16 Government of Kenya: Medical Examination Rules 2005

17 Government of Kenya: Noise Prevention and Control Rules 2005

18 Government of Kenya: Fire Risk Reduction Rules, 2007

19 Government of Kenya: Hazardous Substances Rules, 2007

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

21 Government of the Republic of Kenya, 2007: Kenya Vision 2030

22 Guide to the reptiles and amphibians of east Africa Stephens Spawls Kim M and Robert c. Drews.

23 Hall, J.B. & Swaine, M.D. (1981). Distribution and Ecology of Vascular Plants in a Tropical Rain Forest. Dr W. Junk Publishers, The Hague, the Netherlands.

24 Howell K.M 2002 amphibians and reptiles in the African forest biodiversity manual for vertabrates

25 Davies G al earthwatch institute oxford.

26 IFC, World Bank Group: IFC Performance Standards on Environmental and Social Sustainability, 2012

27 IUCN (2014). IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Accessed 29 July 2022.

28 IUCN (2019) Mammals. IUCN Red List of Threatened Species. Version 2012.2. http://www.iucnredlist.org/initiatives/mammals [accessed 11th June 2019].

29 Kams D .R field herpetology methods for study of amphibians and reptiles Minnesota James ford bell museums of natural history university occasional paper no 18.

30 Kenya Bureau of Standards KS 1938-3: 2012: The handling, storage, and distribution of liquefied petroleum gas in domestic, commercial, and industrial installations - Code of practice - Part 3.

31 Kingdon J (2015). Kingdon field guide to African mammals 2nd edition. Bloomsburg publishing. London-UK.

32 Kiszka Jeremy, Kelly Macleod, Olivier Van Canneyt, Dylan Walker, Vincent Ridoux, Distribution, encounter rates, and habitat characteristics of toothed cetaceans in the Bay of Biscay and adjacent waters from platform-of-opportunity data, ICES Journal of Marine Science, Volume 64, Issue 5, July 2007, Pages 1033–1043, https://doi.org/10.1093/icesjms/fsm067

33 Kruseman, G. P., and N. A. DE Ridder, Reprinted 1994. Analysis and evaluation of pumping test data. International Institute for Land Reclamation and Improvement, Wagenigen, the Netherlands.

34 Maidment, D. R. 1993. Handbook of Hydrology.

35 National Atlas of Kenya, Fourth Edition (1991).

36 Ngumbau et al (2020). An annotated checklist of the coastal forests of Kenya, East Africa. PhytoKeys 147: 1–191

37 Republic of Kenya, Kenya National Bureau of Statistics 2010. 2009 Kenya Population and Housing Census. Volume 1A.

38 Sitherland W.J of (1996) ecological census technique hand book Cambridge university press.

39 United Nations Environment Programme (UNEP). 1996. Environmental Impact Assessment: Issues, Trends and Practice.

40 World Bank Group. 2018. Livewire publication. Kenya's Strategy to Make Liquefied Petroleum Gas the Nation's Primary Cooking Fuel

41 World Bank. 1993. The World Bank and the Environment.

42 World Bank. 1991. Environmental Assessment Sourcebook. Volume I. Policies, Procedures and Cross-Sectoral Issues. *Environment Department.* Technical Paper No. 139.

43 World Bank. 1991. Environmental Assessment Sourcebook. Volume II. Sectoral Guidelines.

44 Environment Department. Technical Paper No.140.

45 World Bank. 1991. Environmental Assessment Sourcebook. Volume III. Guidelines for Environmental Assessment of Energy and Industry Projects. *Environment Department.* Technical Paper No.154.

14.0 ANNEXES

Annex 1: Approved Terms of Reference

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Mobile Lines: 0724-253 398, 0723-363 010, 0735-013 046
Telkom Wireless: 020-2101370, 020-2183718
Incident Lines: 0786-101100, 0741-101100

P.O. Box 67839, 00200
Popo Road, Nairobi, Kenya
E-mail: dgnema@nema.go.ke
Website: www.nema.go.ke

NEMA/TOR/5/2/452

5th July, 2022

Chief Executive Officer,
Kenya Pipeline Company Limited,
P.O Box 73442-00200,
NAIROBI.

RE: TERMS OF REFERENCE (TOR) FOR ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE, MOMBASA COUNTY

We acknowledge the receipt of TOR for the above subject.

Pursuant to the Environmental Management and Coordination Act, 1999 the Environmental (Impact Assessment and Audit) Regulations 2003 and legal notice 31 and 32 of 2019, your terms of reference for the Environmental Impact Assessment (EIA) for the proposed **LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE, MOMBASA COUNTY** has been approved.

You shall submit ten (10) copies, a soft copy summarised version of the ESMP in **WORD** form and one electronic copy of your report prepared by registered expert to the Authority.

MARRIAN KIOKO
HEAD OF EIA SECTION

TOR 452

CONSULTANCY SERVICES FOR FRONT END ENGINEERING DESIGN FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY

CHANGAMWE MOMBASA

TERMS OF REFERENCE FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY

Document No: KPC.KPRL.CHANGAMWE.EHS.06.22-01B

Client Reference Project No
KPC/PU/OT – 241/PROJECTS/KPRL/21 – 22

C								
B	30-June -22	Issued for CIT Approval						
A	27-June-22	Issued for CIT Review	K.M		S.S		S.A	
Rev	Date	Description	Initial	Signature	Initial	Signature	Initial	Signature
			Prepared by		Checked by		Approved by	

CLIENT:	KENYA PIPELINE COMPANY LIMITED	Kenpipe Plaza, Sekondi Road, Off Nanyuki Road, Industrial Area, P.O. Box 73442 – 00200 Nairobi, Kenya
CONSULTANT:	R&E MODERN TECHNOLOGIES LIMITED	Eastern Bypass, Pondo Arcade, 3rd Floor Suite AC3 Post Office Box Number 50692-00200, Nairobi info@rme moderntechnologies.co.ke
CONSULTANT:	PETROCHEM ENGINEERING SERVICES	B-69, Block No. 18, Gulshan-e-Iqbal Karachi-75300, Pakistan info@petrochemengg.com.pk

04 JUL 2022

Document Authentication

These Terms of Reference (ToR) for the above mentioned project have been prepared by a team of experts with the Lead Consultant registered and licensed by NEMA as EIA/EA Lead Expert.

This ToR has been done with reasonable skills, care and diligence in accordance with the Environmental Management and Coordination Act 1999 and the Environmental (Impact Assessment and Audit) Regulations 2003.

We the undersigned, certify that the particulars given in this ToR are correct, complete, accurate and righteous to the best of our knowledge and will be sufficient to provide adequate and informative Environmental and Social Impact Assessment on the Proposed LPG Handling and Storage Facility in Mombasa.

PROJECT PROPONENTS

Kenya Pipeline Company Limited
Kenpipe Plaza, Sekondi Road, Off Nanyuki Road,
Industrial Area,
P.O. Box 73442 – 00200
Nairobi, Kenya

Signature.....**Date/Stamp**..30/06/2022.....

EIA/EA LEAD EXPERT

Kennedy Kijana
NEM REG, NO.: 1254
EMAIL: info@moderntechnologies.co.ke

Signature.....**Date**....30/06/2022.....

Annex 2: Proponent's Ownership Documents

Annex 3: Public Consultation Invitation Letters and Notices

Date: 13/07/2022

REF: R&E/PES/KPC/CHANGAMWE/LPGESIA/140722

To: The Director General
Kenya Civil Aviation Authority,
Aviation House,
Jomo Kenyatta International Airport
P.O. Box 30163 - 00100,
Nairobi.

For Director General
Kenya Civil Aviation Authority
P. O. Box 30163 - 00100
NAIROBI
SIGNATURE:
DATE: 14/07/2022

Dear Sir,

RE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY, CHANGAMWE MOMBASA.

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

R&E Modern Technologies Limited/Petrochem Engineering Services JV has been engaged by Kenya Pipeline Company Limited to undertake an ESIA study for this project as required by the Environmental Management and Coordination Act (EMCA)

You have been identified as a key stakeholder pursuant to the requirements of section 17-1 of the Environmental Impact assessment and audit regulations, 2003 which require an EIA should "seek the views of any persons who may be affected by the project"

In this regard, you are invited to a Stakeholders' workshop on **Friday 15th July at 8.30 AM at the Jambo Village Hotel, Makutano Hall, off Moi International Airport Road in Changamwe.**

The main purpose of the workshop is to present details of the proposed project, to obtain your valued comments and to facilitate incorporation of your ideas and concerns into the project.

We welcome you and look forward to very fruitful discussions with you.

Yours Sincerely,

Simon Abiero
Director
R&E Modern Technologies/Petrochem Engineering Services JV

KENYA PIPELINE COMPANY LIMITED

KENPIPE PLAZA,
SEKONDI ROAD,
OFF NANYUKI ROAD,
INDUSTRIAL AREA,
NAIROBI, KENYA.
P.O.Box 73442 - 00200,
TELEPHONE: 254-20-532244
TELEFAX: 254-20-530384/650436/8
E-mail: Info@kpc.co.ke

Ref: KPC/MD/50

Ref: 27th June 2022

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: STAKEHOLDER ENGAGEMENT FOR ENVIRONMENTAL ASSESMENT IMPACT STUDY FOR THE PROPOSED LPG IMPORT FACILITY AT KPRL CHANGAMWE

Kenya Pipeline Company (KPC) is desirous to develop a LPG import and bulk handling facility at Kenya Petroleum Refineries Limited(KPRL) Changamwe. The project once complete is expected to have a huge positive impact to the country by availing sufficient LPG as well as driving down the cost of LPG thereby saving our forests and improving the livelihoods of Kenyans.

KPC has contracted **M/s R&E Modern Engineering ltd** to carry out consultancy services for the proposed project. Part of their mandate is to carry out an Environmental Impact Assessment study.

Kindly accord them the necessary support.

Yours faithfully,

DR. MACHARIA IRUNGU, MBS
MANAGING DIRECTOR

R&E MODERN TECHNOLOGIES LTD

PES Petrochem Engineering Services

KPC

Consultancy Services for Detailed Engineering Design for the Proposed LPG Import, Storage, and Handling facility at Changamwe Mombasa

KENYA AIRPORTS AUTHORITY RECEIVED 14 JUL 2022 TIME..... CENTRAL REGION

Date: 13/07/2022

REF: R&E/PES/KPC/CHANGAMWE/LPGESIA/140722

To: The Managing Director
Kenya Airports Authority,
P.O. Box 19001 - 00501,
Nairobi.

Dear Sir,

RE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY, CHANGAMWE MOMBASA.

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

R&E Modern Technologies Limited/Petrochem Engineering Services JV has been engaged by Kenya Pipeline Company Limited to undertake an ESIA study for this project as required by the Environmental Management and Coordination Act (EMCA)

You have been identified as a key stakeholder pursuant to the requirements of section 17-1 of the Environmental Impact assessment and audit regulations, 2003 which require an EIA should "seek the views of any persons who may be affected by the project"

In this regard, you are invited to a Stakeholders' workshop on **Friday 15th July at 8.30 AM at the Jambo Village Hotel, Makutano Hall, off Moi International Airport Road in Changamwe.**

The main purpose of the workshop is to present details of the proposed project, to obtain your valued comments and to facilitate incorporation of your ideas and concerns into the project.

R&E MODERN TECHNOLOGIES LTD.
Eastern Bypass, Pondo Arcade,
3rd Floor Suite AC3

P.O. Box 59692 - 00200, Nairobi
Tel: 0713 645 141 • 0729 389 494
Email: info@moderntechnologies.co.ke

We welcome you and look forward to very fruitful discussions with you.

Yours Sincerely,

Simon Abiero

Director

R&E Modern Technologies/Petrochem Engineering Services JV

MEETING MINUTES

Purpose:	**MEETING TO DISCUSS ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE PROPOSED KENYA PIPELINE COMPANY LPG IMPORT, STORAGE AND HANDLING FACILITY AT CHANGAMWE MOMBASA**
Date:	2nd September 2022
Time:	1400hrs – 1500hours
Venue:	Virtual
Prepared by:	Benson Osoro
Prepared On:	2nd September 2022
Present:	**N** **Name** **Organization** 1 Philip Otieno KCAA 2 Benson Osoro KCAA 3 Teresa Njoki KCAA 4 Eng. Jonah Kinyua KCAA 5 Eng. Salim Saidi Engineer 6 Kennedy Macbongo NEMA Lead Expert 7 Eng. Victor Kungu Project Site Agent 8 Simon Abiero Project Director 9 Veronicah Mogesi Project Admin
Agenda:	▪ Presentation of the concept by the proponent ▪ AOB

Min no/Action	Agenda	Points of Discussion	Action by	Action Date
Min 1-2/9/22	**Introduction**	Due notice of the meeting having been given, and there being a quorum, the Chairperson declared the meeting duly constituted and called it to order at 1400hrs.	N/A	N/A
Min 2-2/9/22	**Request from KPC to present to and obtain comments from KCAA the proposed project**	**Background** Kenya Pipeline Company (KPC) Limited wrote to KCAA vide letter Ref: R&E/PES/KPC/CHANGAMWE/LPGESIA/140722 dated 13th July 2022, requesting to present details of the proposed project and obtain KCAA comments concerning the proposed project. In response to the above referenced letter, KCAA invited the proponent for a virtual meeting, for a presentation of the concept (General layout of the project) to the Authority.	ALL	N/A

MEETING MINUTES

Min no/Action	Agenda	Points of Discussion	Action by	Action Date
		After the presentation and given that the proponent kept talking of KCAA Approval, the proponent was advised by the Authority to provide the following items: a. Coordinates in WGS-84 format of the proposed project b. Requested height of the proposed project c. Purpose/ use of the proposed project d. Applicable fees payable in cash or banker's cheque to the Commissioner of Customs services Department, Kenya Revenue Authority (KRA). i. KES 15,000 and 40,000 per site within and outside Nairobi respectively.	Proponent	
Min 3-2/9/22	**Proponent comments on KCAA advise**	The proponent indicated that this was a conceptual stage presentation and that they are yet to develop a detailed Engineering design; and only seeking KCAA comments as a requirement in ESIA as far as the proposed project was concerned.	Proponent	N/A
Min 4 - 2/9/22	**Way forward**	The following was recommended as a way forward: a. The proponent to forward a questionnaire via gops@kcaa.or.ke in which KCAA will give comments. This is in line with public participation given that KCAA is a major stakeholder whose activities will be affected by the proposed project.	All	N/A
Min 5 - 2/9/22	**AOB**	There being no A.O.B the meeting was adjourned at 1500hrs. The chair thanked the members for attending the virtual meeting.	All	N/A

Signed By

Secretary : Benson Osoro Sign..... Date...5/9/2022.....

Chairperson: Philip Otieno Sign..... Date.....5/9/2022.....

KENYA PIPELINE COMPANY LIMITED

KENPIPE PLAZA,
SEKONDI ROAD,
OFF NANYUKI ROAD,
INDUSTRIAL AREA,
NAIROBI, KENYA.
P.O.Box 73442 - 00200,
TELEPHONE: 254-20-532244
TELEFAX: 254-20-530384/650436/8
E-mail: Info@kpc.co.ke

Ref: KPC/MD/50

Ref: 27th June 2022

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: STAKEHOLDER ENGAGEMENT FOR ENVIRONMENTAL ASSESMENT IMPACT STUDY FOR THE PROPOSED LPG IMPORT FACILITY AT KPRL CHANGAMWE

Kenya Pipeline Company (KPC) is desirous to develop a LPG import and bulk handling facility at Kenya Petroleum Refineries Limited(KPRL) Changamwe. The project once complete is expected to have a huge positive impact to the country by availing sufficient LPG as well as driving down the cost of LPG thereby saving our forests and improving the livelihoods of Kenyans.

KPC has contracted **M/s R&E Modern Engineering ltd** to carry out consultancy services for the proposed project. Part of their mandate is to carry out an Environmental Impact Assessment study.

Kindly accord them the necessary support.

Yours faithfully,

DR. MACHARIA IRUNGU, MBS
MANAGING DIRECTOR

KENYA PIPELINE COMPANY LIMITED

KENPIPE PLAZA,
SEKONDI ROAD,
OFF NANYUKI ROAD,
INDUSTRIAL AREA,
NAIROBI, KENYA.
P.O.Box 73442 - 00200,
TELEPHONE: 254-20-532244
TELEFAX: 254-20-530384/650436/8
E-mail:
Info@kpc.co.ke

Ref: KPC/PR/18

06th July 2022

KENYA MARITIME AUTHORITY
RECEIVED
08 JUL 2022
TIME:.....
DIRECTOR GENERAL'S OFFICE

TO,
Kenya Maritime Authority,
Mombasa

RE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY, CHANGAMWE MOMBASA

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users. R&E Modern Technologies Limited/Petrochem Engineering Services JV has been engaged by Kenya Pipeline Company Limited to undertake an ESIA study for this project as required by the Environmental Management and Coordination Act (EMCA)

You have been identified as a key stakeholder pursuant to the requirements of section 17-1 of the Environmental Impact assessment and audit regulations, 2003 which require an EIA should "seek the views of any persons who may be affected by the project"

In this regard, you are invited to a Stakeholders' workshop on Friday 15th July at 8.30 AM at the Jambo Village Hotel, Makutano Hall, off Moi International Airport Road in Changamwe.

The main purpose of the workshop is to present details of the proposed project, to obtain your valued comments and to facilitate incorporation of your ideas and concerns into the project.

We welcome you and look forward to very fruitful discussions with you.

Thanking you in advance,

Yours faithfully,

ENG. DAVID MURIUKI
FOR: MANAGING DIRECTOR

KENYA PIPELINE COMPANY LIMITED

KENPIPE PLAZA,
SEKONDI ROAD,
OFF NANYUKI ROAD,
INDUSTRIAL AREA,
NAIROBI, KENYA.
P.O.Box 73442 - 00200,
TELEPHONE: 254-20-532244
TELEFAX: 254-20-530384/650436/8
E-mail:
Info@kpc.co.ke

Ref: KPC/PR/18

06th July 2022

TO,
The Depot Manager,
Hashi Energy
Changamwe Depot,
Mombasa

RE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY, CHANGAMWE MOMBASA

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users. R&E Modern Technologies Limited/Petrochem Engineering Services JV has been engaged by Kenya Pipeline Company Limited to undertake an ESIA study for this project as required by the Environmental Management and Coordination Act (EMCA)

You have been identified as a key stakeholder pursuant to the requirements of section 17-1 of the Environmental Impact assessment and audit regulations, 2003 which require an EIA should "seek the views of any persons who may be affected by the project"

In this regard, you are invited to a Stakeholders' workshop on Friday 15th July at 8.30 AM at the Jambo Village Hotel, Makutano Hall, off Moi International Airport Road in Changamwe.

The main purpose of the workshop is to present details of the proposed project, to obtain your valued comments and to facilitate incorporation of your ideas and concerns into the project.

We welcome you and look forward to very fruitful discussions with you.

Thanking you in advance,

Yours faithfully,

ENG. DAVID MURIUKI
FOR: MANAGING DIRECTOR

Mohamed H-Ali
8/7/2022

HASHI ENERGY LIMITED
MOMBASA TERMINAL
08 JUL 2022
REFINERY ROAD, CHANGAMWE

KENYA PIPELINE COMPANY LIMITED

KENPIPE PLAZA,
SEKONDI ROAD,
OFF NANYUKI ROAD,
INDUSTRIAL AREA,
NAIROBI, KENYA.
P.O.Box 73442 - 00200,
TELEPHONE: 254-20-532244
TELEFAX: 254-20-530384/650436/8
E-mail:
Info@kpc.co.ke

Ref: KPC/PR/18

06th July 2022

TO,
African Gas & Oil Company Ltd
(AGOL)

RE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY, CHANGAMWE MOMBASA

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users. R&E Modern Technologies Limited/Petrochem Engineering Services JV has been engaged by Kenya Pipeline Company Limited to undertake an ESIA study for this project as required by the Environmental Management and Coordination Act (EMCA)

You have been identified as a key stakeholder pursuant to the requirements of section 17-1 of the Environmental Impact assessment and audit regulations, 2003 which require an EIA should "seek the views of any persons who may be affected by the project"

In this regard, you are invited to a Stakeholders' workshop on Friday 15th July at 8.30 AM at the Jambo Village Hotel, Makutano Hall, off Moi International Airport Road in Changamwe.

The main purpose of the workshop is to present details of the proposed project, to obtain your valued comments and to facilitate incorporation of your ideas and concerns into the project.

We welcome you and look forward to very fruitful discussions with you.

Thanking you in advance,

Yours faithfully,

ENG. DAVID MURIUKI
FOR: MANAGING DIRECTOR

KENYA PIPELINE COMPANY LIMITED

KENPIPE PLAZA,
SEKONDI ROAD,
OFF NANYUKI ROAD,
INDUSTRIAL AREA,
NAIROBI, KENYA.
P.O.Box 73442 - 00200,
TELEPHONE: 254-20-532244
TELEFAX: 254-20-530384/650436/8
E-mail:
Info@kpc.co.ke

Ref: KPC/PR/18

06th July 2022

TO, Amos Kumiti
LPG Superintendend
Rubis at Changamwe
0721208915
Amosmugaisi@rubiskenya.com

RE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY, CHANGAMWE MOMBASA

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users. R&E Modern Technologies Limited/Petrochem Engineering Services JV has been engaged by Kenya Pipeline Company Limited to undertake an ESIA study for this project as required by the Environmental Management and Coordination Act (EMCA)

You have been identified as a key stakeholder pursuant to the requirements of section 17-1 of the Environmental Impact assessment and audit regulations, 2003 which require an EIA should "seek the views of any persons who may be affected by the project"

In this regard, you are invited to a Stakeholders' workshop on Friday 15th July at 8.30 AM at the Jambo Village Hotel, Makutano Hall, off Moi International Airport Road in Changamwe.

The main purpose of the workshop is to present details of the proposed project, to obtain your valued comments and to facilitate incorporation of your ideas and concerns into the project.

We welcome you and look forward to very fruitful discussions with you.

Thanking you in advance,

Yours faithfully,

ENG. DAVID MURIUKI
FOR: MANAGING DIRECTOR

RUBiS
Energy Kenya
P.O. BOX 30322 OR 4202
00100, GPO
NAIROBI

KENYA PIPELINE COMPANY LIMITED

KENPIPE PLAZA,
SEKONDI ROAD,
OFF NANYUKI ROAD,
INDUSTRIAL AREA,
NAIROBI, KENYA.
P.O.Box 73442 - 00200,
TELEPHONE: 254-20-532244
TELEFAX: 254-20-530384/650436/8
E-mail:
Info@kpc.co.ke

Ref: KPC/PR/18

06th July 2022

TO,
STEPHEN MOGOI
HSE ENGINEER
NJI CHANGAMWE,

TOTAL ENERGIES MARKETING KENYA PLC
CHANGAMWE TERMINAL
Tel: 0719 027 000
P.O. Box 24105, MOMBASA

stephen.mogoi@totalenergies.ke
0787609102.

RE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY, CHANGAMWE MOMBASA

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users. R&E Modern Technologies Limited/Petrochem Engineering Services JV has been engaged by Kenya Pipeline Company Limited to undertake an ESIA study for this project as required by the Environmental Management and Coordination Act (EMCA)

You have been identified as a key stakeholder pursuant to the requirements of section 17-1 of the Environmental Impact assessment and audit regulations, 2003 which require an EIA should "seek the views of any persons who may be affected by the project"

In this regard, you are invited to a Stakeholders' workshop on Friday 15th July at 8.30 AM at the Jambo Village Hotel, Makutano Hall, off Moi International Airport Road in Changamwe.

The main purpose of the workshop is to present details of the proposed project, to obtain your valued comments and to facilitate incorporation of your ideas and concerns into the project.

We welcome you and look forward to very fruitful discussions with you.

Thanking you in advance,

Yours faithfully,

ENG. DAVID MURIUKI
FOR: MANAGING DIRECTOR

KENYA PIPELINE COMPANY LIMITED

KENPIPE PLAZA,
SEKONDI ROAD,
OFF NANYUKI ROAD,
INDUSTRIAL AREA,
NAIROBI, KENYA.
P.O.Box 73442 - 00200,
TELEPHONE: 254-20-532244
TELEFAX: 254-20-530384/650436/8
E-mail:
Info@kpc.co.ke

Ref: KPC/PR/18

06th July 2022

TO, Kenha
Coast Regional Office
rd.coast@kenha.co.ke

RE: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY, CHANGAMWE MOMBASA

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users. R&E Modern Technologies Limited/Petrochem Engineering Services JV has been engaged by Kenya Pipeline Company Limited to undertake an ESIA study for this project as required by the Environmental Management and Coordination Act (EMCA)

You have been identified as a key stakeholder pursuant to the requirements of section 17-1 of the Environmental Impact assessment and audit regulations, 2003 which require an EIA should "seek the views of any persons who may be affected by the project"

In this regard, you are invited to a Stakeholders' workshop on Friday 15th July at 8.30 AM at the Jambo Village Hotel, Makutano Hall, off Moi International Airport Road in Changamwe.

The main purpose of the workshop is to present details of the proposed project, to obtain your valued comments and to facilitate incorporation of your ideas and concerns into the project.

We welcome you and look forward to very fruitful discussions with you.

Thanking you in advance,

Yours faithfully,

fr

ENG. DAVID MURIUKI
FOR: MANAGING DIRECTOR

REGIONAL DIRECTOR - COAST REGION
RECEIVED
07 JUL 2022
REG No:.....
KENYA NATIONAL HIGHWAYS AUTHORITY
P.O. Box 84284 - 80100, MOMBASA

Annex 4: Minutes and Attendance Register of Public Consultation Meetings

MINUTES FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE SUB COUNTY, MOMBASA COUNTY.

MEETING 1

DATE: 11TH JULY 2022

VENUE: KWAHOLA PRIMARY GROUNDS

TIME: 11:00AM-12:40PM

MEMBERS PRESENT.

See Attached attendance list

AGENDA

1. Introduction and welcoming remarks
2. Project Brief
3. Discussions
4. Vote of thanks and closure

MIN 1 INTRODUCTION AND WELCOMING REMARKS

The area Chief, called the meeting to order at 11:00am with a word of prayer from a volunteer. He then introduced the Assistant Chief and the Senior Assistant County Commissioner (SACC). The SACC welcomed the Area's OCS, village elders, *Nyumba Kumi* representatives and all the community members to the meeting. She encouraged the members to be attentive and assured them of an open platform to ask any question they might have regarding the Proposed Project. She then invited the Proponent Representative who also introduced both the Proponent's team and the Consultant team.

MIN 2 PROJECT BRIEF

The Proponent

The Proponent's Representative outlined the purpose of the meeting to the participants and the relevance of public participation. He said the Proponent intends to construct a large common user LPG facility within KPRL land with an increased storage capacity to improve the availability of LPG which is currently trading at high prices due to demand and supply. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users. He also pointed out that once complete, is expected to have a huge positive impact to the country by availing sufficient LPG as well as driving down the cost of LPG.

The Design Consultant

The design consultant gave a brief description of the proposed project stating that the most suitable design storage capacity for the proposed import terminal has been estimated at 30,000 metric tons in the medium term based on the available in-country LPG import capacity activities

that are expected during implementation of the project. He also stated that the bulk storage shall be in the form of mounded bullets that provide intrinsically passive and safe environment. The import pipeline from KOT-2 will also be below ground on the existing oil pipeline wayleave.

The health and safety expert talked about the risk assessment associated with bulk LPG storage which is mainly fire and said the necessary precautions will be put in place including import pipeline being below ground in addition to being fitted with automatic leak detectors for emergency response. The wayleave will also be patrolled to ensure maximum security is maintained.

The Environmentalist summarized on the environmental and economic impacts. Positive impacts associated with the project will include employment creation, improved health due to use of clean energy, affordable LPG prices, forest conservation due to increased use of LPG, improved regional economic activities and trade. Negative impacts during construction phase include air pollution, noise pollution, biodiversity loss, disruption of traffic during pipeline installation across Airport Road. During operation is risk of fire outbreak.

The sociologist highlighted that the Environmental Impact assessment and audit regulations, 2003 require an EIA should "seek the views of any persons who may be affected by the project". The constitution also gives everyone a right to be part of all developments therefore community views are important in the ESIA process hence everyone has the freedom to discuss and share their thoughts on the issues regarding the Proposed Project.

MIN 3 DISCUSSIONS

The following were the questions and comments by the participants and answers and clarifications by the Proponent and the Consultant:

Q1 Will there be disruption of the market that is currently operational along the wayleave?

ANS: The Kenya Pipeline Company's way leave is from Kipevu Oil Terminal (KOT) to the Kenya Pipeline Refinery Limited. Protocols will be observed in case there will be need for displacement. This may only be temporary during the laying of the import pipeline.

Q2 Apart from the employment opportunities how else can the residents benefit socially from the proposed project?

ANS: Kenya Pipeline Company has been involved in many social projects, but they have to be vetted before implementation. Therefore all the needs should be channeled through written proposals.

Q3 Can we get employment and what will be the criteria used?

ANS: Depending on the type of job, priority is always given to the locals within the project. The contactors will liaise with the chief to ensure people within the area are considered for employment.

Q4 What effects will the LPG pipeline have on the area residents?

ANS: There will be no danger since the pipeline will be buried on the ground. Leak detection will also be installed that can notify the control room of any leakage and the system shut down and danger averted.

Q5 Can Kenya Pipeline Company offer training for inside jobs like firefighting despite not going to school?

ANS: There are no trainings that are currently offered by Kenya Pipeline Company.

Q6 There has been an issue of insecurity along the wayleave and dumping of solid waste, is the Kenya Pipeline Company aware?

ANS: The issue of insecurity is a national government mandate and should have been channeled through the office of the chief.

Q7 Can solid waste in the area be useful in production of biogas in relation to this project?

ANS: No. In this project, the gas will be imported.

MIN 4 VOTE O F THANKS AND CLOSURE

The SACC, thanked all the residents for their attendance and active participation in the meeting. She assured the residents of job opportunities once the project commences. She also urged the KPC to work together with her office and take into consideration all the ideas and recommendations put forth by the residents.

The meeting ended at 12:40 p.m. with a word of prayer from a volunteer from the stakeholders.

Signed by

COMMUNITY REPRESENTATIVE

SIGNATURE

R&E MODERN TECHNOLOGIES

SIGNATURE:

CHIEF (KWAHOLA LOCATION)

SIGNATURE

CHIEF
KWAHOLA LOCATION
CHANGAMWE SUB - COUNTY

Attendance Register

CHIEF KWAHOLA LOCATION CHANGAMWE SUB-COUNTY

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

Administrative Location: KWAHOLA **Venue:** Kwaholo Primary **Date:** 11th July 2022

No.	Name	Organization/Village	Position/Status	Mobile No.:	Signature
1.	Akinyi Flora Mitchel	R&E	Environmentalist	0701393729	
2.	George Wandera	R&E	Sociologist	0729632854	
3.	DIANA NTHUA	KPRL	HSE Technologist	0724831943	
4	VICTOR KUNGU	R&E	S.A	0721771288	V.K.
5	BERNARD Kimani	KPC	ACCO	0723984155	
6	Eng. Alboian Maondo	KPC	SE-PCM	0722165839	
7.	MIRIAM TILAS	INTERIOR ~~SACC~~ - PORTREITZ	SACC	0721932740	
8	ROSE MBAABU	KPS	OCS CHAANI	0723829 117	
9.	OMAR SWALEH	INTERIOR	CHIEF	0722123112	
10	BAKARI AHMAD	INTERIOR	ASST CHIEF	0790659885	
11	LEILA M. NYACHE	M-CA	M-CA	0792081422	
12	JONES KHAYUVA	V/ELDER	V/ELDER	0721550447	
13	TERESA WAMOYI	V/ELDER	V/ELDER	0111413840	
14	ABDALLA KONDO	V/ELDER	V/ELDER	0714990179	
15	HABIBA BIKAR	V/ELDER	V/ELDER	0721667589	
16	JAMILA AHMED	V/ELDER	V/ELDER	0711168964	

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*					
	Administrative Location:	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
17.	Nicholas Mutuku	Kwahola		0721801470	
18	Isaiah Muli	"		0725599517	
19	Ludovick Moses	"		0799370938	
20	Geoffrey Mbwana	"		0796022688 ~~0796022688~~	
21	Stephen Makwele	"		0705052041	
22	Anthony Okechi	"		0718252134	
23	Benson Otonda	"		0758251105	
24	Stanley K. Masila	"		0723518461	
25	Salma S. Said	"		0757630554	
26	Hewa A. Issack	"		0726971715	
27	Elvin ~~M.~~ ~~Mwakende~~	"		0725060190	
28	Kwekwe Saumu Juma	"		0798507697	
29	Amina J Juma	"		0746106194	
30	Mwanakombo Juma	"		0798507697	
31	Rosemary Wathera			0793856554	

CHIEF
KWAHOLA LOCATION
CHANGAMWE SUB-COUNTY

Attendance Register

CHIEF
KWAHOLA LOCATION
CHANGAMWE SUB - COUNTY

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Administrative Location: / Name	Venue: / Organization/Village	Position/Status	Date: / Mobile No.:	Signature
32	ELIBAH ANGUBA	//		0725774802	
33	SABINA MJOMBA	Kwahola		0724205329	
34	FAITH MARIANA	//		0708257008	
35	NIMO NUNOW	KWA-HOLA	RESIDENT	0722105451	
36	SHANKARON ABDI	KWA-HOLA	RESIDENT	0725814168	
37	GLADYS NYAMWOLA	KWA HOLA	RESIDENT	0718426239	
38	MULKALL MUENGOKI	KWA HOLA	RESIDENT	0724695079	
39	MUENI NAUMBI	KWA HOLA	RESIDENT	0705162584	
40	MONICAH ATUBA	KWA HOLA	RESIDENT	0726634912	
41	FRIDAH KALONDU	KWA HOLA	RESIDENT	0717511746	
42	FAITH KAMAMI	KWA HOLA	RESIDENT	0724015325	
43	JANE NGUMA	KWA HOLA	RESIDENT	0725802779	
44	KUBESHA HASSAN	Kwa Hola	RESIDENT	0758337146	
45	ZEINAB ABDI	Kwa Hola	RESIDENT	0768812573	
46	Thalo Muthami	Kwa Hola	Resident	0112339976	
47	ROZINA MKANYIKA	Kwa Hola	Resident	0715503377	

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	**Administrative Location:** Name	**Venue:** Organization/Village	Position/Status	**Date:** Mobile No.:	Signature
48	Judith ngaira	Kwahola Pri	Resident	0715328220	[signature]
49	Yvonne Andebe	Kwa hola	peer educator	0712952927	[signature]
50	Rodgers Uhuru	Kwa hola	Resident	0710303905	[signature]
51	DINAH GITINGU	Kwa hola	Resident	0710649658	[signature]
52	Thabo muthami	Kwa hola	Resident	0112739927	[signature]
53	WENDY muthoni	" "	Resident	0722402571	[signature]
54	WILLIS OKELLO	" "	"	0702752562	[signature]
55.	Monica mutuoka	Kwa hola	Resident	0741567320	[signature]
56	Usui Abdallah	Sisi kwa sisi	Resident	0703386458	US
57	Elizabeth mwango	Kwa hola	Resident	0743112536	[signature]
58	SELINA NDUKU	KWA HOLA	RESIDENT	0729995483	[signature]
59	FAITH M NGUI	KWA HOLA	"	0702649478	[signature]
60	DOROTHY WAMBUA	KWA HOLA	"	0708935544	[signature]
61	Miriam Andebe	Kwa hola	CHV/peer educator	0711854331	[signature]
62	RUKIA OMAR	Kwa hola	RESIDENT	0725954409	

Attendance Register

CHIEF
KWAHOLA LOCATION
CHANGAMWE SUB - COUNTY

Project Name: *Environmental And Social Impact Assessment Study For The Proposed LPG Handling and Storage Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Venue: / Name	Organization/Estate	ID Number	Date: / Address/Mobile No.:	Signature
63	RUTH AKOLA	RESIDENT	35555914	0746514038	
64	MOHAMED SIMBA	VILLAGE ELDER	5312668	0722 326912	
65	RAMADHANI MOHAMED	NYUMBA 10	14491940	0722 666240	
66	WINNIE KANZI	NYUMBA 10	11646503	0727 816448	
67	AKRIM ABDULHAMID	NYUMBA 10	11788544	0706726663	
68	HASIGUA MAJANI	VILLAGE ELDER	11042315	0706726278	
69	JOSEPHINE YUMBYA	NYUMBA 10	13616807	0718567656	
70	DAMARIS WANDOE HANNINGTON	NYUMBA KUMI	9632292	0720294109	
71	ABIGAEL MUANDI	NYUMBA KUMI	31877155	0748120975	
72	BETTY AUMA	RESIDENT	20273954	0707508647	
73	TREAZAH ADONGO	RESIDENT	30789126	0707508647	
74	PHOEBE ADHIAMBO	RESIDENT	32977903	0702870976	
75	FATUMA KIBWANA		25904763	0703367859	
76	SALAMA SAID	Nyumba 10	30478938	0704557903	
77	AMINA SHALEH		10959544	0726893539	

Attendance Register

CHIEF KIPEVOLA LOCATION CHANGAMWE SUB-COUNTY

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

	Administrative Location:	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
78	philip MWASHIGHANDI	NYUMBA KUMI	NYUMBA KUMI	0723494411	
79	LYNDAH KEMUNTO	Nyumba Kumi	Nyumba kumi	0728732689	
80	ABIGAEL MILANDI	Nyumba Kumi	Nyumba Kumi	0748720975	
81	SALAMA SAID	Nyumba Kumi	Nyumba Kumi	0704557903	
82	JEMIMAH MUKHI	Nyumba Kumi	Nyumba Kumi	0711320484	
83	DAMARIS WANDOE HANNINGTON	NYUMBA KUMI	NYUMBA KUMI	0720294109	
84	MARY NYABOKE	Nyumba Kumi	NYUMBA KUMI	0721421166	
85	RUKIA OMAR	Nyumba Kumi	Nyumba	0725954409	
86	NANCY ATIENO	NYUMBA KUMI	NYUMBA KUMI	0719287869	
87	SAFENIA IGOKI	NYUMBA KUMI	NYUMBA KUMI	0723417918	
88	ZULEKHA BAKARI	Nyumba Kumi	Nyumba Kumi	0720446632	
89	CECILIA MUGURE	NYUMBA KUMI	NYUMBA KUMI	0715600148	
90	Paul OIASO	NYUMBA KUMI		0748085516	
91	WINNIE MAYIKA	"	"	0727358807	
92	FATUMA OMARI	NYUMBA KUMI	"	0728172101	

Attendance Register

CHIEF
KWAHOLA LOCATION
CHANGAMWE SUB - COUNTY

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Administrative Location: / Name	Venue: / Organization/Village	Position/Status	Date: / Mobile No.:	Signature
93	LUCY CAROLINE TSAZA	NYUMBA 10		0710492917	
94	JANCITA ACHIENG	NYUMBA 10		0733548299	
95	MOHAMED [illegible]	NYUMBA KUMI		0729712085	
96	Abdallah Salim	Nyumba 10		0758032039	
97	Abdul Omar	N/K		072999-5429	
98	Bi. PHILIP HINGA	V/ELDER	V/ELDER	0722829061	
99	ALI RASHID	V/ELDER	V/ELDER	0724854333	
100	OMAR RAMADHAN	NYUMBA 10		0702361157	
101	VENCE MBARU	Nyumba Kumi	Nyumba kumi	0729467855	
102	DENNIS DIUKA	NYUMBA KUMI	NYUMBA KUMI	0723167297	
103	Phoenicia Mukii Mitili	Nyumba Kumi	Nyumba Kumi	0712672060	
104	CHRISTINE MWIKALI	Nyumba Kumi	Nyumba kumi	0710928948	
105	Mwanamyaka Kombo	V/ELDER		0724958963	
106	ROSE WANJE	NYUMBA KUMI	NYUMBA KUMI	0712503099	
107	AMINA HAMISI	V/ELDER		0712436528	

Attendance Register

CHIEF
KWAHOLA LOCATION
CHANGAMWE SUB-COUNTY

Project Name: *Environmental And Social Impact Assessment Study For The Proposed LPG Handling and Storage Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Venue: Name	Organization/Estate	ID Number	Date: Address/Mobile No.:	Signature
108	REUBEN MWAKIREMBA	RESIDENT	32868861	0792087486	
109	EVANS MWACHOKI	"	23388345	0711564031	
110	BAMATI ALI	"	32340298	0702814245	
111	MWANASHA OMARI	"	21073311	07922685 74	MWANASHA OMARI
112	SALMA MOHAMMED	"	40399858	0702814245	
113	SHUKURU RAMADHAN	"	24810144	0799515056	
114	FRANCIS M NGULA	NYUMBA KUMI	5389380	0727993221	
115	IRENE MUKWA	NYUMBA KUMI	13445638	0797165512	
116	JOHN M. MUSYA	NYUMBA KUMI	8385550	0717200021	
117	MARY BINDU	RESIDENT	30728435	0717575253	
118	NZINGO M. MUYAGA	RESIDENT	26541762	0713499866	
119	COLLINS OMONDI	RESIDENT	31883103	0799725751	
120	DEVOTA E. AANIENG	"	30869914	0794444169	
121	PHILISTAH WAKESHO	"	13823044	0737453062	
122	SHARON BARASA	"	32847396	0719455456	

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study For The Proposed LPG Handling and Storage Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Venue: Name	Organization/Estate	ID Number	Date: Address/Mobile No.:	Signature
123	Halima AXUB		23686452 ~~071669~~	0716695155	
124	IRENE KALENICIA		22250261	0799029686	
125	MERCY SIMIYU		31478703	0790747100	
126	CHRISTINE KILONZO		20865239	0706141452	
127	INDIATSI MIKE		28773451	0724874376	
128	MIRIIN MUNDI		23429972	0723 219378	
129	Agnes NBUKI		28875785	0716158595	
130	SARAH M. DECHA		21772025	0728574693	
131	SCHOLASTICA ACOTH		21717287	0710449595	
132	MARY MATUKU		34814016	0741517964	
133	ELIZABETH ATIENO		38379068	0796289060	
134	CATHERINE MIROTO		29415296	0726403410	
135	CAUNDESIA IRUMBI		30238554	0728547200	
136	EVALYNE IMIMZA		30163512	0718757389	
137	KASUNGWA MWANZAI		21041868	0768301188	

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study For The Proposed LPG Handling and Storage Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Venue: Name	Organization/Estate	ID Number	Date: Address/Mobile No.:	Signature
138	YUSUF SULEMAN	Resident	2253578	0732985192	
140	EMMAH KEADI	Resident	21846546	0798439174	
141	Elizabeth Oyugi	Resident	29099939	0746299248	
142	Nancy Akeyo	Resident	9775403	0719287869	
143	Rosina Mkangika	Resident	~~0728~~ 28210807	0718151377	
144	ROCKY KIMETU	Resident	39806661	0712598777	
145	IAN MATHEKA	Resident	39806671	0112456163	
146	MARY KIMETU	Resident	20297224	0723909035	
147	JOSEPHINE MUENI	Resident	12535601	0704160326	
148	JANE ACHIENO	//	23436816	0742587926	
149	ABDALLAH KHEIR MGENGE	Changamwe Youth Coord C.Y.C	21808414	0724046011	
150	PAUL OSONSO	NYUMBA KUMI BOMAS	13289348	0708173026	
151	Kennedy Kijana	R&E Nodem	21914800	0720964333	

Attendance Register

CHIEF
KWAHOLA LOCATION
CHANGAMWE SUB - COUNTY

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Administrative Location: Name	Venue: Organization/Village	Position/Status	Date: Mobile No.:	Signature
152	CATHERINE NJAMBI			0714 617 381	
153	IRENE NG'ANG'A			0712 172 655	
154	SAFENIA IGOKI			0723 417 918	
155	ANNE NJERI			0768 214013	
156	MERAL THE ATUMA SHISOKA			0728577116	
157	MARIAM ATHMAN			0795897444	
158	JEMIMAH MUKAI			0711 320 484	
159	SAUMU HAMISI			0702803336	
160	AMINA SWALEH			0726893539	
161	NORAH MLAGHO			0797766061	
162	RHODA DANIEL			0700492469	
163	RUTH WAMBUA			0798735728	
164	JACKLINE KITHOME			0713876389	
165	JASON WANYONYI	K.W.M		0713823658	
166	Ahmed Mohamed			0729240526	
167	Lisa Kanguha			0759775632	

Attendance Register

CHIEF
KWAHOLA LOCATION
CHANGAMWE SUB - COUNTY

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Administrative Location: Name	Venue: Organization/Village	Position/Status	Date: Mobile No.:	Signature
168	RAPHAEL MUASYA	KWAHOLA NYUMBA KUMI	NYUMBA KUMI	0724704984	
169	MANCY ACHIENG.			0718824249	
170	Bethuel Alubisia			0725530088	
171	MARIAM JUMA KAPERA	HAKI OTG KENYA	ASS SECRETARY	0701301168	
172	ROSE NDANI			0712768811	
173	ROSE AMUNGA			0716771896	
174	Muzdamimi ATHMAN			0791740997	
175	Samuel K. Busienei			0720050155	
176	STEPHEN KUGERA			0721100791	
177	ANTHONY · OKOCHI			0718252134	
178	MARY MULINGE			0795897294	
179	Margret Muthui			0703657651	
180	JANE KAVESA			0721641328	
181	JOSEPHINE YUMBYA	NYUMBA KUMI	NYUMBA KUMI	0718567656	
182	ESTHER MUSEMBI			0713463194	

Attendance Register

CHIEF
KWAHOLA LOCATION
CHANGAMWE SUB - COUNTY

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Administrative Location: Name	Venue: Organization/Village	Position/Status	Date: Mobile No.:	Signature
183	MARIAM SHAINDO	VILLAGE ELDER	ELDER	0726411221	
184	SAUDA HASSAN	nyumbakumi	nyumbakumi	0711437610	
185	MARIAM JUMA	Nyumba KUMI	Nyumba kumi	0717027030	
186	HASHIM SALIM			0115563680	
187	Abdallah Salim	Nyumba 10	Nyumba 10	0758032030	
188	FRANCIS NGOWY		N.	0769865022	
189	FRANCIS KAZUNGU	Village Elder	WANJIKU	0722740545	
190	JUDITH WERE	V. Elder	Elder	0722502455	
191	Stephen Makwele	Resident	Resident	0705052041	
192	Geofrey MBwana	Resident	Resident	0796022688	
193	Benson Otonda	Resident	Resident	0758251105	
194	HAMDI IBRHAIM ABDI	Resident	Resident	0704931414	
195	EMILLY AKINYI	Resident	Resident	0701687768	
196	JACKTONE OCHIENG	Resident KWA HOLA		0731771002	
197	HASSAN NGALAA	RESIDENT		0705810602	

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study For The Proposed LPG Handling and Storage Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Venue:			Date:	
	Name	**Organization/Estate**	**ID Number**	**Address/Mobile No.:**	**Signature**
198	SAMMY MUSEMBI		26268714	0755490723	
199	JOHN MALI		33168957	0726696002	
200	Brian Mwaruta		35556989	0790731775	
201	IAN KALUKI		40391227	0716195145	
202	ROSE MWADIME		27494233	0796079706	
203	Jacklyn Kitonga		31693026	0720076045	

MINUTES FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE SUB COUNTY, MOMBASA COUNTY.

MEETING 2

DATE: 12TH JULY 2022

VENUE: CHAANI SOCIAL HALL

TIME: 10:45AM-1:35PM

MEMBERS PRESENT.

See Attached attendance list

AGENDA

1. Introduction and welcoming remarks
2. Project Brief
3. Discussions
4. Vote of thanks and closure

MIN 1 INTRODUCTION AND WELCOMING REMARKS

The area Chief, called the meeting to order at 10:45am with a word of prayer from a volunteer. He then introduced the Assistant Chief and the two Assistant County Commissioners (ACCs) from Port Reitz and Changamwe Divisions. The Senior ACC from Port Reitz welcomed the Area's OCS, village elders, *Nyumba Kumi* representatives and all the community members to the meeting. She encouraged the members to be attentive and assured them of an open platform to ask any question they might have regarding the Proposed Project. She then invited the Proponent Representative who also introduced both the Proponent's team and the Consultant team.

MIN 2 PROJECT BRIEF

The Proponent

The Proponent's Representative outlined the purpose of the meeting to the participants and the relevance of public participation. He said the Proponent intends to construct a large common user LPG facility within KPRL land with an increased storage capacity to improve the availability of LPG which is currently trading at high prices due to demand and supply. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users. He also pointed out that once complete, is expected to have a huge positive impact to the country by availing sufficient LPG as well as driving down the cost of LPG.

The Design Consultant

The design consultant gave a brief description of the proposed project stating that the most suitable design storage capacity for the proposed import terminal has been estimated at 30,000 metric tons in the medium term based on the available in-country LPG import capacity activities

that are expected during implementation of the project. He also stated that the bulk storage shall be in the form of mounded bullets that provide intrinsically passive and safe environment. The import pipeline from KOT-2 will also be below ground on the existing oil pipeline wayleave.

The health and safety expert talked about the risk assessment associated with bulk LPG storage which is mainly fire and said the necessary precautions will be put in place including import pipeline being below ground in addition to being fitted with automatic leak detectors for emergency response. The wayleave will also be patrolled to ensure maximum security is maintained.

The Environmentalist summarized on the environmental and economic impacts. Positive impacts associated with the project will include employment creation, improved health due to use of clean energy, affordable LPG prices, forest conservation due to increased use of LPG, improved regional economic activities and trade. Negative impacts during construction phase include air pollution, noise pollution, biodiversity loss, disruption of traffic during pipeline installation across Airport Road. During operation is risk of fire outbreak.

The sociologist highlighted that the Environmental Impact assessment and audit regulations, 2003 require an EIA should "seek the views of any persons who may be affected by the project". The constitution also gives everyone a right to be part of all developments therefore community views are important in the ESIA process hence everyone has the freedom to discuss and share their thoughts on the issues regarding the Proposed Project.

MIN 3 DISCUSSIONS

The following were the questions and comments by the participants and answers and clarifications by the Proponent and the Consultant:

Q1 Why should the public participation be done in a hall and not on the site where Kenya Pipeline is intending to set up the proposed project?

ANS: Majority of the work will be done inside the refinery, there are dangers that can be caused without adequate HSE induction and PPEs therefore it was best to be done in the community since the wayleave also passes across the locations.

Q2 Is it possible for the LPG pipeline to pass somewhere else that is not that is not near where people leave?

ANS: No. This project requires the Kenya Pipeline Company to use the existing wayleave.

Q3 Can we get employment and what will be the criteria used?

ANS: Depending on the type of job, priority is always given to the locals within the project. The contactors will liaise with the chief to ensure people within the area are considered for employment.

Q4 Why is the sample size for this public participation small yet it is a big project?

ANS: The total number public participation meetings are five and still it will be gazzetted, advertisement from two national newspapers and radio station. Furthermore, it is voluntary and open for everyone to attend.

Q5 Can Kenya Pipeline Company offer training for inside jobs like how oil and gas management?

ANS: Yes there is a school that offers trainings on oil and gas management that is currently sponsored by Kenya Pipeline Company.

Q6 Is there an immediate fire response team in case of fire?

ANS: Yes. There are fire stations inside the refinery and five fire trucks. There is also regular inspections. There will be no danger since the pipeline will be buried on the ground. Leak detection will also be installed that can notify the control room of any leakage and the system shut down and danger averted.

Q7 Where is the final layout design?

ANS: Environmental Impact Assessment has to be done first and public participation can also have an influence on the final design. A draft will be placed in the chief's office in case anyone want to look at it.

Q8 What is the criteria that will be used to ensure the price of the gas reduces?

ANS: before the project plan, the landing cost and the profits have already been calculated and based on the economy of scale the proposed project will be able to withstand bulk storage.

Q9 Apart from the employment opportunities how else can the residents benefit from the proposed project?

ANS: Kenya Pipeline Company has been involved in many social projects, but they have to be vetted before implementation. Therefore all the needs should be channeled through written proposals.

Q10 Why must the LPG gas be imported?

ANS: It could have been better if we cleaned our own gas and invested fully on the refinery but this is a government directive and it must have fully been researched.

Q11 How will Kenya Pipeline Company ensure there is no gender based violence among workers during the implementation of the Project?

ANS: Kenya Pipeline Company will ensure public awareness and measures will be taken if need be.

MIN 4 VOTE OF THANKS AND CLOSURE

The SACC, thanked all the residents for their attendance and active participation in the meeting. She assured the residents of job opportunities once the project commences. She also urged the

KPC to work together with her office and take into consideration all the ideas and recommendations put forth by the residents.

The meeting ended at 1:35 p.m. with a word of prayer from a volunteer from the stakeholders.

Signed by

COMMUNITY REPRESENTATIVE

SIGNATURE 13/7/2022

R&E MODERN TECHNOLOGIES

SIGNATURE:

CHIEF (CHAANI LOCATION)

SIGNATURE

BEN. M. VALASA
CHIEF CHAANI LOCATION
Tel: 0724-694087

Attendance Register

BEN. M. VALASA
CHIEF CHAANI LOCATION
Tel: 0724694087

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

Administrative Location: CHAANI **Venue:** CHAANI SOCIAL HALL **Date:** 12/7/2022

No.	Name	Organization/Village	Position/Status	Mobile No.:	Signature
1.	Fredrick M. Maero	R&E	HSE Expert	0722574237	
2.	George Wandera	R&E	Sociologist	0729632854	
3.	Kennedy Kijana	R&E	Environmentalist	0720964333	
4.	Akinyi Flora Mitchel	R&E	Environmentalist	0701393729	
5	Omar K. Mwinyikai	MCG.	WARD ADMINISTRATOR	0733906772	
6	Vallery Akinyi Siwo	R&E	Environmentalist	0708873387	
9	ROSE MBAABU Nhuki	KPS	OCS CHAANI	0723829117	
10	HEZRON W KATANA	CGM	SCA CHANGAMWE	0725963650	
11	MIRIAM TILAS	INTERIOR	SACC – PORT REITZ	0721932740	
12	SHARON MBUSIRO	INTERIOR	ACC CHANGAMWE	0727032680	
13	AMINA.M.NYAMBU	IN-		0711405078	
14	SIPROZA M. MWAKOI	V Elder		0721636742	
15	MAURINE M. MWALUMA	V. Elder		0729562762	
16	MIRIAM KAZUNGU	NYMB 10		0708127925	
17	M. Swaleh	K.P.C		0791458920	
18	ROSEMARY OTIENO	V. ELDER	CHAANI	0725723491	

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Administrative Location: Name	Venue: Organization/Village	Position/Status	Date: Mobile No.:	Signature
19	EVERLYNE CHOME	V. ELDER	CHAAN 5 HALL	0726010086	
20	MARGRET MWAMBURI		CHAANI	0741549889	
21	JANET KIOKO		CHAANI	0769776769	
22	ANN DAVID		CHAANI	0715761533	
23	NICODEMUS MWAMBINGA	V. Elder	CHAANI	0788355757	
24	ANNA MUSYOKA		CHAANI	0769885054	
25	CINTHIA KIOKO	V. Elder	Chaani	0716560208	
26	ONESMAS MWENSWA		CHAANI	0790653392	
27	Ikias Sammy		Chaani	0768578180	
28	FLORENCE MWAMBURI	V. Elder	CHAANI	0768193640	
29	Janis Gatwiri		Chaani	0111932144	
30	Hezekiah Gitau		Chaani	0794168234	
31	SHARON MUTINDA	V. Elder	CHAANI	0791439358	
32	PHILIP ODERO	V. Elder	CHAANI	0715245175	
33	MERAY MUINDE		CHAANI	0799742070	

Attendance Register

BEN. M. VALASA
CHIEF CHAANI LOCATION
Tel: 0724

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

	Administrative Location:	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
34	ANNE NAIRIMU	V. ELDER	CHAANI	0716931244	
35	AMOS NDUMBA	ELDER	CHAANI	0711945473	
36	CHRISTINE NZUVE	V. ELDER	CHAANI	0729687572	
37	DORCAS MUSYOKA	V. ELDER	CHAANI	0740789371	
38	Jedida KAWEMBE	nyumba kumi	CHAANI	0723388142	
39	KAMBUA KIAMBUA	V. ELDER.	CHAANI	0701104064	
40	HELIDA JAGERO	NYUMBA KUMI	CHAANI	0710154689	Hjagero
41	MERCY NIGOT	CHAANI	CHAANI	0701858844	
42	ALICE NGOVI	CHAANI	CHAANI	0708543070	ALICE
43	KAINDE KIEMA	CHAANI	CHAANI	0745515606	Kainde
44	NANCY MUSEMBI	CHAANI	CHAANI	0742751007	
45	EMILLY MWEKE	HAIC KENYA	MEMBER	0723950568	
46	Gladness Mghoi	NYUMBA KUMI CHV	CHAANI	0720503828	
47	AGNES KADARI	CHAANI	CHAANI	0715254258	
48	ALICE MAWAKA	(HAANI)	CHAANI	0742890135	

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Administrative Location: / Name	Venue: / Organization/Village	Position/Status	Date: / Mobile No.:	Signature
49	Stella Gocha		Nyumba Kumi	0712492001	
50	Asuma Hadewa		Elder	0727098983	
51	Kweeth Melu	Chaani	Elder	0729264552	
52	Belinda Apondi	Chaani	Chaani	0111778787	
53	KASSIM KEA	CHAANI	CHAANI	0113943876	
54	HADIJA ISMAIL	NGARAMITI	MZEE WA MTAA	0723537102	
55	HALIMA SWALEH	CHAANI	CHAANI	0713686669	
56	MWANGANGI KARUNIA	CHAANI/Migadini Resident		0727127126	
57	ELNORAH Mkaburi	Chaani	Chaani	0721558242	
58	HUSSENI Shabani	Chaani	Chaani	0796970614	
59	Catherine Mbeleete	Chaani	Chaani Resident	0115560343	
60	Christine Maingi	Chaani	Chaani Resident	0790393328	
61	Rehema Sammy	Chaani	Chaani Resident	0111525558	
62	Irene Kilonzo	chaani	chaani Resident	0748017258	
63	Salma mohammed	Chaani	Chaani Resident	0701648161	
64	MARIA NGILA	NGARAMITI	Nyumba Kumi	0711519263	

Attendance Register

BEN. M. VALASA
CHIEF CHAANI LOCATION
Tel: 0[illegible]694087

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

	Administrative Location:	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
65	Keziah Maxensia	Chaani	Chaani resident	0114204305	
66	Eugene Ochieng	Chaani	Chaani resident	0768203801	
67	Yohana Sila	chaani	chaani resident	0719236027	
68	Pst Felix Mkerema	Chaani		0728096640	
69	CHRISTOPHER ADEMA	chaani	chaani	0726488732	
70	George otieno	chaani	chaani	0797638243	
71	ISSA AHMED.	CHAANI	CHAANI	0723406205	
72	MARSDEN DENA	CHAANI	CHAANI Resident	0745477202	
73	Brian Ndimu George	Chaani	Chaani Resident	0759779781	
74	LAWRENCE MASHA	MIGADINI	Civil society	0727735113	
75					
76					
77					
78					
79					

Attendance Register

BEN. M. VALASA
CHANGAMWE LOCATION
Tel: 0724-[illegible]087

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

	Administrative Location:	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
75	BERNARD KIMANI	KPC/HQ	ACCO	0723984155	
76	ENG. ALBRIAN M	KPC/PS10	SE-PCM	0722165839	
77	SHARON MBUSIRO	INTERIOR	ACC-CHANGAMWE	0727032680	
78	MIRIAM TILAS	INTERIOR	SACC-PORT REITZ	0721932740	
79	HERBON K KATANA	County Govt. Mba	SCA-CHANGAM	0725943680	
80	ROSE Nhuki MBARABU	KPS	OCS CHAANI	0723829117	
81	JOHN W. [illegible]	KPRL	HSE01	0723706562	
82	Omar K. Mwinyigai	CG.M	WARD ADMIN	0733706772	
83	VICTOR KUNGU	R&E	S.A	0721771280	V.K
84	DIANA NTHIWA	KPC/PS15	ASET	0724831943	
85	CONSTANCE MWAKIO	KPC/PS15	OPERATIONS	0720788191	
86	NDARA OGOL	KPRL	P.ENG	072/877771	
87	BEN M. VALASA	CHIEF INTERIOR	CHIEF	0724644087	

Attendance Register

BEN. M. VALASA
CHIEF CHAANI LOCATION
Tel: 0724-694...

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	**Administrative Location:**	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
1	CHARLES MWAMO	CHAANI	V-ELDER	0725567802	
2.	CHRISPHINE OJIJO	INTERIOR CHAANI	ASS CHIEF	0702078636	
3	GEORGE MWADIME	CHAANI	V ELDER.	0713365710	
4	SILAS A. ANGORE	CHAANI	V. ELDER	0720663249	
5	WALTER OPANDA .A.	MWW	CSO	0726288560	
6	EMMANUEL MAINA	MATANGINI	V. ELDER	0721476841	
7	ANDREW NGUBYA	MWATATE	V. ELDER	0721678002	
8	REBECCA AUMA	MUKOMANI	YOUTH	0794115214	
9.	JAEL. AWUOR. MUMBO	MWW	CHV	0792425866	
10.	CINTHIA MUTINDI MWANGA	chaani	YOUTH.	0719410816	
11.	DIANA RASOA	CHAANI	YOUTH	0110082118	
12.	ATHMAN HASSAN MBONGWE	CHAANI (IAA)	V. Chairman IAA	0701910415	
13	ATHMAN SULEIMAN SWAFI	CHAANI	YOUTH	0115759697	
14	DICIC TUMAINI MWATSUMA	CHAANI	YOUTH	0793019648	
15.	IBRAHIM ALUKWE	CHAANI	V. ELDER	0707381262	

Attendance Register

BEN. M. VALASA
CHIEF CHAANI LOCATION
Tel: 0724-694087

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

	Administrative Location:	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
16	Ramadhan Taifa	Chaani	Youth	0110703964	[signature]
17.	KENNEDY KISAKA.	CHAANI.	YOUTH.	0769127197	[signature]
18	JACOB MUTUA	DUNGA UNUSE	BALOZI	0716207318	[signature]
19	GARES FIKIRI	CHAANI	V. ELDER	0705470091	[signature]
20	JOHN BOSCO	CHAANI	BALOZI	0703398856	[signature]
21	CHARLES MATOLE	CHAANI	V. ELDER	0718373295	[signature]
22.	TABU CHARO MWENI	CHAANI	V/ELDER	0711274734	[signature]
24	EMMANUEL MWANGOMA	CHAANI	V/ELDER	0740133227	[signature]
24	PETRONILLAR O. O JUMA	MIGADINI	CIVIL ACTIVIST	0716579088	[signature]
25	EUTYCHUS N. NG'ANG'A	MIGADINI	V.E	0729677008	[signature]
26	DANIEL MUI	MIGADINI	YOUTH		Daniel
27	CHARLES O. MENDA	CHAANI	CHAIRMAN	0721568141	[signature]
28	Grace Nyamai	migadini	Youth	0715571717	[signature]
29	VIOLET AUMA	Chaani	youth	0743529372	[signature]
30	HARUN MWASAKA	MIGADINI	Youth	0711531561	[signature]

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Administrative Location: / Name	Venue: / Organization/Village	Position/Status	Date: / Mobile No.:	Signature
1	SIMON MWAWAI	MIGADINI	YOUTH	0793008448	
2	ELNORA KIWO	MIGADINI	CHV	0723240414	
3.	TIME SALIM J.	CHAANI	CH. W	0717178864	
4.	EMMAH MBITHE MWAI	MIGADINI	YOUTH	0726402 38	
5.	Sabina Mwende	Migadini	Youth	0790195668	
6.	MAUREEN MAUTA	CHAANI	YOUTH	0713196716	
7.	AGNES MATUKU	MIGADINI	YOUTH	0710288169	
8.	MARGRET AOKO	Chaani	YOUTH	0715506020	
9.	OGUTU ERICK	MYA	YOUTH	0725438291	

BONN. M. VALAS...
CHIEF CHAANI LOCATION
Tel: 072...694087

MINUTES FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE SUB COUNTY, MOMBASA COUNTY.

MEETING 3

DATE: 13TH JULY 2022

VENUE: CHANGAMWE SOCIAL HALL

TIME: 10:30AM-12:35PM

MEMBERS PRESENT.

See Attached attendance list

AGENDA

1. Introduction and welcoming remarks
2. Project Brief
3. Discussions
4. Vote of thanks and closure

MIN 1 INTRODUCTION AND WELCOMING REMARKS

The area Chief, called the meeting to order at 10:30am with a word of prayer from a volunteer. He then introduced the Assistant Chief and the two Assistant County Commissioners (ACCs) from Port Reitz and Changamwe divisions. The ACC welcomed the Representative from County Commissioner's Office, Ward Admin, Area's Deputy OCS, village elders, *Nyumba Kumi* representatives and all the community members to the meeting. She encouraged the members to be attentive and assured them of an open platform to ask any question they might have regarding the Proposed Project. She then invited the Proponent Representative who also introduced both the Proponent's team and the Consultant team.

MIN 2 PROJECT BRIEF

The Proponent

The Proponent's Representative outlined the purpose of the meeting to the participants and the relevance of public participation. He said the Proponent intends to construct a large common user LPG facility within KPRL land with an increased storage capacity to improve the availability of LPG which is currently trading at high prices due to demand and supply. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users. He also pointed out that once complete, is expected to have a huge positive impact to the country by availing sufficient LPG as well as driving down the cost of LPG.

The Design Consultant

The design consultant gave a brief description of the proposed project stating that the most suitable design storage capacity for the proposed import terminal has been estimated at 30,000

metric tons in the medium term based on the available in-country LPG import capacity activities that are expected during implementation of the project. He also stated that the bulk storage shall be in the form of mounded bullets that provide intrinsically passive and safe environment. The import pipeline from KOT-2 will also be below ground on the existing oil pipeline wayleave.

The health and safety expert talked about the risk assessment associated with bulk LPG storage which is mainly fire and said the necessary precautions will be put in place including import pipeline being below ground in addition to being fitted with automatic leak detectors for emergency response. The wayleave will also be patrolled to ensure maximum security is maintained.

The Environmentalist summarized on the environmental and economic impacts. Positive impacts associated with the project will include employment creation, improved health due to use of clean energy, affordable LPG prices, forest conservation due to increased use of LPG, improved regional economic activities and trade. Negative impacts during construction phase include air pollution, noise pollution, biodiversity loss, disruption of traffic during pipeline installation across Airport Road. During operation is risk of fire outbreak.

The sociologist highlighted that the Environmental Impact assessment and audit regulations, 2003 require an EIA should "seek the views of any persons who may be affected by the project". The constitution also gives everyone a right to be part of all developments therefore community views are important in the ESIA process hence everyone has the freedom to discuss and share their thoughts on the issues regarding the Proposed Project.

MIN 3 DISCUSSIONS

The following were the questions and comments by the participants and answers and clarifications by the Proponent and the Consultant:

Q1 Can Kenya Pipeline Company consider laying the LPG pipeline more than 1.5 m below ground level?

ANS: There are international standards and API standards that have been considered before the decision to lay the pipeline at that specific depth.

Q2 What mitigation measures will be put in place to ensure the gas is not released to the atmosphere?

ANS: There is a LPG relief system. Currently the plan is still at the design stage but there are optimum ways and provisions that will be put in place to ensure gas is not released to the atmosphere.

Q3 Can we get employment and what will be the criteria used?

ANS: Depending on the type of job, priority is always given to the locals within the project area. The contactors will liaise with the chief to ensure people within the area are considered for employment.

Q4 What can happen when the pipes expands due to heat?

ANS: There is thermos expansion relief valve provision that will be put in place together with gas leak detectors to curb the issue of expansion and maybe explosion.

Q5 Can Kenya Pipeline Company offer training for inside jobs like how oil and gas management?

ANS: Yes there is a school that offers trainings on oil and gas management that is currently sponsored by Kenya Pipeline Company.

Q6 Is there an immediate fire response team in case of fire?

ANS: Yes. There are fire stations inside the refinery and five fire trucks. There is also regular inspections. There will be no danger since the pipeline will be buried on the ground. Leak detection will also be installed that can notify the control room of any leakage and the system shut down and danger averted.

Q7 Apart from the employment opportunities how else can the residents benefit from the proposed project?

ANS: Kenya Pipeline Company has been involved in many social projects, but they have to be vetted before implementation. Therefore all the needs should be channeled through written proposals.

Q8 Can Kenya Pipeline Company consider liaison with the county government to upgrade the nearest dispensary in case of fire incidence?

ANS: The recommendation has been noted and it will be discussed.

Q9 Can the youth in partnership with Kenya Pipeline Company plan flowers along the wayleave?

ANS: That is a good recommendation and Kenya Pipeline Company was thinking along the same line, youths will be involved once that project is set to commence**.**

Q10 Will there be disruption of the market that is currently operational along the wayleave?

ANS: The Kenya Pipeline Company's wayleave is from Kipevu Oil Terminal (KOT) to the Kenya Pipeline Refinery Limited. Protocols will be observed in case there will be need for displacement. This may only be temporary during the laying of the import pipeline.

MIN 4 VOTE OF THANKS AND CLOSURE

The Chief, thanked all the residents for their attendance and active participation in the meeting. The meeting ended at 12:35 p.m. with a word of prayer from a volunteer from the stakeholders.

Signed by

COMMUNITY REPRESENTATIVE

SIGNATURE

R&E MODERN TECHNOLOGIES

SIGNATURE:

CHIEF (CHANGAMWE LOCATION)

SIGNATURE

ASSISTANT CHIEF HAMISI SUB-LOCATION
Date: 15/07/2022
P.O. Box 93444 - 80102
CHANGAMWE
CHANGAMWE SUB-COUNTY

Attendance Register

CHIEF KOMBO FARJALA CHANGAMWE LOCATION Date:

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

Administrative Location: CHANGAMWE **Venue:** CHANGAMWE SOCIAL HALL **Date:** 13/7/2022

No.	Name	Organization/Village	Position/Status	Mobile No.:	Signature
1	Kennedy Kijana	R&E Modern	Environmentalist	0720964333	
2	Fredricks Masero	R&E Modern	Health & Safety expert	0722574237	
3	MIRIAM TILAS	INTERIOR	SACC - PORT REITZ	0721932740	
4	TOM W. KONYELO	INTERIOR	DCC's Office	0720824009	
5	SHARON MBUSIRO	INTERIOR	ACC-CHANGAMWE	0727032680	
6	OMAR K. MWINYIKAI	C.G.M	WARD ADMIN CHANGAMWE	0711906772	
7	Eng. Alonan M	KRC	SE-PCM	0722165839	
8	BERNARD KIMANI	ACCO	ACCO	0723984155	
9	MARK OGOL	KPRL	P. ENG	0721577771	
10	George Wandera	R&E	Sociologist	0729632854	
11	Akinyi Flora Mitchel	R & E	Environmentalist	0701393729	
12	Vallery Akinyi Siwo	R & E	Environmentalist	0708873387	
13	Constance M. Mwakio	KPRL	DPS technician	0720788191	
14	KOMBO FARJALA	INTERIOR	CHIEF	0111675227	
15	SUSAN AKOTH	INTERIOR	ASS. CHIEF	0725997199	
16	REHEMA JUMA	IEBC	VOTER EDUCATOR	0724 639 443	

Attendance Register

CHIEF
KOMBO FARJALA
CHANGAMWE LOCATION
Date:

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

Administrative Location: CHANGAMWE **Venue:** Changamwe social hall **Date:** 13/7/2022

No.	Name	Organization/Village	Position/Status	Mobile No.:	Signature
17	BEN OTIENO	CHANGAMWE	RESIDENT	0720435232	[signature]
18	MWANAHAWA MWIJAKA	CHANGAMWE	RESIDENT	0796609599	[signature]
19	John W Andakosig	N.H.C	RESIDENT	0720856957	[signature]
20	JOSEPH BARAZA	"	"	0722968028	[signature]
21	Ubah Abdi Osman	"	Mzee Mtaa	~~0722440~~ 0724-499670	[signature]
22	Fadhila Sfadi	N.H.C.	Nyumba Kumi	0722-919861.	[signature]
23	Malachi Orondo.	NHC.	Resident	0722798899.	[signature]
24	JULIUS MACHARIA	CHANGAMWE	V/ELDER	0723922096	[signature]
25	GILIAN CHARI KIGOWA	CHANGAMWE	V/ELDER	0721461736	[signature]
26	WANJIKU JOSEPH NGANGA	CHANGAMWE	V/ELDER	0728055107	wanjiku
27	JOSEPH KATANA	CHANGAMWE	V/ELDER	0722342155	[signature]
28	RICHARD SHIDAGWA AKUMONYO	CHANGAMWE	V/ELDER	0720795740	[signature]
29	CHARLES PETER IKUTWA	N.H.C	RESIDENT	0718737845	[signature]
30	ZAINAB JIMA GUYO	N.H.C	V. ELDER	0722363746	[signature]
31.	FRANCISCA ATIENO	KWAMNSI STATE	V. ELDER	0722279973	Atieno

Attendance Register

CHIEF
KOMBO MARJALA
CHANGAMWE LOCATION
Date:

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Administrative Location: / Name	Venue: / Organization/Village	Position/Status	Date: 13/7/2022 / Mobile No.:	Signature
32	GETRUDY CHANYA	CHANGAMWE	V. ELDER	0713288770	
33	ROSELINE MUAKIO	"	"	0707428570	Rose
34	IKEMSA ABDULREHMAN	CHANGAMWE	"	0722627974 ~~0720911880~~	
35	ELIZABETH OISIENO	RAILWAYS CHANGAMWE	"	0727312374	
36	JOSEPH KONDO	KITAMISI EST.	V. ELDER	0700483265	
37	ASSUMPTA M. MUINDE	RAILWAYS		0723811285	
38	NASRA SOGOW	N.H.C	V. ELDER.	0724806170	
39	ASHIKOYE BRUCE	N.H.C	V. ELDER	0701811117	
40	BIASHA ALI KOMBO	BOMU	RESIDENT	0703739732	
41	RUKIA EBRAHIM ABDALLA	BOMU	"	0715014871	
42	IAIN MWANGI MUTUKU	HAMISI	"	0720687414	
43	AGNES ~~CHANGAMWE~~ SHIKARAGI	CHANGAMWE	"	0721601675	
44	BELINDA ODERA	CHANGAMWE	"	0745784548	
45	TERESIA KAVINDU NJOROGE	CHANGAMWE	"	0708894189	
46	Mathius mayoki	Hamisi estate	V. Elder	0799245545	
47	John malala	Changamwe	"	0741205662	

Attendance Register

CHIEF
KOMBO PAMJALA
CHANGAMWE LOCATION
Date:

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

	Administrative Location:	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
48	MZEE KHATIBU	I.E.B.C	VOTER EDUCATOR	0719 144 049	
49	JUSIUS WAMBUA	KHAMISI ESTATE	RESIDENT	0711271085	
50	PATTERSON G. MWANGI	CHANGAMWE	V. elder RESIDENT	0712262406	
51	MASUGWA MUNYUKI	HAMISI	RESIDENT	0706795632	
52	DELINA MWAMBINGU	KALAHARI	RESIDENT	0715574336	Delina.
53	MWANAISHA HASSAN	CHAANI	" "	0721600368	Mwanaisha
54	Fezal Angess	Changamwe	Resident	0724685308	
55	Fatma Amani	Changamwe	Resident	0723082866	Fatma.
56	FRANCIS OLOO	CHANGAMWE.	ELDER.	0722355416	
57	PHYLLIS -N- MWANGI	RAILWAY.	Elder	0720749521	
58	MILLICENT AKINYI	CHANGAMWE	RESIDENT	0729178840	
59	Jostina Mwambinga	chaani	Resident	0701491935	
60	Adiambo Seling	chaani	Resident	-	
61	WILFRED JUMA	HAMISI	KRCS/RESIDENT	0745789977	
62	NICHOLAS OTWORI	CHANGAMWE	RESIDENT	0721046588	

Attendance Register

CHIEF
KOMBO FARJALA
CHANGAMWE LOCATION

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

Administrative Location: CHANGAMWE **Venue:** CHANGAMWE SOCIAL HALL **Date:** 13/7/2022

No.	Name	Organization/Village	Position/Status	Mobile No.:	Signature
63	Esther wangeci	Michindani		0719446464	Esther
64	Nicolastica syovulu	chaani		0705182773	Schola
65	Sofia Sidii	Chaani		0707668628.	
66	Mahammed muidani	michindani		07 NIL	
67	Hajra mohammed	Nuru		07 NIL	
68	Tsuma kariva	Newplate		NIL	
69	SAMUEL ODHIAMBO	HAMISI		0722 722792	
70	SALIM ALI	CHANGAMWE		0741721041	
71	Juma Khamis	Nuru		0704778345	
72	STEVEN KYALO	Hamisi		0745247869	
73	LOICE ACHANDO LWANGU	Changamwe		0758176282	
74	Agripina Mwakio	Railways		0759566378	
75	ZUBERI ABDALLA	Nuru		0113406556	
76	JOSE ODHIAMBO	RAILWAYS		0722269124	
77	Victor Omondi	Railways		0746955371	

Attendance Register

CHIEF
KOMBO FARJALA
CHANGAMWE LOCATION

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

	Administrative Location:	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
78	ELIZABETH MKIONGELI	CHANGAMWE		0728091747	
79	NANCY MUNDULA	CHANGAMWE		0714104590	
80	JOEL DENVER	CHANGAMWE	KAZI MTAANI	0742617264	
81	PETER MWAURA	RAILWAYS		0727639476	
82	FAITH MAKAU	CHANGAMWE	KAZI MTAANI	0742735678	
83	STEPHANIE NJERI	"	"	0712911929	
84	EMMALYNE BEATRICE	"	"	0716502752	
85	EMMA MUTINDA	"	"	0712186568	
86	AMINA MOHAMMED	"	"	0729629791	
87	DHAHABU MOHAMMED	"	"	0757666995	
88	RAMADHAN HUSSEIN	"	"	0790376808	
89	RAMADHAN YUSUF	"	"	0700686586	
90	GRACE MUSTAFA	"	"	0743207076	
91	JUDITH OVYINO	"	"		
92	ST JOHN BWIRE	"	"	0111737020	
93	JECINTA MWENDE	"	"	0748343156	

Attendance Register

CHIEF
KOMBO FARJALA
CHANGAMWE LOCATION
Date:

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*					
	Administrative Location:	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
94	EMMAH NDUKOKO	CHANGAMWE	KAZI-MTAANI	0711247833	[signature]
95	ALICE MAINGI	CHANGAMWE	KAZI-MTAANI	0705716701	[signature]
96	JOSEPH KIOKO	CHANGAMWE	KAZI MTAANI	0725508468	[signature]
97	JOHN NGUTHU	CHANGAMWE	COMMUNITY	0721600268	[signature]
98	CARNATION WANCHELA.	changamwe.	Kazi-mtaani	0716149727	[signature]
99	MARIAM ADAM	Changamwe	Kazi mtaani	0741738705	[signature]
100	ANDERSON STEPHEN NZOVU	CHANGAMWE	Kazi Mtaani MCG	0746038030	[signature]
101	JOAKIM NDOLO	CHANGAMWE		0729-475909	[signature]
102	PATRICK OKEYO	CHANGAMWE	ACTIVE CITIZEN	0743828518	[signature]
103	RAPHAEL KAMATA.	CHANGAMWE	ACTIVE CITIZEN	0721263233	[signature]
104	COLLINS AZUNA ASIA	CHANGAMWE	KAZI MTAANI	0704259141	[signature]
105	EVERLYNE MWENDE	CHANGAMWE	EDUCATION OFFICER I	0720073856	[signature]
106	FARIDA SALIM	EDUCATION OFFICE	ADMINISTRATIVE	0728206435	[signature]
107	MWARALE J. MUMBO	CHANGAMWE	CITIZEN	0710482425	[signature]
108	DAVID MUTUKU	CHANGAMWE	POLICE OFFICER	0721941849	[signature]

Attendance Register

CHIEF
KOMBO FARJALA
CHANGAMWE LOCATION
Date:

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

Administrative Location: CHANGAMWE **Venue:** Changamwe social hall **Date:** 13/7/2022.

No.	Name	Organization/Village	Position/Status	Mobile No.:	Signature
109	Kuruna chondo	miritini	Resident	0716336909	
110	DACMAS JUMA	CHANGAMWE	Resident	0715602089	
111	MUKUNA O. OPAKA	CHANGAMWE	RESIDENT	0711533028	
112	DANIEL MBUVI	CHANGAMKIE	RESIDENT	0768396609	
113	JOSEPH NYAWARA	CHANGAMWE	RESIDENT	0729710127	
114	BARKE RAMADHAN	CHANGAMWE	RESIDENT	0705060353	
115	Dogo Jairo Chitaya	Changamwe	Resident	0721558725	
116	JOSHUA ONYARO	CHANGAMWE	Resident	0722-647685	
117					
118					
119					
120					
121					
122					
123					

MINUTES FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE SUB COUNTY, MOMBASA COUNTY.

MEETING 4

DATE: 14TH JULY 2022

VENUE: BOMU PIMARY SCH HALL

TIME: 10:40AM-1:20PM

MEMBERS PRESENT.

See Attached attendance list

AGENDA

1. Introduction and welcoming remarks
2. Project Brief
3. Discussions
4. Vote of thanks and closure

MIN 1 INTRODUCTION AND WELCOMING REMARKS

The area Chief, called the meeting to order at 10:40am with a word of prayer from a volunteer. He then introduced the Assistant Chiefs from Ayani, Bomu and Mwagosi Sub Locations and the Senior Assistant County Commissioner (SACC) from Port Reitz Division. The SACC welcomed the Area's OCS, Village elders, *Nyumba Kumi* representatives and all the community members to the meeting. She encouraged the members to be attentive and assured them of an open platform to ask any question they might have regarding the Proposed Project. She then invited the Proponent Representative who also introduced both the Proponent's team and the Consultant team.

MIN 2 PROJECT BRIEF

The Proponent

The Proponent's Representative outlined the purpose of the meeting to the participants and the relevance of public participation. He said the Proponent intends to construct a large common user LPG facility within KPRL land with an increased storage capacity to improve the availability of LPG which is currently trading at high prices due to demand and supply. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users. He also pointed out that once complete, is expected to have a huge positive impact to the country by availing sufficient LPG as well as driving down the cost of LPG.

The Design Consultant

The design consultant gave a brief description of the proposed project stating that the most suitable design storage capacity for the proposed import terminal has been estimated at 30,000

metric tons in the medium term based on the available in-country LPG import capacity activities that are expected during implementation of the project. He also stated that the bulk storage shall be in the form of mounded bullets that provide intrinsically passive and safe environment. The import pipeline from KOT-2 will also be below ground on the existing oil pipeline wayleave.

The health and safety expert talked about the risk assessment associated with bulk LPG storage which is mainly fire and said the necessary precautions will be put in place including import pipeline being below ground in addition to being fitted with automatic leak detectors for emergency response. The wayleave will also be patrolled to ensure maximum security is maintained.

The Environmentalist summarized on the environmental and economic impacts. Positive impacts associated with the project will include employment creation, improved health due to use of clean energy, affordable LPG prices, forest conservation due to increased use of LPG, improved regional economic activities and trade. Negative impacts during construction phase include air pollution, noise pollution, biodiversity loss, disruption of traffic during pipeline installation across Airport Road. During operation is risk of fire outbreak.

The sociologist highlighted that the Environmental Impact assessment and audit regulations, 2003 require an EIA should "seek the views of any persons who may be affected by the project". The constitution also gives everyone a right to be part of all developments therefore community views are important in the ESIA process hence everyone has the freedom to discuss and share their thoughts on the issues regarding the Proposed Project.

MIN 3 DISCUSSIONS

The following were the questions and comments by the participants and answers and clarifications by the Proponent and the Consultant:

Q1 Who are the people that are required to attend such public consultation meetings?

ANS: Everybody within the proposed project area is invited. There was a notice that was given through the office of the chief to allow everyone to participate.

Q2 What effects will the LPG pipeline have on the area residents?

ANS: There will be no danger since the pipeline will be buried on the ground. Leak detection will also be installed that can notify the control room of any leakage and the system shut down and danger averted.

Q3 Will there be disruption of the market that is currently operational along the wayleave?

ANS: The Kenya Pipeline Company's way leave is from Kipevu Oil Terminal (KOT) to the Kenya Pipeline Refinery Limited. Protocols will be observed in case there will be need for displacement. This may only be temporary during the laying of the import pipeline.

Q4 Can we get employment and what will be the criteria used?

ANS: Depending on the type of job, priority is always given to the locals within the project. The contactors will liaise with the chief to ensure people within the area are considered for employment.

Q5 Is Environmental Impact Assessment Consultant an independent body?

ANS: Yes, in this project the Consultant is R&E Modern Engineering Technologies Ltd.

Q6 Is there an immediate fire response team in case of fire?

ANS: Yes. There are fire stations inside the refinery and five fire trucks. There is also regular inspections. There will be no danger since the pipeline will be buried on the ground. Leak detection will also be installed that can notify the control room of any leakage and the system shut down and danger averted.

Q7 Does this proposed project has any influence from politics?

ANS: No. The project is not related to any politics, it is just a coincidence that the election process is around the corner.

Q8 Apart from the employment opportunities how else can the residents benefit from the proposed project?

ANS: Kenya Pipeline Company has been involved in many social projects, but they have to be vetted before implementation. Therefore all the needs should be channeled through written proposals.

MIN 4 VOTE OF THANKS AND CLOSURE

The SACC, thanked all the residents for their attendance and active participation in the meeting. She assured the residents of job opportunities once the project commences. She also urged the KPC to work together with her office and take into consideration all the ideas and recommendations put forth by the residents.

The meeting ended at 1:20 p.m. with a word of prayer from a volunteer from the stakeholders.

Signed by

COMMUNITY REPRESENTATIVE

SIGNATURE

R&E MODERN TECHNOLOGIES

SIGNATURE:

CHIEF (PORT REITZ LOCATION)

SIGNATURE

CHIEF PORT REITZ

15 JUL 2022

P.O Box 9344 CHANGAMWE

MOB: 0734 759 880

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

Administrative Location: PORT REITZ **Venue:** BOMU PRI HALL **Date:** 14/7/2022

No.	Name	Organization/Village	Position/Status	Mobile No.:	Signature
1	DANIEL MAIKAU MBALU	MAZUNGUKA	BROZI	0795962220	
2	NIVEN NYAMU	11	11	0725072881	
3	SALIM MWANTIRO	MAZUNGUKA	BALOZI	0712918152	
4	PACHO NYAMBU	MAZUNGUKA	BALOZI	0714762833	
5	HESBON AMOLO	MAZUNGUKA		0728 264954	
6.	Joseph Oluoch	"		0722734476	
7.	Philip Omolo	"		0735094787	
8.	Zablon Juma	Lilongwe	V/Elder	0724929029	
9.	phulip Duma	Mazunguka	V/Elder	0783 255722	
10	MWANASTI KIBWANA	MWAGOSI	V/ELDER	0790519443	
11	SALIM BADRU	MWAGOSI	V/ELDER	0726131679	
12	Sulemman Mohammed	Magongo	V/Elder	0727672066	
13	Smd Juma	Magongo	Balozi	0712-920978	
14	Chimoyo Katana	Bokole-B.	V/ELDER	0728534049	
15	Ali Hamisi	Bokole A	V/Elder	0101449948	

Attendance Register

CHIEF PORT REITZ
14 JUL 2022
P.O. Box 93444 CHANGAMWE
MOB: 0734 759 880

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

	Administrative Location:	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
16	KARIM SUDI ALI	TRANSFORMER	V-ELDER	0722346532	Ali
17	Hassor Said	TRANSFORMER	BAZOZI	0723725229	
18	Hassor Said	TRANSFORMER B	V-ELDER	0112408521	
19	BAKARI YUSUF ALI	BOMA		0745628430	
20	SHAHAME SALIM	ILAY * FUARO	11	0768627410	
21	HAMADI KIBWANA	SANAANA	11	0769914153	
22	WILSON MUIA	OVERLAND	11 11	0726115224	
23	ERNACIS IGYALO	PORTREITZ	11	0796691261	
24	JOHN MWANGANGI MUSYA	MWISABU	11 11	0725065076	
25	JOHN KOMBE	KWASUDI	V/ELDER	0716327217	
26	HONESI MCHANA	KWASUDI	ASS/ELDER	0723458159	
27	JUMA KALINGA	JUA KALI	V/ELDER	0724383494	Kalinga
28	HEMED-A-MOHAMED	KWA MREFU MWAGOSI B	V/ELDER	0728204373	
29	MUSINGILA KIMINZA	MASUNGUKA		0600974	
30	ALFANI ABDALLA	CALABASH	V/ELDER	0723637688	

Attendance Register

CHIEF PORT REITZ LOCATION
14 JUL 2022
P.O. Box 93444 CHANGAMWE MOMBASA

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

	Administrative Location: PORTREITZ	**Venue:** BOMU PRY HALL		**Date:** 14/7/2022	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
31	SHARON MBUSIRO	INTERIOR	ACC-CHANGAMWE	0727032680	[signature]
32	Kennedy Kijana	R&E	Environmentalist	0720964333	[signature]
33	Vallery Akinyi Siwo	R&E	Environmentalist	0708873387	[signature]
34	Constance M. Mwakio	KPC/PS15	Opr-Technician	0720788191	[signature]
35	Fredrick M. Maseno	R&E	Health&Safety Expert	0722579237	[signature]
36	DIANA NTHIWA	KPC PS 15	HSE Technologist	0724831943	[signature]
37	BERNARD KIMANI	KPC PS 15	ACCO	072398445	[signature]
38	Adrrew Maclu	KPC/PS10	SE-PCM	07[illegible]829	[signature]
39	MIRIAM TILAS	INTERIOR	SACC-PORT REITZ	0721932740	[signature]
40	JOHN W. WAIMA	HSE	KPRL	0723706582	[signature]
41	ABDULKADIR KHALID	INTERIOR	ASST. CHIEF	0722562679	[signature]
42	Abushir Abdalla	Interior	Asst. Chief	0118011?7	[signature]
43	KHADIJA KHAMIS	INTERIOR	ASST. CHIEF	0729848616	[signature]
44	TARAJI KIBWANA	INTERIOR	CHIEF	0713855028	[signature]
45	Akinyi Flora Mitchel	R&E	Environmentalist	0701393729	[signature]
46	ANN NJOKI	R&E	Enumerator	0790264478	[signature]

Attendance Register

CHIEF PORT REITZ
14 JUL 2022
P.O. Box 93444 CHANGAMWE
MOB: 0734 759 880

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	Administrative Location: / Name	Venue: / Organization/Village	Position/Status	Date: / Mobile No.:	Signature
47.	BIHINDI ATHMAN	KWAHOLA B	VILLAGE ELDER	0706551512	
48.	ESHA ALI	MIKIAKIDSMU	BALOZI	0115943438	
49.	FATUMA OMAR	LILONGWE	BALOZI	0724719027	
50.	SAIDA SWALEH	SOWETO AIR PORT	V/ELDER	0724719027	
51.	FLORENCE MDUNDA	MAYAMI	BALOZI	0700637549	
52	VIRIDIANA M MJOMBA	LILONGWE		0700487509	
53	BIMVMA JAFU-A.	BOMU	V/E/DER	0757609911	
54	SAID KIBWANA	MWAKOSI	V/ELDER	0712-920630	
55.	HERBERT MURASA	BROTHERHOOD	BALOZI	0712454569	
56	RAEL KASYOKA	SOWETO	BALOZI	0714510980	
57	KAMARI KOMBO	MWAKIDEM	V/ELDER	0719536488	
58	FATUMA NGULI	MKUNGO	BOMU	0702742758	
59	SWABRA NDINDA	LILONGWE	V.E	0705861662	
60	PHILIS ENGEFU	Lilongwe	V.E	0704615753	
61	LAZARO RIGHA	Bomu	V.E	0717560110	

Attendance Register

CHIEF PORT REITZ
P.O. Box 93444 CHANGAMWE
MOB: 0734 759 880

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*					
	Administrative Location:	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
62	Mutuku Makau	Lilongwe	Res	0742162220	
63	Julius Okiya	Lilongwe	Re	0726488782	
64	RAPHAEL MUTINDA	MWANGOSI	BALOZI	0726076263	
65	George Mwanyama	Lilongwe	Res	0112889003	
66	LEEMAN ONYANGO ODUO	LILONGWE	CHANGAMWE SOCIAL JUSTIS UHAKI NA USAWA	0790-488443	
67	HASSAN NGOWA	LILONGWE	Res	0720-931794	
68	ALI HAMISI DZAYA	LILONGWE	"	0712742257	
69	DANCAN MAGANGA	LILONGWE	RESIDENT	0757367186	
70	CAROLINE VEGI	MWAKIRUNGE	RESIDENT	0735174655	
71	JAMES OBIERO	WAYANI	RESIDENT	0726825214	
72	MAGDALINE ACHIENG	MWANGEZA	RESIDENT	0727423881	
73	ANDERSON STEPHEN NZOVU	Chaani	MCG	0746038030	
74	MOHAMMED KHALFAN	POLICE	DUTY OFFICER	0720265615	
75	SAMUEL MWANGI	POLICE	DUTY DRIVER	0726101136	

Attendance Register

CHIEF PORT REITZ

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

Administrative Location: Portreiz **Venue:** Boma Primary hall **Date:** 14/7/2022

No.	Name	Organization/Village	Position/Status	Mobile No.:	Signature
76	DOROTHY IKEMUNTO	MWAZUNGUKA		0715391872	
77	NAOMI RUTH	MWAZUNGUKA		0769921924	
78	SAIMA MBENYU	SALAMA PORTREIZ	VILLAGE ELDEY	0700179010	
79	KASICHANA MIENZA MWAVITA	SCEMBO	VILLAGE ELEDY	0713458526	
80	MARIANA MESI	BOKOLE AIRPORT	VILLAGE ELDER	0721436875	
81	LEAH AURA	MWANGAZA		0728625814	
82	VALENTINA MUGHANGA	MAZUNGUKA	BALOZI	0769686736	
83	Bettroda Omolo	Mwangaza	Balozi	0706765861	
84	Naum Nyanchama	Mwangaza	Village	0715013033	
85	VALENTINA MWAWUGHA	MAZUNGUKA	BALOZI	0715506109	
86	Annah W. Rebo	Mazungula		0724911436	
87	Loyce Namayan	Luongwe		0725911497	
88	Gina Munathe	Luongwe		0110172385	
89	Esther Kadii	Mwangaza	Balozi	0718670106	
90	LISHA ABDALLAH	MWINGO	Village Elder	0720595373	
91	AMINA MOHAMED	MWINGO	VILLAGE ELDER	0729773450	

Attendance Register

CHIEF PORT REITZ
14 JUL 2022
P.O Box 93444 CHANGAMWE
MOB: 0734 759 880

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

	Administrative Location:	**Venue:**		**Date:**	
No.	**Name**	**Organization/Village**	**Position/Status**	**Mobile No.:**	**Signature**
92	ABUSHAIR MOHAMED	SANTANA	V/ELDER	0745275736	
93	MAZANO ABDALLA	WAYAHI	V/ELDER	0701838948	
94	HASSAN GORO	MSURINI	V/ELDER	0112046455	
95	MZEE MBARAKU	BOKOLE	V/ELDER	0717949060	
96	AHMED ABDALLA	BOMU	V/ELDER	0734778841	
97	SAMWEL BAGINE	KWA HOLA	V/ELDER	072169403	
98	RAPHAEL OCHOLA	BOKOLE	V/ELDER	0720694701	
99	HEZRON KATANA	CHANGAMWE	SUBCOUNTY ADMIN	0725943680	
100	OMAR K. MWINYIOATI	CHANGAMWE	WARD ADMIN	0711906772	
101	MARK OGOL	KPRL	PE	072/5777/	
102	CALVIN MUTAI	NPS (Changamwe)	INSPECTOR	0717114888	
103	ABUSHIR A. MOHAMED	MWAROSI	INTERIOR	0748011117	

MINUTES FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE SUB COUNTY, MOMBASA COUNTY.

MEETING 5: INSTITUTIONAL STAKEHOLDER'S MEETING

DATE: 15TH JULY 2022

VENUE: JAMBO VILLAGE HOTEL

TIME: 9:35AM-1:10PM

MEMBERS PRESENT.

See Attached attendance list

AGENDA

1. Introduction and welcoming remarks
2. Project Brief
3. Discussions
4. Vote of thanks and closure

MIN 1 INTRODUCTION AND WELCOMING REMARKS

The meeting began at 9:35am with a word of prayer from a volunteer.

The Environmentalist welcomed and thanked everyone for taking their time to attend the meeting. He outlined the purpose of the meeting to all who were present, followed by a round of self-introduction.

MIN 2 PROJECT BRIEF

The Proponent

The Proponent's Representative gave a brief project description. He said the Proponent intends to construct a large common user LPG facility within KPRL land with an increased storage capacity to improve the availability of LPG which is currently trading at high prices due to demand and supply. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users. He also pointed out that once complete, is expected to have a huge positive impact to the country by availing sufficient LPG as well as driving down the cost of LPG.

The Design Consultant

The design consultant gave a brief description of the proposed project stating that the most suitable design storage capacity for the proposed import terminal has been estimated at 30,000 metric tons in the medium term based on the available in-country LPG import capacity activities that are expected during implementation of the project. He also stated that the bulk storage shall

be in the form of mounded bullets that provide intrinsically passive and safe environment. The import pipeline from KOT-2 will also be below ground on the existing oil pipeline wayleave.

The health and safety expert talked about the risk assessment associated with bulk LPG storage which is mainly fire and said the necessary precautions will be put in place including import pipeline being below ground in addition to being fitted with automatic leak detectors for emergency response. The wayleave will also be patrolled to ensure maximum security is maintained.

The Environmentalist summarized on the environmental and economic impacts. Positive impacts associated with the project will include employment creation, improved health due to use of clean energy, affordable LPG prices, forest conservation due to increased use of LPG, improved regional economic activities and trade. Negative impacts during construction phase include air pollution, noise pollution, biodiversity loss, disruption of traffic during pipeline installation across Airport Road. During operation is risk of fire outbreak.

The sociologist highlighted that the Environmental Impact assessment and audit regulations, 2003 require an EIA should "seek the views of any persons who may be affected by the project". The constitution also gives everyone a right to be part of all developments therefore community views are important in the ESIA process hence everyone has the freedom to discuss and share their thoughts on the issues regarding the Proposed Project.

MIN 3 DISCUSSIONS

The following were the questions and comments by the participants and answers and clarifications by the Proponent and the Consultant:

Q1 How wide is the way leave?

ANS: The way leave is around thirty feet.

Q2 Is there an immediate emergency response plan in case of incidents like fire?

ANS: Yes. There are fire stations inside the refinery and five fire trucks. There is also regular inspections. There will be no danger since the pipeline will be buried on the ground. Leak detection will also be installed that can notify the control room of any leakage and the system shut down and danger averted.

Q3 Will the common user manifold serve only Kenya Pipeline Company and will there be interconnectivity to other surrounding Oil Marketing Companies (OMC)?

ANS: Yes the common user will be open to all OMC. What Kenya Pipeline Company does, is to provide a common user facility and option is given to investors to bid. There will be a provision of a T to join.

Q4 When is the Project due to commence?

ANS: This is still the design phase which will be on for six months, from then is when definite time for commence and completion will be determined

Q5 Is there a waste management plan?

ANS: Yes, Kenya Pipeline Refinery Limited has an elaborate waste management plan.

Q6 What is the criteria that will be used to ensure the price of the gas reduces?

ANS: It is normally based on competition and market both local and international. Before the project plan, the landing cost and the profits have already been calculated and based on the economy of scale the proposed project will be able to withstand bulk storage.

Q7 Why is the sample size for this public participation small. Can there be a comparative study for an LPG action plan and consumption data covering the whole country?

ANS: The total number public participation meetings are five and still it will be gazzetted, advertisement from two national newspapers and radio station. Furthermore, there will be a market study research that will cover other countries.

Q8 How will the issue of decommissioning of the Airport Road be averted and will there be Traffic Impact Assessment?

ANS: During the construction phase the pipeline was factored in, all provisions were put in place to ensure the road will not be completely demolished.

Q9 Will the LPG design be for commercial propane or butane?

ANS: The design will be on commercial propane.

Q10 Why were fishers not involved during public consultation?

ANS: There was an Environmental Impact Assessment that was done in Kipevu Oil Terminal. However, this project does not touch on water or activities done by the beach management unit, but project are integrated and have cumulated impacts.

MIN 4 VOTE O F THANKS AND CLOSURE

The Environmentalist, thanked all the residents for their attendance and active participation in the meeting.

The meeting ended at 1:10 p.m. with a word of prayer from a volunteer from the stakeholders.

R&E MODERN TECHNOLOGIES LTD

SIGNATURE 

Attendance Register

No.	Name	Organization	Designation	Mobile No.:	E-mail	Signature
Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*						
	Meeting Venue: Jambo Village Hotel			**Date:** 15th July 2022		
1	Akinyi Flora Mitchel	R&E	Environmentalist	0701393729	floramitchel1994@gmail	[signature]
2	Vallery Siwo	R&E	Enumerator	0708873387	valleryduncan@gmail.co	[signature]
3	ALEX JAMBO	R&E	EDUCATIONIST/ HEADTEACHER	0726541839	alexjambo2@gmail	[signature]
4	Geoffrey kiptoo	OSMAG	Technical Assistant	0722926628	geoffrey.kiptoo@ osmagsociety.com	[signature]
5	Stellamaris Mutiku	KMA	Environment Officer	0719745538	smutiku@kma.go.ke	[signature]
6	Anthony Kahindi Kenga	AGOL	Laboratory Technologist	0728722193	anthonykenga1789 6@gmail	[signature]
7	Erastus Warui	Hashi	Ops Assistant	0727830641	erastus.warui@hashi -energy.com	[signature]
8	MOHAMED OMAR	K.B.M.U	COMMITTEE MEMBER	0707044065	—	[signature]
9	ALEXRIA	K.BMU.	CHAIRMAN	0720172734	ALEX NDAMAWE @ G-MAIL COM	[signature]
10	SHABANI MATANO	LIKONI BMU	CHAIRMAN	0719144276	mataroshabani65 @gmail.com	[signature]
11	ATHUMANI MWERO	N.B.M.U	SECRETARY	0727835584	—	[signature]
12	SULEIMAN MWINYI K.	KITONGWE BMU	CHAIRMAN	071308913	suleimanfuwari @gmail.com	[signature]
13	HAJI MASSA	CWWDA	Envir. mthg. (EEM)	0722379703	hajimassa@yahoo	[signature]
14	MASUDI.M.BAKARI	MKUPE B.MU	CHAIRMAN	0724468858	mkupeb-mug m	[signature]
15	BENARD MATUKU	CWWDA	Environmentalist	0708266687	benardmalanga6@	[signature]

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*						
	Meeting Venue: Jambo Village Hotel			**Date:** 15th July 2022		
No.	**Name**	**Organization**	**Designation**	**Mobile No.:**	**E-mail**	**Signature**
16	Sheikh Juma Uthuby	CIPK	Imam	0723571133	—	[signature]
17	Patrick Kamau	Total	Logistics MGR	0712565161	patrick.kamau@totalenergies.ke	[signature]
18	Bernard Kimani	KPC	ACCO	0723984155	bernardo.kimani@kpc.co.ke	[signature]
19	Jira Mdzomba Ruwa	MCG. Fire	ADO	0721520422	[illegible]	[signature]
20	John Jape Stanley	County Fire	Divisional Fire Officer	0708209068	jape.john2007@yahoo.com	[signature]
21	Brian Orioki Moturi	KPRL	ENG	0707376385	brian.moturi@kprl.co.ke	[signature]
22	Sammy Nduati	Total	Plant Mngr	0736241956	sammy.nduati@totalenergies.ke	[signature]
23	Michael Karuki	KPRL	MEDD	0722614572	michael.karuki@kprl.co.ke	[signature]
24	Mark Ogot	KPRL	Mech Eng	0721577777	mark@kprl.co.ke	[signature]
25	Edwin Odhiambo	NPSC - APS	CPU	0711922047	edwinodhmb@gmail	[signature]
26	Esta Mwaloma	VTTI	HSE	0700364770	emw@mtt-vtti.com	[signature]
27	Boniface Mbinayo	Port Health Msa County	CCPHO	0722438…	bmbinayo30@gmail	[signature]
28	Stella Ntayiemi	EPRA	OG	0702671433	stella.ntayiemi@epra.go.ke	[signature]
29	Mungai Boniface	KCAA	ATC	072279378	mungaib@kcaa.or.ke	[signature]
30	Henry Kibea	KCAA	ENG	0722401708	hwanii@kcaa.or.ke	[signature]

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*

No.	**Meeting Venue:** Jambo Village Hotel			**Date:** 15th July 2022		
No.	**Name**	**Organization**	**Designation**	**Mobile No.:**	**E-mail**	**Signature**
31	Michael Yator	INTERIOR	DCC	0722571297	michaelyator5 @gmail.com	[signature]
32	Bwanamwenu	A CRR	OPS	0792893952	mahonzu@pamsa @gmail.com	[signature]
33	Ibtsam Ahmed	PROL	HSEM	0720211[illegible]	[illegible]@gmail.com	[signature]
34	Geoffrey Kiptoo	OSMAG	Technical Assistant	0722926628	geoffrey.kiptoo@osmagsociety.com	[signature]
35	ABDULSALAM OMAR	COUNTY GOV'T OF MSA ENV'T	DIRECTOR CLIMATE CHANGE	0725436080	abduser2424@gmail.com	[signature]
36	MIRIAM TILAS	INTERIOR	SACC-PORT REITZ	0721932740	watilas013@gmail.com	[signature]
37	SHARON MBUSIRO	INTERIOR	ACC-CHANGAMWE	0727032680	sharonmbusiro22@gmail.com	[signature]
38	NICHOLAS OTWORI	MCA	MANANGER	07[illegible]04658	[illegible]@gmail	[signature]
39	CONSTANCE MWAKIO	KPRL	OPS-TECHNICIAN	0720788191	mbalaconnie@gmail.com	[signature]
40	HEZRON W KATANA	CGM	SUBCOUNTY ADMN CHANGAMWE	0725943680	hezron.katana@gmail	[signature]
41	OMAR K. MWINYIKAI	CGM	WARD ADMIN CHANGAMWE	0711906772	omarmwinyikai@yahoo.co.uk	[signature]
42	AMOS M. LUMITI	RUBIS	CHANGAMWE DEPOT	0721208915	Amos.Mugaisi@rubis-kenya.com	[signature]
43	Mohamed J Ruwa	KPRL	SLM	0703492464	Mohamed.Ruwa@kprl.co.ke	[signature]
44	SOPHIA WAIHU	OFFICE	REPRS	0704629195	[signature]	[signature]
45	LYDIAH C. MAMBO	NPS	DISCPC	0722372828	lydiaumambo3@gmail.com	[signature]
46	KENNEDY KITANA	R&E	Environmentalist	0720964333	[illegible]	[signature]

Attendance Register

Project Name: *Environmental And Social Impact Assessment Study For the Proposed LPG Import, Storage And Handling Facility in Changamwe Mombasa For M/S Kenya Pipeline Company Limited*						
	Meeting Venue: Jambo Village Hotel			**Date:** 15th July 2022		
No.	**Name**	**Organization**	**Designation**	**Mobile No.:**	**E-mail**	**Signature**
47	George Wandera	R&E	Sociologist	0729632854	wanderakinna@hotmail.com	
48	Fredrick Maseno	R&E	H&S Expert	0722574237	fmaseno@gmail.com	
49	ANN NJOKI	R&E	Enumerator	0790264478	annnjokikariuki@gmail	
50						
51						
52						
53						
54						
55						
56						
57						
58						
59						
60						

JAMBO VILLAGE
Hotel
Moi International Airport Rd. Changamwe. P. O. Box 40604 - 80100, Msa - Kenya
Tel: +254-0706 871 800 / +254-0717 357 327, Fax: +254-41- 2495317
E-mail:info@jambovillagehotel.com info@ndoloinvestments.com

R&E - CONFERENCE LIST

NO	GUEST'S NAME	ID/PASSPORT NO.	MOBILE NO.	PLACE OF ORIGIN	SIGN 15/7/22
1.	Akinyi Flora Mitchel	31644816	0701393729	Nairobi	
2	MASUDI.M.BAKARI	22593672	0724468388	B.MU	
3	ATHUMANI MTOI MWERO	21113936	0727835584	B MU	
4	SULEIMAN MWINYI KIMUSHA	21779729	0713089138	MTONGWE BMU	
5.	Haji MASSA	9850973	0722377703	CWWDA	
6.	DIANA NTHIWA	24599925	0724831943	KPRL	
7.	BERNARD KIMANI	24597743	0723984155	KPC	
8	Alloram Marah	24736972	0727165725	KPC	
9	Vallery Akinyi Siwo	36567958	0708873387	R&E	
10	JOHN JAPE STANLEY	13731073	0708209068	COUNTY FIRE	
11	JIRA MBZOMBA RUWA	9963457	0721520422	MCG FIRE	
12.	Kennedy Njau	27193014	0734744532	NEMA	
13	ABDULSALAM OMAR	25435926	0725436080	COUNTY GOVT OF MOMBASA	
14	Brian Moturi	31661535	0707376385	KPRL	

JAMBO VILLAGE Hotel

Moi International Airport Rd. Changamwe. P. O. Box 40604 - 80100, Msa - Kenya
Tel: +254-0706 871 800 / +254-0717 357 327, Fax: +254-41- 2495317
E-mail:info@jambovillagehotel.com info@ndoloinvestments.com

R&E - CONFERENCE LIST

NO	GUEST'S NAME	ID/PASSPORT NO.	MOBILE NO.	PLACE OF ORIGIN	SIGN 15/7/22
15	SAMMY NDUATI	23564985	0723624956	TOTAL	[signature]
16	ABDUlsalam OMar	25435926	0725436080	COUNTY GOVT OF MSA ENV'T	[signature]
17	EDWIN ODHIAMBO	25391513	0711922047	APS-CIPU	[signature]
18	ESTA MWALOMA	22273638	0700864773	VTTI	[signature]
19	BONIFACE MBILAYO	21254220	0724345902	DOHS CHANGAMWE	[signature]
20	BONIFACE MURAI	13533930	0722793730	KCAA	[signature]
21	Henry Kibett	10587897	0722401708	KCAA	[signature]
22	Michael Yator	11338499	0722571297	NGAO	[signature]
23	Stella Nyamami	29447525	0703637433	EPRA	[signature]
24	ALEX JAMBO	13732803	0726541839	GOME	[signature]
25	Ibrahim Abud	22772425	0720211068	Abud	[signature]
26	Ibrahim Mahmoud	11622499	0792893912	Acroh	[signature]
27	Geoffrey Kiptoo	23994323	0722926628	OSMAG	[signature]
28	MIRIAM TILAS	11316362	0721932740	INTERIOR	[signature]

JAMBO VILLAGE
Hotel

Moi International Airport Rd. Changamwe. P. O. Box 40604 - 80100, Msa - Kenya
Tel: +254-0706 871 800 / +254-0717 357 327, Fax: +254-41- 2495317
E-mail:info@jambovillagehotel.com info@ndoloinvestments.com

R&E - CONFERENCE LIST

NO	GUEST'S NAME	ID/PASSPORT NO.	MOBILE NO.	PLACE OF ORIGIN	SIGN 15/7/22
29	SHEE JUHUDI	11366066	0723571133	CHANGAMWE	[signature]
30	Erastus Wanji	30968928	0727 820 641	Changamwe	[signature]
31	SHARON MBUSIRO	32917830	0727032680	INTERIOR	[signature]
32	NICHOLAS OTWORI	22880790	0721704658	WARD MANAGER	[signature]
33	CONSTANCE MWAKIO	24205066	0720788191	CHANGAMWE	[signature]
34	OMAR K. MWINYIKAI	11459456	0711906772	AIRPORT	[signature]
35	HEZRON W KATANA	11878072	0725963680	CHANGAMWE	[signature]
36	AMOS M. LUMITI	9301850	0721208915	CHANGAMWE	[signature]
37	Mohamed Rumbe	9724139	0703452164	Magongo	[signature]
38	SOPHIA WAHU	20346121	0704627951	Changamwe	[signature]
39	ANN NJOKI	38015135	0790964478	Nairobi	[signature]
40	LYDIAH C. MAMBO	10830842	0722372828	CHANGAMWE	[signature]

Annex 5: Stakeholder Consultations Response

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Users of LPG Gas in households within the distribution Network.
- Connectivity

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Access to LPG Gas
- Provision of business opportunity
- Reduction of Green House gases through reduced usage of firewood & Kerosene.

   b. ***Negative impacts***

- Pollution in the event of leakage.
- Fires in the vicinity of the aerodrome in the event of leakage.
- Infrastructure penetrating the airspace.

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Yes.
- Fires May affect aircraft Operation.
- LPG infrastructure depending on location of stacks or chimneys May present Obstacles on the flight paths.

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Control of height of installation
- Ensuring installation of fire prevention & suppression systems.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- Control of height through Obtaining height approval from KCAA and reduction of light for glare protection

6. What are your additional comments on the proposed project?

- Avoid non-aeronautical light facing the flight path.

NAME: Eng. Jonah Kinyua TELEPHONE NO. 0726249788

DATE: 5/9/2022 SIGNATURE and /STAMP.....

INSTITUTION (If any): KCAA POSITION (If any): CHIEF AERODROME INSPECTOR

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

The increased investment LPG will benefit the common mwanachi in increasing LPG supply in the country, LPG is also environmentally friendly source of energy. The project will also enhance economic empowerement. The project will increase LPG accessibil and affordability.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Economic empowerement
- Breakdown LPG supply monopoly in the country
- control and regulate LPG accessibility and affordability
- Will reduce dependence on Charcoal and reduce deforestation -

   b. ***Negative impacts***

- In the case of leakage there must be control system that can track leakages considering LPG gas are flamable.
- There may be aposibility of fluctuating prices OF LPG product high or low prices.
- Through establishment of LPG storage handling there will be alteration of Biophysical environment restoration.
- Thorough assessment study to be conducted in the

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Embracing of renewable energy which is the vision for the country. There should be mainstreaming of both.

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Ther LPG systems should consider to have appropriate leakage tracking to prevent any Environmental Manage.
- There should proper Market Strategy.
- There should Massive public awareness both state and non state actor.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- traffic management plan
- Occupational health safety policy
- Multi Stakeholder engagement in the operation and implementation Process is very key
- The institution need to establish public information centre and grieverance readiness mechanism
- The KPC need to conduct continuous surveillance and promote approved standards by ISO.

6. What are your additional comments on the proposed project?

- The proposed project is very key for the prosperity of our economy and provision of employment opportunity

NAME: Abdulsalam Omar TELEPHONE NO. 0725436080

DATE: 7/7/2022 SIGNATURE and /STAMP

ENVIRONMENT, WASTE MANAGEMENT & ENERGY
RECEIVED
07 JUL 2022
P.O. BOX 90144-80100 MOMBASA
COUNTY GOVERNMENT OF MOMBASA

INSTITUTION (If any): County Govt of Mombasa POSITION (If any): ...for Climate Change

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Residents that lies along the pipeline area. As this helps in provision of jobs opportunity to the residents from the roots.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

1. Creation of job opportunity.
2. Awareness of the dangers of mis-using gas.
3.

   b. ***Negative impacts***

1. Re glozation of market place especially Sisi kwa Sisi.
2. In Case of pour response of gas linkage this will Cause destruction to areas.

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

1. Lacking of job opportunity in the society during the project excecution, this lee leads to rioting to the administration.

4. What mitigation measures would you recommend for the negative impacts you listed above?

1. Transparency should be embraced during recruiting of the youths to the project

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

1. Co-orperation between all Safety Stakeholde

6. What are your additional comments on the proposed project?

1. As the project is for the bettement of the Community we expect a low and friendly Cost towards its use

NAME: Bakari A. Juma TELEPHONE NO. 0790659885

DATE: 11/07/22 SIGNATURE and /STAMP

CHIEF
KWAHOLA LOCATION
CHANGAMWE SUB-COUNTY

INSTITUTION (If any): Interior POSITION (If any): Ass. Chief

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

The said Project will have a positive gain to the Kenyans in general but mostly we Kilifi people. Even our youth will have part time jobs in the Project.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

1. Though it shall have a positive impacts, our social impacts like business shall be affected because many small business are by the leeway of the project.
2. movements though short time shall be affected eg. mud during the rains. Try to minimize duration of the Project.

   b. ***Negative impacts***

Quoted above.

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

.....
.....
.....
.....
.....
.....
.....

4. What mitigation measures would you recommend for the negative impacts you listed above?

Have some passages left that people can cross from one side to the other during the digging of the trench. Those whose business shall be affected there should be a way to prop them during the construction period.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

The proposed line is long and gas is very dagdangerous. Shall there be some valves to control the flow in case of a leakage?

6. What are your additional comments on the proposed project?

We the people who are the guardians of the entire line from Kipevu to the K.P.L.C., Our request is that we be given some or provided with A tent and chairs that can be used in futu

NAME: ABDALLA ICONDO TELEPHONE NO. 0714990179

DATE: 11/07/2022 SIGNATURE and /STAMP.....

INSTITUTION (If any): ..... POSITION (If any): V/ELDER Chairman.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Everybody and especially the resident
- It will provide the job opportunities
It will be easily available.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

Residents will be enlighted/enhanced the benefet of use of gas
- That it is cheaper than charcoal or electricity.

   b. ***Negative impacts***

- Some of the residents that have invaded the location of KPC will be evicted.
- In case of gas leakage.

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

NIL

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Public participation is the way to go.
- Involvement of all Stakeholders.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

Residents be informed of the dangers involved if they interfere with the pipeline.

6. What are your additional comments on the proposed project?

- It is a good thing to the area and the neighbouring people
- Having people / youth be give chance of jobs.

NAME: Rose Nguyi TELEPHONE NO. 0780950038

DATE: 11/7/2022 SIGNATURE and /STAMP

INSTITUTION (If any): ..... POSITION (If any): .....

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

The Members of public especially in this area of Changamwe who still use charcoal for cooking

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Lowering the cost of living when the gas is affordable
- Uplifting health status of resident as they stop using harmful sources of charcoal or firewood
- A cleaner environment for the area & individuals

   b. ***Negative impacts***

- Any leakage may be disastrous especially if any attempts to steal from underground pipes
- Dust & disturbance to the people living near the way leave

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

- Environmentally yes it will affect me positively when the air is cleaner from use of gas
- Economically the cost of gas will reduce the cost of living for all of us

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Information given to the people to be affected early enough and cooperating with the public during the project.
- Capacity building to residents on choices available for cooking
- Markets along the wayleave to be sensitized

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- Dumpsites along the wayleave to be cleared before the project starts
- Ensuring that safety warnings along the trenches are enhanced to avoid any accidents

6. What are your additional comments on the proposed project?

Engage the community from the start, during & after the project for the success of the project

NAME: Miriam Tilal TELEPHONE NO. 0721932740

DATE: 11/7/2020 SIGNATURE and /STAMP

INSTITUTION (If any): INTERIOR POSITION (If any): SACC

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

The common Mwananchi stands to gain most.
- In getting labour
- get gas in cheaper price.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Cheap gas
- employment
- business people will gain from workers who will be working during the time

   b. ***Negative impacts***

- air polution
- displacement of business people along the line
-

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

- Yes:
- Pollution will also affect my office.
- displacement of business people

4. What mitigation measures would you recommend for the negative impacts you listed above?

- have good measures of before and during the project to find ways of improving the above
- said issues.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- N.A.

6. What are your additional comments on the proposed project?

- to involve residents of the affected area.

NAME: Omar Swaleh TELEPHONE NO. 0722120112

DATE: 11/7/2022 SIGNATURE and /STAMP.....

CHIEF
KWAHOLA LOCATION
MANGAMWE SUB-COUNTY

INSTITUTION (If any): NIL POSITION (If any):

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

- The community as well benefit from direct casual and permanent employment this improve their living standard
- From Corporate Social Responsibility programs such as Medical Camps, Environmental Awareness

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- employment
- Environment Conservation
- Community empowerment
-

   b. ***Negative impacts***

- Fire Incidents / Outbreaks
- possible air pollution

3. Are there any of the impact(s) identified in _question 2 above_ that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Yes - Issues to do with environmental degradation. Environmental concerns are part of the county government mandate and therefore will affect parts of my mandate

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Conducting missions that will protect the environment eg. protecting the way leave so that community members do not dump solid waste anyhow during the day and at night

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- Training community members on emergency fire fighting / drilling / first aid
- Training members on safety use of gas products

6. What are your additional comments on the proposed project?

The project is good but must address all safety and social concerns

NAME: [illegible] Katana TELEPHONE NO. 0725943680

DATE: 12/07/2022 SIGNATURE and /STAMP [signature]

INSTITUTION (If any): CGM POSITION (If any): Sub County Admin Changamwe

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

The Public.
The gas prices are high therefore once the project is complete, there will be sufficient gas supply which will be relatively cheaper.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Creation of employment
- Sufficient gas supply

   b. ***Negative impacts***

- The gas plant or pipes might cause be tragic when it explodes due to leakage of the pipes
- Displacement of people

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Yes.
Through my office, the youth will benefit by getting employment from the project.

4. What mitigation measures would you recommend for the negative impacts you listed above?

- A proper Environmental Impact Assessment should take place before the project kicks off to ensure that the citizens around the project are not affected in any way.
- Ensure that the displaced people are catered for.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

Ensure safety of the piper and the gas.

6. What are your additional comments on the proposed project?

NAME: SHARON MBUNO TELEPHONE NO. 0727032680

DATE: 12TH JULY 2022 SIGNATURE and /STAMP ~~stamp~~

INSTITUTION (If any): INTERIOR POSITION (If any): ACC

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Common mwananchi stand to gain most
- Alternative use of port town Chacel and district
- Creation of employment

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Job creation
- CSR benefit

   b. ***Negative impacts***

- Noise polution
- Risks of fear on danger of gas
- displacement of some community
- Temperary disclosure of roads causing delay
- Danger of children passing using / cross especially school children

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

- Temporary closure of roads along the way/leg
- School children crossing will be affected
- Risks/fear of tempering other fuels pipline
- Noise/pollution along the route may affect residents

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Create awareness to people living along the area.
- Secure the area of works before working take place.
- Disturbance allowance to households along the affected areas.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- Some safety awareness and emergency evacuation drills/exercise in the area for community benefit.
- Safe ways for local residents especially school children.
- 24-7 security surveillance and patrol

6. What are your additional comments on the proposed project?

- Local residents to benefit in employment port liason office to incooperate local residents
- Safety measures to be highly emphasized in order to secure life.

NAME: Omar Khamis TELEPHONE NO. 0733906772

DATE: 12/7/2022 SIGNATURE and /STAMP

INSTITUTION (If any): CGM POSITION (If any): Ward Administrator

CHIEF
KOMBO FA[illegible] LA
CHANGAMWE L[illegible]ATION
Date:.....

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Public. This is due to the following
= Creation of job opportunities
= Reduction in prices for the gas to be supplied.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

= Growth in economy.
= Achievement in the big four agenda.
= Creation of job opportunities

   b. ***Negative impacts***

= Fire risk.
=

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Yes. The creation of job opportunities will help on reducing cases of insecurity and idleness. Hence assistance in day to day running of activities

4. What mitigation measures would you recommend for the negative impacts you listed above?

= Proper measures should be put in place to ensure, incase of any fine eruption the matter is cared for before escalation.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

None.

6. What are your additional comments on the proposed project?

When employment case arises the community within to be the first priority to be considered.

NAME: KORISO FARSALA TELEPHONE NO. 0754690209.

DATE: 12/07/22 SIGNATURE and /STAMP:

CHIEF
KOM[illegible] FARSALA
[illegible]AMWE LOCATION
Date: .....

INSTITUTION (If any): ..... POSITION (If any): .....

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Residents of Changamwe are the most to gain in the Project. The reason being employment Creation. During Construction the residents who will be employed to facilitate the Construction.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Employment Creation
- K.P.C has been Construction Infrastructure facilities in the Society which helps in the health ad education Sector.

   b. ***Negative impacts***

- It will be muddy during the digging to put in place.
- Children will be at risk of falling in the trench if not properly secured and guarded.

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Yes! it will affect because the Children who use the Lee way when going to school. Socially Children Play along the Lee way which will be hindering the Social development of our Children.

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Security Measures - 24 hour Surveilance from the security Personel of KPC to ensure that no Children are at risk
- Employment - Measures be Put in place to enable the locals be invited for employment if they meet the Standards

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- Guard Guards to Constructed along the Lee way for Safety purposes

6. What are your additional comments on the proposed project?

I appreciate to be Involved in the Public Participation by K.P.C, KPRL and R&E for the betterment of livelihood in our Location.

NAME: ABDULKADIR KHALID TELEPHONE NO. 0722562679

DATE: 14-07-2022 SIGNATURE and /STAMP

ASSISTANT CHIEF BOMU SUB-LOCATION
Date
Box 3644-80102
CHANGAMWE
CHANGAMWE SUB-COUNTY

INSTITUTION (If any): INTERIOR POSITION (If any): ASSISTANT CHIEF

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Residents of the proposed area because they are going to benefit from employment at the site.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

a) Job creation
b) Health benefits
c) Limited supply of gas
d) Environmental friendly -

   b. ***Negative impacts***

- Demarcation of settlements.
- Security purposes.
- ~~Environment~~ Destruction of property.

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

- Environmental issues - Incase there is leaking of gas from the pipeline then the people are going to be affected directly through breathing.
- Gas leakage in our homes, can cause fire.

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Creation of awareness on the use of gas.
- Health committee should be formed incase of any incidence that would occur, they should be the first to take action.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- Signs and should be kept on the roadway.
- Settlements around the pipelines should be demacated.
-

6. What are your additional comments on the proposed project?

It is a beneficial project to both the government and the community at large, because it shall benefit people from one generation to the next.

NAME: KHADIJA KHAMIS TELEPHONE NO 0729848616

DATE: 14/07/22 SIGNATURE and /STAMP

ASSISTANT CHIEF WAYANI SUB-LOCATION
Date
P.O. Box 03444 - 80102
KWALE
CHANGAMWE SUB-COUNTY

INSTITUTION (If any): INTERIOR POSITION (If any): ASS. CHIEF.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

The government
Due to the scrongg gases to other
land Lockes countries. I mean by collecting
revenue of the LPG

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Employment
- Good environment by not using firewood.

   b. ***Negative impacts***

- LPG can cause death if ~~not~~ a person will not be carefule.

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Bad gases or exhaust gas.
- Bad gases through the always pollute the environment.

4. What mitigation measures would you recommend for the negative impacts you listed above?

Bad gases should be banned completely

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- There should be a ~~first~~ disaster management & first & fire team in place.
- Also fire engines should be put in place.

6. What are your additional comments on the proposed project?

We need the project for the employment of our people.

NAME: Khusha Abdalla TELEPHONE NO. 0117804417

DATE: 13/7/22 SIGNATURE and /STAMP ASSISTANT CHIEF MWAYANI SUB-LOCATION Date P.O. Box 93444 - 80102 CHANGAMWE CHANGAMWE SUB-COUNTY

INSTITUTION (If any): Interior POSITION (If any): Asst. Chief.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

The people who resides along the proposed area of project.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- LSP are the people who will be given first priority to work as per jobs commence
- We will be the first persons to benefit from the proposed construction in our area.

   b. ***Negative impacts***

- Lost of Propelties in our area during demolussion.
- There will be no business as usual according to the destruction of the structures along the proposed area.
- There will be no piece of mind due to noise and commotion of pipe heavy machines around the area

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Yes There will be alot of Noise and because of heavy Earth moving during the construction of the proposed project.

4. What mitigation measures would you recommend for the negative impacts you listed above?

- The villagers should be Educated by the Officers who are running the project.
- The villagers should be compesated by the project managers.
- We should be given another place or land so that we should vacate for the project to take place.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- We need to be given place for accomodation rather than being left as Squaters.
- We need Compesation before demolution.

6. What are your additional comments on the proposed project?

- IT should be well organised before the progress begin.
- The villagers should be accommoted duties in the proposed project.

NAME: Zakayo Juma TELEPHONE NO. 0724929029

DATE: 14/07/2022 SIGNATURE and /STAMP

INSTITUTION (If any): N/A POSITION (If any): Village Elder.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

   The people who stands to gain the most are the residence of changamwe because they are the locals, hence should be considered for job opportunities.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

   - Job opportunities
   - Improved standard of living
   - Reduction in poverty rate

   b. ***Negative impacts***

   - Pollution especially air pollution

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

My institution is Gome primary which is just opposite the oil refinery, therefore I feel that smoke from the industry can have a negative impact to learners, teachers and parents visiting the school

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Smoke from the industry to be directed to a specific point of collection

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented? Yes

- Make sure learners are sensitized about fire outbreak and how to control it.

6. What are your additional comments on the proposed project?

The project is very nice. Gome primary as a stakeholder we are requesting for your help. May you assist us in painting the classrooms and we shall appreciate

NAME: ALEX JAMBO TELEPHONE NO. 0726541839

DATE: 15/7/2022 SIGNATURE and /STAMP

HEADTEACHER
GOME PRIMARY SCHOOL
P. O. Box 92233 - 80100, MOMBASA
DATE: 15/7/22 SIGN. ADW

INSTITUTION (If any): GOME PRIMARY POSITION (If any): HEADTEACHER

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

   kenyan citizens

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

   - Increased gas supply.
   - stabilization of LPG prices

   b. ***Negative impacts***

   - Fire Disasters related to LPG.
   - Influx of foreigners
   - Increased slipping activities

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

- Yes

4. What mitigation measures would you recommend for the negative impacts you listed above?

- management of shipping traffic at the new road

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- Revise existing emergency response plans to incorporate the new project
- Disaster preparedness through equipment stockpile and training of responders

6. What are your additional comments on the proposed project?

- There is need to do proper stakeholder consultation before implementing the project
- There is need to set aside a grievance handling mechanism to address stakeholder comments as may arise

NAME: Stellomans Msiska TELEPHONE NO. 0172831534

DATE: 15/07/2022 SIGNATURE and /STAMP.....................

INSTITUTION (If any): KMA POSITION (If any): Environmental Office

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Kenya and the region - The cost of clean energy will greatly come down

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Cost of energy will come down
- Job opportunities
- CSR.

   b. ***Negative impacts***

- Relocation of population within the way leave
- LPG is dangerous when mishandled.
- Initial investment
- Safety.

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

- Design of [illegible] and Waste Management

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Invest in safety provision
- Monitor weak areas and address early.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

6. What are your additional comments on the proposed project?

NAME: Henry K TELEPHONE NO. 0722401708

DATE: 15.07.2022 SIGNATURE and /STAMP [signature]

INSTITUTION (If any): KCAA POSITION (If any): [illegible]

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

.....
.....
.....
.....
.....

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

It is premature to assess the project impact in relation to Aviation safety matters the design shows.

   b. ***Negative impacts***

as above.

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

.....
.....
.....
.....
.....
.....
.....

4. What mitigation measures would you recommend for the negative impacts you listed above?

.....
.....
.....
.....
.....
.....
.....

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

.....
.....
.....
.....
.....
.....
.....
.....

6. What are your additional comments on the proposed project?

.....
.....
.....
.....
.....

NAME: MUNAKI BONIFACE TELEPHONE NO. 0722793730

DATE: 15.7.22 SIGNATURE and /STAMP.....

INSTITUTION (If any): KCAA POSITION (If any): ATC, Operations

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG HANDLING AND STORAGE FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

(a) Consumers of LPG in Wananeth will benefit from reduced unit operation costs - low prices of gas.
(b) Employment to the local people.
(c)

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Creation of Employment opportunities
- Reliable supply of LPG gas thus reducing reliance on wood fuel/c
- Contribution to Government Revenue
- Trade

   b. ***Negative impacts***

- Air pollution / Noise pollution
- Solid waste Management - Increase in solid & liquid generation.
- Release of Petroleum into the atmosphere during operation phase
- Clearing of the forest on the site area.
- Dust Emissions
- Noise from construction Machinery
- Risk of fires

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Reliable supply of LPG and storage – LPG companies will save alot due to economies of scale and incurring demurage for vessel delays.

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Workers at site to be provided with PPEs, HESQ toolbox Meetings
- Contractor to put in place effective & efficient solid waste disposals.
- Emergency Response Plan.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

6. What are your additional comments on the proposed project?

The Project to proceed on which will be beneficial to all stakeholders and the end users.

NAME: AMOS MUGAISI LUMITI TELEPHONE NO. 0721208915

DATE: 15/07/22 SIGNATURE and /STAMP

INSTITUTION (If any): RUBIS ENERGY POSITION (If any): LPG DEPOT SUPERINTENDENT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

The local community and the whole republic at large through:
Creation of employment opportunities. Availability of clean source of energy. Promotion of related businesses

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

Creation of employment
Promotion of related businesses
Availability of clean fuel
Possible decrease in price of LPG

   b. ***Negative impacts***

Displacement of people encroaching the wayleave.
Flora and fauna destruction

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Yes
Availability of clean fuel for the society

4. What mitigation measures would you recommend for the negative impacts you listed above?

Conduction of a substantive Risk Assessment
Public participation throughout the project
process

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

Yes from the Risk Assessment done all the
covered area to be attended to so as all
the gaps

6. What are your additional comments on the proposed project?

It's imperative to have a possible layout of
the project proposal rather than talking
from assumptions

NAME: Anthony Venge TELEPHONE NO. 0728722193

DATE: 15/07/2021 SIGNATURE and /STAMP.....

INSTITUTION (If any): ..... POSITION (If any): .....

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG HANDLING AND STORAGE FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Kenya Pipeline Company Limited - the proposed project will benefit them most as a gas depot in Mombasa will result in added revenues and multi-national ~~sta~~depot will have been established

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

→ Cheaper gas refilling stations
Employment opportunities

   b. ***Negative impacts***

→ Can result into global warming when gases are released into the atmosphere.
→ High rate of displaced people (squatters)
→ Can result in an ecological disaster in case of a gas leak.
→

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

→ Gas leakage can cause an ecological disaster in terms of our health and can cause mass destruction during the aftershock

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Quality sensing machines (gas sensors) to detect gas leaks as early as possible to prevent unwanted damages caused by the leak.
- Effective measures should be taken to avoid such leakages like placing lpg pipeline deeper underground.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

→ The facility should be placed some miles away from people to avoid and minimize health and safety impacts to the people
→ Signs to warn people in case it passes near residential houses or buildings warning them of the presence of the gas pipeline beneath.

6. What are your additional comments on the proposed project?

→ If the project goes through, we want the majority of vacancies at least 70%, be allocated to the nearby residents
→ Community works like building hospitals, schools and boreholes be a priority for the company including school fees.

NAME: SHEE JUMA TELEPHONE NO. 0723571133

DATE: 12/7/022 SIGNATURE and /STAMP

INSTITUTION (If any): ..... POSITION (If any): Imam

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

THE Community.
Reduce energy expenses and protection of trees.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

1) Low gas prices (cooking gas)
2) Environment protection (trees, forests)
3) Clean Energy.
4) Educate on use Volatile Domestic products

   b. ***Negative impacts***

1) Accidents over Misuse of gas
2) Facility storage Location and amount of gas to be stored, Pose a deadly risk to the Community around the facility

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

YES
i) When and where there will be a leakage of the Submarine Pipeline.

4. What mitigation measures would you recommend for the negative impacts you listed above?

Thorough evaluation of the Risks and Measures to ensure that THEY DON'T HAPPEN

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

6. What are your additional comments on the proposed project?

It is a Recommendable project that will be a Milestone to this Country's Oil Energy requirements.

NAME: SHABANI MATANO TELEPHONE NO. 0719144276

DATE: 15/07/2022 SIGNATURE and /STAMP.....

INSTITUTION (If any): LIKONI SUB-COUNTY BMU NETWORK POSITION (If any): CHAIRMAN.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

THE COMMUNITY

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- CREATE JOB OPPORTUNITIES
- MAY BRING COMPETITIONS WITH OTHER L.P.G COMPANIES THUS FURTHER CHEAPER GAS MAY BE AVAILABLE FOR DOMESTIC USERS.

   b. ***Negative impacts***

MAY CAUSE DANGER TO THE COMMUNITIES

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

YES
① SOME BUILDINGS MAY BE BROUGHT DOWN
② DESTRUCTION

4. What mitigation measures would you recommend for the negative impacts you listed above?

PEOPLE SHOULD BE CAREFUL

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

YES:
① THOSE AFFECTED BY THE PROJECT TO BE COMPENSATED BEFORE THE START OF THE PROJECT.

6. What are your additional comments on the proposed project?

NAME: ATEO RIA TELEPHONE NO. 0720172734

DATE: 15/7/2022 SIGNATURE and /STAMP.....

INSTITUTION (If any): KITANGATA B.M.V POSITION (If any): CHAIRMAN

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

LPG Marketers might gain the most. The common user facility will allow marketers to handle large volume and take advantage of favourable international market prices.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

(1) reduced product cost due to economies of scale
(2) Job creation
(3) reduced environmental pollution and promoting forests conservation by ensuring LPG availability

   b. ***Negative impacts***

(1) The line leave and storage fees might add to the product cost making marketers using the facility.
(2) Clearing of vegetation, noise pollution due to heavy machinery use

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

If Hashi Energy stores its product in the proposed facility this might be cost bound us due to line lease and product storage fees. This in turn will affect its competitive ability.

4. What mitigation measures would you recommend for the negative impacts you listed above?

Consider using favourable reasonable rates for line lease and storage fees.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

(1) Kindly Ensure the operators who will operate the plant are well trained and qualified.

6. What are your additional comments on the proposed project?

The project comes at a time when the LPG market is very promising and fast tracking the project will be beneficial to all players.

NAME: Erastus Wanni TELEPHONE NO. 0727 830 641

DATE: 15/07/22 SIGNATURE and /STAMP.....

INSTITUTION (If any): HASHI POSITION (If any): Operations Asst.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

KPC is stands to gain as per the monopolistic nature of the facility being operated here

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

   Job creation
   Availability of LPG
   Promotion of use of clean energy

   b. ***Negative impacts***

   Risk of SEA due to labour influx
   Erosion due to excavation
   Air pollution due to excavation
   Safety issues due to heavy machinery

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Yes, Excavation work may ~~affect~~ affect water service pipelines

4. What mitigation measures would you recommend for the negative impacts you listed above?

Involvement of key stakeholders during the project implementation (Stakeholder engagement)

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

Community awareness on the impacts and measures that the people can take

- Risk Assessment of environmental and social to be taken

6. What are your additional comments on the proposed project?

The project is commendable with the Government target of increasing forest cover and more towards clean energy use

NAME: Hagi Mama TELEPHONE NO. 0722379703

DATE: 15/7/2022 SIGNATURE and /STAMP.....

INSTITUTION (If any): CWWDA POSITION (If any): Manager, ECM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

The consumer
- Lowering of the prices of LPG

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Improved livelihood standards.
- Reduce deforestation for firewood.
- Source of employment.
- Improve safety as standards are met.

   b. ***Negative impacts***

- Increased traffic on the road
- High risk project - if standards are not met
  * results can be catastrophic

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Yes - Traffic management should trucks support the 56 parking area provided within the facility.

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Engage land owners within environment of the facility to provide, commercially, additional parking area.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- Meet all recommendations of the ESIA.

6. What are your additional comments on the proposed project?

- Ready to necessary support.

NAME: KIPKEMOI ROTO TELEPHONE NO. 0707889469

DATE: 15-07-2022 SIGNATURE and /STAMP. ~~Kotto~~

INSTITUTION (If any): KENHA - CONSTRUCTION POSITION (If any): Regional SURVEYOR.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

The most gains is the Government because the project meant to uplift the Government not the Community

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

   No Public Participation

   Not good so that people could give out inputs and comments of the project.

   b. ***Negative impacts***

   The project will not be a benefit to the Community.

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

YES the project will affect people especially those who normally going for fishing because after the heavy machine shall work on the ocean and alot of vibration will make fishing travel along NOT CALL make [illegible] creating [illegible] to the fishermen.

4. What mitigation measures would you recommend for the negative impacts you listed above?

Hence the project is on the people concern should consider the community or fishermen who are entirely depend on fishing activities for their livelihood.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

6. What are your additional comments on the proposed project?

The project should [illegible] to community.

NAME: ATHUMANI MWERO TELEPHONE NO. 0727835584

DATE: 15/7/2021 SIGNATURE and /STAMP [signature]

INSTITUTION (If any): NGARE B.M.U POSITION (If any): SECRETARY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Locals:- Employment and buying gas at a cheaper price.
Govtment :- Revenue

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Employment.
- Increase in supply of LPG hence reduced prices

   b. ***Negative impacts***

- Pollution.
- Fire

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

As a result of employment, crime rates will be reduced hence my institution will be enhanced

4. What mitigation measures would you recommend for the negative impacts you listed above?

Proper EIA be done elaborately and it be implemented fully.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- Access roads be properly designed for both entry & exit and energy lamps be introduced.
- Elaborate Public participation and sensitization of the community — safety procedures incase of energy.

6. What are your additional comments on the proposed project?

The project will be of great benefit to the community and the region at large

NAME: EDWIN ODHIAMBO TELEPHONE NO. 0711922047

DATE: 15/7/2022 SIGNATURE and /STAMP.....

INSTITUTION (If any): APS POSITION (If any): .....

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

(1) Citizens of Kenya & East Africa - Cost reduction and product availability of this green energy
(2) Environment - reduction in use of charcoal & firewood

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Environmental - reduction in emission owing to use of clean energy
- Economic - low cost and available clean energy
- Social - improved health of population due to reduction of inhalation of toxic smoke

   b. ***Negative impacts***

- Increased risk of disastrous accidents owing to increased traffic of bulk LPG trucks and penetration of cylinder use to the population

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Yes
Environmental – will facilitate Total's transition towards net-zero by 2050
Economic – cheap product means increased demand hence increased throughput and revenue
Social – will be glad to serve clean energy to a healthy population

4. What mitigation measures would you recommend for the negative impacts you listed above?

- Increased vigilance and enforcement of safety standards towards logistics and use of the product

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

- Enforcement of LN 100 to stem illegal refillers/ illegal activities associated with LPG

6. What are your additional comments on the proposed project?

The project is way overdue and should be accelerated

NAME: Patrick KAMAU TELEPHONE NO. 0712565161

DATE: 15/JULY/2022 SIGNATURE and /STAMP.....

INSTITUTION (If any): Total Energies POSITION (If any): Logistics Manager

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

1) Common Mwanchi ⇒ Increased storage for LPG will bring leverage on gas prices and ensure the LPG reaches the user at a cheaper price
2) OMCs i.e Oil Marketing Companies will have flexibility on where they can store their LPG

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

a. ***Positive impacts***

1) Job creation
2) Improvement of livelihoods
3) Improve carbon footprint by reducing usage of firewood and charcoal.

b. ***Negative impacts***

1) Increased fire risk incase of leaks and spillages.
2) Environmental degradation if the waste is not handled properly
3) Monopoly where KPC will have a huge storage facility hence dictate prices

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

* Being closer to KPRL, any fire disaster at the facility can easily affect our depot. Safety measures should be included to avert such scenarios.

4. What mitigation measures would you recommend for the negative impacts you listed above?

* Involve regulatory authorities to control the market and prevent unhealthy business tendencies where the big players will kick away the small players.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

* Allow provisions for future connections with existing OMCs.
* Incorporate the OMCs in the design phase to get their input on safety.

6. What are your additional comments on the proposed project?

* This is a good project and will be a game changer in the LPG business.

NAME: SAMMY MOMAT TELEPHONE NO. 0736241956

DATE: 15/7/22 SIGNATURE and /STAMP.....

INSTITUTION (If any): TOTAL POSITION (If any): PLANT MNGR.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

FROM My point of VIEW, I regard that the consumers stands to gain most ~~co~~ because since there would there would be a steady supply of the commodity within the market

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Employment opportunity to the community
- Increase of revenue to the government since the supply would be doubled
- Development in regard to industrialization
- It's probably the CBD town would grow because many investment would arise

   b. ***Negative impacts***

- Displacement of settlements in the areas involved.
- Since the project is linked in the maritime environment probably fishermen would be restricted in localized areas their activities where ships carrying L.P.G docked would be restricted.
- In the account of pipes leakage both marine and human life may be greatly negatively impacted

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

YES - In the advent of pipes leakage fishermen and marine aquatic creatures would be greatly negatively impacted

4. What mitigation measures would you recommend for the negative impacts you listed above?

As it has been explained that fibre cable would be installed in order to detect if there would be any leakage of pipes under water

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

I think there should be standby firefighters to tackle any ~~advent~~ matter concerning matters relating to accident of fire controlled by gas leakage

6. What are your additional comments on the proposed project?

I personal welcome the project because we need our country to develop in terms of industrial development.

NAME: SULEIMAN MWINYI TELEPHONE NO. 0713089138

DATE: 15/7/2022 SIGNATURE and /STAMP.....

INSTITUTION (If any): MTENGWE B.M.U POSITION (If any): CHAIRMAN

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Kenyans (~~Ether~~ Citizens of Kenya)
Reasons: with reduced gap in demand and Supply of the LPG Products, the Cost of household LPG gases will go down considerably and that is likely to reduced the cost of living

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Employment opportunities to locals, Constructors etc.
- Redule Supply gap of LPG in the Country.
- Source of revenue to the goverment → Increase in GDP
- Control LPG Prices (inflation)

   b. ***Negative impacts***

- Risk of fire incase of leakages.
- Traffic challedes from LPG Trucks transporting the Gas to other Counties.
- STDs & HIV/AIDS in the area
- Pressure on Social amenities e.g. hospitals,
- Drug trafficking & Drugs abuse among the Commodities

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Kenyans (~~Ethen~~ citizens of Kenya)
Reasons: with reduced gap in demand and supply of the LPG Products, the cost of household LPG gases will go down considerably and that is likely to reduced the cost of living

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Employment opportunities to locals, constructors etc.
- Redule supply gap of LPG in the country.
- Source of revenue to the goverment → Increase in GDP
- Control LPG Prices (inflation)

   b. ***Negative impacts***

- Risk of fire incase of leakages.
- Traffic challeges from LPG trucks transporting the Gas to other Counties.
- STDs & HIV/AIDS in the area
- Pressure on Social amenities eg. hospitals
- Drug trafficking & Drug abuse among the Commodities

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

As a residence in Mrgadini am likely to get affected by all the listed points.

4. What mitigation measures would you recommend for the negative impacts you listed above?

Risk of fire — use ~~det~~ detectors to quick mitigate the problem.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

Proper EIA should be done and all the issues well addressed.

6. What are your additional comments on the proposed project?

—None—

NAME: Benard Matuku TELEPHONE NO. 0708266687.

DATE: 15/07/22. SIGNATURE and /STAMP.....

INSTITUTION (If any): C.W.W.D.A POSITION (If any): Intern

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

The Kenyan Citizens especially Changamwe residents. This is based on the fact that this project will create employment to the residents and It also make gas affordable to many Citizens.

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

(i) Creation of employment.
(ii) Conservation of environment
(iii) Prevention of the respiratory diseases
(iv) Reduction of cost of living (reduced gas cost).

   b. ***Negative impacts***

(i) Air pollution.
(ii) Sound pollution.
(iii) Displacement of persons and families.
(iv) Fear of fire from gas leakage.
(v) Project providing jobs to non Changamwe residents.

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

(i) Air pollution ⇒ This is a condition when dirt is introduced to the atmosphere which contributes oxygen we breath in and out for daily living.
(ii) Fear of fire from gas leakage. When gas leakage is not detected in good time and mitigated it can lead to loss of life and property.

4. What mitigation measures would you recommend for the negative impacts you listed above?

Air pollution ⇒ I would recommend watering to be done before and during excavation to avoid dust emmission.
Fear of fire from gas leakage ⇒ I would advice the technical team to use digital technology to detect any leakage and also to install standby fire engines to respond incase of emergency

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

(i) Notice to issued to people doing along the way that before they are moved
(ii) Fire brigade stations to be set in prior in readyness to any emergency
(iii) Patrols to be enhanced along the way left to ensure there is no vandalism
(iv) Workers should be well trained on safety to ensure no accidents occur during implementation

6. What are your additional comments on the proposed project?

I recommend the project to be implemented because positive impacts outdo the negative impacts.

NAME: CATRISPHINE OTIJD TELEPHONE NO. 0702078636

DATE: 12/07/2022 SIGNATURE and /STAMP: ASSISTANT CHIEF MIGADINI SUB-LOCATION Date: 12/07/22 P.O.Box 93444 - 80102 CHANGAMWE CHANGAMWE SUB-COUNTY

INSTITUTION (If any): INTERIOR POSITION (If any): ASS CHIEF

REN. M. VALASA CHIEF CHAANI LOCATION Tel: 0724-694087

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG IMPORT, STORAGE AND HANDLING FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

— The proponent — Cause the fortunes of the Company will grow, they shall employ their people and become prosperous
— The Consumer — Prices Could be affected to the advantage of the Consumer

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

— Economic empowering opportunities Could be made available to citizens e.g. Jobs, Contracts.
— The area Could be More Secure
—

   b. ***Negative impacts***

— Could Lead to displacement of people from their Settlements.
— The project Could harm the Environment

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

— I live in that neighborhood.

4. What mitigation measures would you recommend for the negative impacts you listed above?

— finding an alternative site.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

— We shall look at the design.

6. What are your additional comments on the proposed project?

— N/A

NAME: MICHAEL NATO TELEPHONE NO. 0724 66 56 10

DATE: 13/07/2021 SIGNATURE and /STAMP.....

INSTITUTION (If any): HAKI KENYA POSITION (If any): DIRECTOR

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG HANDLING AND STORAGE FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

The mass population of Kenyans using LPG as the domestic use and Hospitals. Lowering of the fuel gas to cheap and affordable cost

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

Social - Impact simple and easiest way of cooking in most homes.
Economic - Pocket friendly affordable to many.
Environmental - Reduction of forest destruction and increase of forest cover.

   b. ***Negative impacts***

Social - Knows how skills to use.
Economic - May be over charged for well to do families.
Environment - Incase of explosion destroys life and property.

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Positive - Fuel acquiction will be easily available to me and the Company.

4. What mitigation measures would you recommend for the negative impacts you listed above?

Enviromental - Acquiction of bulk water storage for fire fighting incase of explosion.

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

1- Public awareness of the danger and importance of the pipe.

2. Standby - fire equipments especially the foam type.

6. What are your additional comments on the proposed project?

This is Mega project, that is recommended to be implemented as it has better positive side to the Nation, both commercially and domestic.

NAME: Hakim Omwa TELEPHONE NO. 0722 685506.

DATE: 5/7/2022 SIGNATURE and /STAMP.....

INSTITUTION (If any): MSA WATER POSITION (If any): Bu Manager

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED LPG HANDLING AND STORAGE FACILITY IN CHANGAMWE MOMBASA FOR M/S KENYA PIPELINE COMPANY LIMITED

STAKEHOLDERS OPINION

Project disclosure

Kenya Pipeline Company Limited (the Proponent) has proposed to design and construct a large common user LPG facility within KPRL land to comply with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end users.

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (Second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment. The Proposed LPG Handling and Storage Facility in Mombasa Project including its associated components is categorized a high risk project under Hydrocarbon projects, including depots for natural gas and is required to undergo a full ESIA Study.

It is in this regard, and in compliance with EMCA (Amended 2015) and IEIA/EA Regulations, that your views are sought regarding potential environmental and socio-economic impacts that may arise from implementing the above project activities. Your views will be incorporated into the ESIA Report.

1. In your opinion, who stands to gain the most from the implementation of the proposed project? Please explain why.

Members of the public / citizens
- When the project is complete the cost of cooking gas will definately reduce as monopoly will be done away with

2. What are some of the impacts (social, economic and/or environmental) that you anticipate from execution of the proposed project? Please list them.

   a. ***Positive impacts***

- Creation of job
- Low cost of living

   b. ***Negative impacts***

- pollution

3. Are there any of the impact(s) identified in *question 2 above* that you think will affect you directly or affect your institution directly? If YES, please explain how you will be affected.

Crime will be reduced when more people are employed at the facility / institution

4. What mitigation measures would you recommend for the negative impacts you listed above?

Good environmental assessment need to be done to mitigate pollution

5. Are there any specific safety or operational considerations that you wish to be met before the project is implemented?

Pipes / leakages should be adequately addressed

6. What are your additional comments on the proposed project?

The project when well implented will be an asset to the people of Chingame and the government

NAME: EDWIN ODHIAMBO TELEPHONE NO. 0711922047

DATE: 5/4/2022 SIGNATURE and /STAMP

INSTITUTION (If any): APS POSITION (If any): SOA

Annex 6: Baseline Noise Level Measurement Report

NOISE LEVELS MEASUREMENTS REPORT

Kenya Petroleum Refineries Limited

Prepared for:

Kenya Petroleum Refineries Limited

Prepared By:

AIRMET SERVICES LIMITED

P.O BOX 56129, MOUNTAIN MALL, NAIROBI

MARCH, 2022

REPORT DETAILS

REPORT TITLE	NOISE LEVEL MEASUREMENT REPORT
REPORT REFERENCE NUMBER	KPRL /NLMR/03/22
MEASUREMENT DATE	4TH MARCH 2022
PURPOSE OF MEASUREMENT	INTERNAL/REGULATORY COMPLIANCE
OPERATING CONDITIONS	FULL OPERATION
CLIENT	KENYA PETROLEUM REFINERIES LIMITED P.O.BOX 90401 – 80100 MOMBASA
CONTACT PERSON	NAME..... DESIGNATION..... SIGNATURE.....
PREPARED BY	**WILSON BARU WACHIRA** OSH ADVISOR**: OSH/ADV 109** ……..
STATUS	FINAL REPORT

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

EXECUTIVE SUMMARY

Kenya Petroleum Refineries Limited commissioned Airmet Services Limited to undertake environmental and occupational noise measurements in their facility located at Changamwe, along Refinery Road, Mombasa County; in fulfillment of both internal requirements and regulatory compliance.

This report details noise level measurements undertaken on 3rd and 4th March 2022. Noise level measurements were taken at various locations within the facility in regard to both diurnal and nocturnal schedules.

Measurements were performed at the stated areas in accordance with the South African standard SANS 10083:2004, Fifth Edition: "The Measurement and Assessment of Occupational Noise Exposure for Hearing Conservation Purposes and evaluated against The Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005. Monitoring was done at a height of 1.5 meters from the ground and 1-meter away from the façade of the noise source. Measurements were carried out at various locations within the facility. Environmental noise levels were evaluated against the local legislation and guidelines; the Excessive Noise and Vibration Control Rules, 2009 (Legal Notice No. 61).

The measurement results depict that for all of the measured points occupational noise levels were found to be within the guideline values implying that no further action is to be carried out. The levels were however found to be above the EMCA limits for some of the locations as outlined under Chapter 4 of the report.

We recommend that the occupier continues conducting the annual audiometric medical tests. Further, the occupier is advised to continue training the workers on noise hazards, with the training focusing on the hazards involved and instruction on the measures available for the prevention, control and protection against noise exposure. Ear protectors with NRR (Noise Reduction Rate) value should be provided in section where exposure limits are likely to exceed 85 decibels.

DEFINITION OF TERMS AND ABBREVIATIONS

Attenuation	Reduction of noise level
Decibel (dB)	Unit of measure for sound levels. It is based on a logarithmic scale.
Decibel, A weighted (dBA)	Unit representing the sound level measured with the A weighting network of a sound level meter. A weighted filter is an electronic circuit whose sensitivity to sound pressure levels varies in the same way as the human ear
Lmax	Maximum sound pressure level obtained during the measurement period
Lmin	Minimum sound pressure level obtained during the period of measurement
Leq	Value of A-weighted sound pressure level of a continuous steady sound that, within a specified interval, has the same mean square sound pressure as a sound under consideration whose level varies with time.
Peak	The maximum instantaneous sound level in dB(A)
Frequency	The number of cycles that a sound wave completes per second. It is measured in Hertz or cycles per second (CPS)
Impulse noise	This is the noise characterized by sharp rise and rapid decay in sound levels and is less than one second in duration.
Noise Reduction Rating (NRR)	Measure of the estimated attenuation capacity of a hearing protector
Time Weighted Average (TWA)	The average of the sampled sound over an eight-hour period

1 INTRODUCTION

1.1 Definition of Noise

Noise can be defined as unwanted or undesirable sound derived from sources such as industrial set up and operations, road traffic or construction works. Noise interferes with conversation and communication, sleep, recreation, general work performance, thought and concentration, relaxation, causes annoyance and induces hearing loss. Legal Notice number 25 of 2005, The Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005 describe noise as all sound energy which can result in hearing impairment or be harmful to health or otherwise be dangerous. Legal Notice number 61 of 2009, The Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations define noise as any undesirable sound that is intrinsically objectionable or that may cause adverse effects on human health or the environment. Related to noise is vibration, which is an oscillatory motion of solid bodies of deterministic or random nature described by displacement, velocity or acceleration with respect to a given reference point. It is caused by the transmission of low frequency energy through the medium of ground or buildings. It results in small movements of the transmitting medium, which can cause discomfort if the movements are large enough.

1.2 Background of the Survey

Sound is the longitudinal wave motion that propagates matter. When the waves reach the human ear, the membrane in the eardrum vibrates and sound is heard. Changes in the volume of sound are measured in decibels. The human ear can distinguish sound of between 0 and 120 decibels. The risk threshold for hearing is generally considered to be 85 to 90 decibels. An increase in three decibels doubles the noise energy level and the risk of hearing damage being sustained.

Various activities in the facility give rise to noise. Airmet services Limited undertook noise measurements at the predetermined locations with a view of advising the company on the impact of high noise levels and an expanding scope of recommending appropriate noise control measures aimed at forming part of the standard working practice at the facility.

1.3 Scope of the work

The noise survey was conducted at Kenya Petroleum Refineries Limited upon the client's request.

The aims of this survey were:

- To measure the noise levels and assess the potential health risks to employees in terms of Noise Induced Hearing Loss (NIHL);
- To ensure and prove compliance with governmental and other relevant exposure limits;
- To recommend appropriate control measures if required;

1.4 Health hazards of Noise

Noise or unwanted sound is one of the most widely and frequently experienced problems of the industrial working environment.

Noise may interfere with communication, annoy, cause tiredness, reduce work efficiency and cause hypertension. Of major concern, however, is that intense noise of long stays in a noisy environment can cause a permanent reduction of hearing sensitivity through the damage of sensory organs of the inner ear. Sound stimulates tiny hair-like cells in the inner ear, which send messages to the brain. Noise induced hearing loss occurs because excessive noise damages the delicate ear hair cells. Often, damage occurs gradually over a number of years and remains unnoticed until it is too late. The damaged cells can no longer send the messages to the brain and hearing is lost. Extremely loud noises can cause immediate lasting damage. The sudden burst of energy in noises such as jack hammering can cause this type of damage.

Initially, the excessive noise causes a temporary hearing loss, or Temporary Threshold Shift (TTS), and hearing recovers to normal over a period of time. In the workplace, if the noise exposure exceeds the equivalent of 90 dB (A) for eight hours, or a peak sound pressure level of 140dB (A), workers may experience the same effects and a TTS may occur. Repeated exposure to excessive noise from the workplace will eventually transform the TTS into a Permanent Threshold Shift (PTS). Exposure to noise outside of work will accumulate one's daily noise exposure. This is because a person's ears never switch off and are constantly alerting the individual to the environment around them. If the TTS becomes permanent, there is no medical solution and the person's hearing will never come back. A PTS, accompanied by ringing in the ears or tinnitus, is extremely distressing and caused other problems such as stress and difficulty in sleeping.

The extent of the noise-induced hearing loss depends on the intensity (loudness) of the noise, its duration, its frequency (pitch) and whether it is impulse (impact), steady state or fluctuating. In addition, some individuals are more susceptible than others to the harmful effects of noise. The more times the ear is exposed to any particular excessive noise level, the greater the degree of hearing loss. More time equals more acoustic energy and hence more damage.

NIHL is progressive and permanent, but preventable with appropriate noise control options. Laboratory tests have shown that noise reduces efficiency in some tasks, can upset the sense of balance and can cause blood vessels to constrict, raising blood pressure and reducing the volume of blood flow. It causes the pupils of the eye to dilate, the heart races, the muscles respond, the blood vessels contract and adrenalin is secreted into the system. Even when one is asleep, noise can cause changes in electro encephalograms and blood circulation without waking one up. It can also cause fatigue, headache, nervousness, irritability and high pretension, increasing the likelihood of accidents and add to the overall stress of living.

Perhaps the most hazardous feature of noise is that NIHL is not detectable in its early stages.

2 LEGISLATION AND STANDARDS

2.1 The Factories and Other Places of Work (Noise Prevention and Control) Rules 2005

The Factories and Other Places of Work Act (Cap. 514) was repealed by the Occupational Safety and Health Act (OSHA) 2007. However, as provided for under the transitional clauses, the subsidiary legislation issued before the commencement of the OSHA 2007 remain in force to the extent that the same are not inconsistent with the Act until they are repealed or revoked by subsidiary legislation under the provisions of the OSHA 2007.

The Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005 indicate that it is the duty of the occupier to ensure that the noise that gets transmitted outside the Workplace does not exceed 55 dB (A) during the day and 45 dB (A) during the night. It states that no worker shall be exposed to a noise level in excess of the continuous equivalent of 90 dB (A) in eight hours within any twenty-four-hour duration and 140 dB (A) peak sound at any given time. Where the noise is intermittent, noise exposure shall not exceed the sum of the partial noise exposure equivalent continuous sound level of 90 dB (A) in eight-hour duration within any twenty-four hours duration.

At 90 dB (A), most workers can continually be exposed to noise without developing occupational hearing loss in industries. This is the recommended noise limit to reduce hearing loss occupational deafness.

The rules also state that where noise in a workplace exceeds the Continuous equivalent of 85 dB (A) the occupier must develop and implement an effective noise control and hearing conservation programme. The occupier shall also maintain a record of hearing tests for each worker which must be kept as long as the worker is employed and for not less than two years; and such records shall be treated as confidential and not be released to anyone without the written permission of the worker.

2.2 Occupational Exposure Limits

Occupational Exposure Limits (OELs) for noise are typically given as the maximum duration of exposure permitted for various noise levels. They are displayed in the exposure duration table below.

The OELs depend on two key factors that are used to prepare exposure-duration tables, i.e. the criterion level and the exchange rate (CCOSH 2004).

Table 1: Noise Exposure-Duration Table

Noise Exposure Limits When Criterion Level = 90dB(A)	
3 dB(A) Exchange Rate Allowable Level dB(A)	Maximum Permitted Daily Duration(hours)
90	8
93	4
96	2
99	1
102	0.5
105	0.25

2.3 Other Internationally Recommended Threshold Limit Values (TLV)

According to the International Labor Organization (ILO) and American Conference of Industrial Hygienists (ACGIH) 1989 guideline document, the following threshold limit values will apply:

- For speech, comfort and reduced work interference, and where the nature of work requires higher mental concentration, noise levels less than 60dB (A) is adopted.
- For workshop and plant area where occasional communication is required, the recommended limit is 75 dB (A).
- For workshop office, control room, laboratories and workshop where easy communication is required, the recommended limit is 55 dB (A).
- For offices, mess-room and canteens, the limit recommended is 50dB (A).
- For prestige offices, conference rooms, the noise level limit recommended is 35dB (A).

Note:

For the purpose of this report, the Factories and Other Places of Work (Noise Prevention and Control) Rules 2005 Guidelines and Occupational Exposure Limits (OEL) have been adopted.

2.4 The Excessive Noise and Vibration Control Rules, 2009 (Legal Notice No. 61).

Environmental/ambient noise levels were evaluated against the local legislation and guidelines; the Excessive Noise and Vibration Control Rules, 2009 (Legal Notice No. 61). Additionally, The World Bank (IFC) Environmental, Health and Safety Guidelines and the World Health Organization Guidelines are used.

The EMCA, 1999 part 101 provides for NEMA-Kenya to recommend guidelines for the abatement of unreasonable noise emitted into the environment from any source.

The Environmental Management and Coordination (Noise and Control) Regulations, 2009 sets out maximum permissible noise levels in the First Schedule of the Regulation for various zones. Part IV of the regulations state that where a sound source emits noise which fail to comply with provisions of the Regulations, such person shall apply for a license to the Authority;

Table 2: Guideline values for different zones

Zone		Sound Level Limit dB(A) (Leq, 14h)		Noise Rating levels (NR) (Leq, 14h)	
Time Frame Day: 6:01am- 8:00 pm (Leq. 14h) Night: 8:01pm-6:00 am (Leq. 10h)		Day	Night	Day	Night
A	Residential: Outdoor	50	35	40	25
B	Mixed Residential (with some commercial and places of entertainment)	55	35	50	25
C	Commercial	60	35	55	25

3 MEASUREMENT METHODOLOGY

3.1 Survey methodology

Noise measurements were performed at the stated areas in accordance with the South African standard SANS 10083:2004, Fifth Edition: “The Measurement and Assessment of Occupational Noise Exposure for Hearing Conservation Purposes”. Further afield, A European directive (Directive 2003/10/EC of the European Parliament and the Council), published in 2003, describes the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise).

Monitoring was done at a height of 1.5 meters from the ground and 1-meter way from the façade of the noise source. The run time was averagely 30 minutes per point. Measurements were carried out at various locations in the facility.

3.2 Instrumentation

Noise levels were determined using the following equipment:

- Cirrus Noise Level Meter

Calibration certificate for the sound level meter is attached in appendix 1 of this report.

4 MEASUREMENTS RESULTS

The measurement results are expressed as follows:

- **Lmax,** Maximum sound pressure level obtained during the measurement period
- **Lmin,** Minimum sound pressure level obtained during the period of measurement
- **Leq,** Value of A-weighted sound pressure level of a continuous steady sound that, within a specified interval, has the same mean square sound pressure as a sound under consideration whose level varies with time.

Table 3: Diurnal Measurement results

Area	Measurement location	Source of noise	Noise level dB (A)	OSHA Limit	EMCA Limit	Remarks	Number of exposed workers
Offices	Drawing office	Central Air Conditioning Unit	**57.5**	90	60	Within both OSHA and EMCA limits	10
	First floor general office	Adjacent Refinery Road	**57.8**	90	60	Within both OSHA and EMCA limits	10
Laboratory	Next to octane machine	Octane machine	**82.3**	90	60	Within OSHA limit but above EMCA limit	10
Workshop	General area	Repair and maintenance activities within the workshop	**61.3**	90	60	Within OSHA limit but above EMCA limit	10
Tank farm	Next to the pumps	Running oil pumps	**64.4**	90	60	Within OSHA limit but above EMCA limit	7
Loading area	Between loading points 1&2	Movement of trucks being loaded	**60.3**	90	60	Within OSHA limit but slightly above EMCA limit	5
Port Reitz	Entrance to KPRL tank area	Vehicles moving in and out of the area	**55.9**	90	60	Within both OSHA and EMCA limits	1
	Exit to the port adjacent to the port road	Adjacent port activities including movement of trucks, trains, etc.	**61.5**	90	60	Within OSHA limit but above EMCA limit	**2**

In front of the offices	Adjacent to refinery road	Refinery Road users, consisting largely of motor vehicles	**62.2**	90	60	Within OSHA limit but above EMCA limit	0

Table 4: Nocturnal Measurement results

Area	Measurement location	Source of noise	Noise level dB (A)	OSHA Limit	EMCA Limit	Remarks	Number of exposed workers
Tank farm	Next to the pumps	Running oil pumps	**62.9**	90	60	Within OSHA limit but above EMCA limit	7
Loading area	Between loading points 1&2	Movement of trucks being loaded	**51.5**	90	60	Within both OSHA and EMCA limits	5
In front of the offices	Adjacent to refinery road	Refinery Road users, consisting largely of motor vehicles	**58.9**	90	60	Within both OSHA and EMCA limits	0

5 DISCUSSION OF RESULTS, CONCLUSION AND RECOMMENDATION

5.1 Discussion of results

Noise levels recorded at the laboratory (next to the octane machine) was the highest of all the measured locations and had a weighted average of 82.3dB (A).

Although the noise levels recorded during the survey were within the guideline values, it is recommended that the workers who are exposed to potentially high noise levels such as the octane machine should always put on ear protectors. It was further noted during the survey that management has clearly marked such sections as being noisy areas and has conspicuously put a signage showing that usage of ear protectors at the areas is mandatory.

It was also noted that the noise level at some of the sections measured were above the permissible 60 dB (A) limit specified in the First Schedule to the Environmental Management and Coordination (Noise and Excessive Vibration Pollution (Control) Regulations, 2009.

5.1.1 Background Noise

Background noise made an insignificant contribution to the noise measurements during the survey.

5.1.2 Existing Noise Control Measures

Existing noise control measures at the time of the noise survey included:

a) Regular maintenance of the machines; and
b) Limiting exposure time for machine operations like octane machine which are operated intermittently thereby workers get breaks in between their schedules at the machine.

5.1.3 Conclusion

The objectives of the noise level survey were sufficiently met. The occupier is advised to maintain a hearing conservation program to minimize potential adverse noise induced health hazard as practically as possible. This is in accordance with the Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005 which requires that where noise in a work place exceeds the continuous equilibrium of 85 dB (A), the occupier must develop and implement an effective noise control and hearing conservation program.

5.1.4 Recommendations

The occupier is recommended to:

1. Ensure continuous implementation of equipment and machines maintenance/inspection program to minimize/control noise emission and ensure continued compliance;

2. Pursuant to rule 16(1) of the noise reduction rules, the occupier must ensure that he carries out audiometric tests on workers in all areas exceeding 85 dB (A). These tests must be done pre-employment and annually. No assignments should be given to a new employee before an audiometric test is done in all areas with 85 dB (A) or more; the DHP should produce the results within 14 days in a statutory manner i.e. summary report, redeployment forms etc.

3. Occupier to Provide standard ear muffs with NRR (Noise Reduction Rating) value of at least 15 dB (A) / 25% NRR as the attenuation. Noise levels must be indicated on the equipment emitting elevated noise levels.

4. Enforce consistent use of ear protectors by all workers accessing or working in sections where noise levels are presumed to be high and may cause adverse effects;

5. Regularly train all the workers on noise hazards, with the training focusing on the hazards involved and instruction on the measures available for the prevention, control and protection against noise exposure;

6. Conduct noise level assessment annually

7. Noise reduction program must be reviewed annually as per rule 18(1) of noise reduction rules and must address

    - The adequacy of noise control measures
    - The selection and use of hearing protection
    - Hearing test and information on rate and extent of occupational hearing impairment.

8. Pursuant to the Factories and Other Places of Work (Noise Prevention and Control) Rules of 2005 all work stations and equipment with noise levels exceeding 90dB (A) must have the noise levels labeled on the equipment and the entrance of such workrooms. Instructions like **"HEARING PROTECTION MUST BE WORN"** must also be indicated.

    - Display warning signs (should be in words & pictogram) in areas where noise levels exceeded the threshold limit value of 85 dB (A);

Sample signage for areas with high noise levels

6 REFERENCES

a) The Environmental Management and Coordination (*Noise and Excessive Vibration Pollution) (Control) Regulations 2009.* Nairobi: Government Press.

b) Girard, S. A. (2015). Occupational Noise Exposure and Noise-induced hearing loss are Associated with Work-related Injuries Leading to Admission to Hospital. *Injury Prevention*, 21.

c) Republic of Kenya, (2005). *Factories and Other Places of Work, Cap 514, (Noise Prevention and Control) Rules,* Legal Notice No. 25, Laws of Kenya. Government Printing Press, Kenya.

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 May 2021** CERTIFICATE NUMBER **157618**

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Approved signatory
S.Doveton
Electronically signed:

Sound Calibrator : IEC 60942:2003

Instrument information

Manufacturer: Cirrus Research plc

Model: CR:514

Serial number: 81630

Class: 2

Notes:

Test summary

Date of calibration: 27 May 2021

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC60942_2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

The manufacturer's product information indicates that this model of sound calibrator has been formally pattern approved to IEC60942_2003 Annex A to Class 2. This has been confirmed with the PhysikalischTechnische Bundesanstalt (PTB).

Notes:

CERTIFICATE OF CALIBRATION

Certificate Number: **157618**

Environmental conditions

The following conditions were recorded at the time of the test:

Pressure: 101.36 kPa
Temperature: 24.3 °C
Humidity: 42.0 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Acoustic Calibrator	Bruel and Kjaer	4231	2610257
Distortion Meter	Keithley	2015	1046217
Multimeter	Fluke	8845A	1498004

Initial Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	94.00	93.93	93.94	93.93	**93.93**	-0.07	±0.75	0.11 dB
Distortion (%)	< 4.00	0.36	0.36	0.36	**0.36**	0.36	+4.00	0.13 %
Frequency (Hz)	1000.0	1000.3	1000.3	1000.3	**1000.3**	0.3	±20.0	0.1 Hz

The measured quantities or deviations (as applicable), extended by the expanded combined uncertainty of measurement, must not exceed the corresponding tolerance.

Adjusted Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	94.00	94.00	94.01	94.00	**94.00**	0.00	±0.75	0.11 dB
Distortion (%)	< 4.00	0.36	0.36	0.36	**0.36**	0.36	+4.00	0.13 %
Frequency (Hz)	1000.0	1000.3	1000.3	1000.3	**1000.3**	0.3	±20.0	0.1 Hz

APPENDIX 2 : GENERAL INFORMATION ON NOISE CONTROL

The main approach to noise control should centre on the people affected, not necessarily on the machines creating the noise. If the noise will not affect anybody, control is not necessary.

The situation of the noise source is also important. A noisy extraction fan would probably go unnoticed in a noisy Facility, yet be unacceptable in an office.

One must also consider the effectiveness of controls from an economic standpoint. Spending large sums of money to engineer out noise that affects very few people may not be viable, and the wearing of ear protection may in fact be a better option. Where many people are affected by a single noise source, which can be isolated or acoustically enclosed, this would be the preferred option.

Hearing conservation programme

A hearing conservation programme including the following requirements should be implemented in the stated areas to meet the legal requirements of the Factories and other Places of Work Act (Noise Prevention and Control Rules), 2005. The following measures are prescribed for hearing conservation and must be applied to all noise hazards evaluated. To comply with the requirements therein, the following noise abatement procedures should be carried out:

i. Take, where possible, the best practical means to reduce the equivalent noise level to below 85 dB (A).

ii. Where it is not possible to reduce the equivalent noise levels to below 85 dB (A), ensure that all persons who work in noise zones wear hearing protectors.

iii. Ensure that persons who perform work in noise zones / tasks are subjected to audiometric tests as follows:

- ❖ New employees should undergo baseline audiograms before or within 30 days of commencement of employment or as soon as possible.
- ❖ During the first three years of exposure, tests should be conducted every year.
- ❖ After three years, the period between tests should not exceed two years <u>if no significant change</u> in hearing levels is evident, provided the employee's noise conditions have not been intensified.
- ❖ An exit audiogram where last audiogram is older than 6 months.

- ❖ Ensure that noise zones / tasks are clearly demarcated and that notices advising persons to wear hearing protectors when entering a noise zone are prominently displayed along the boundaries of the zone.

Re-assessment of measured areas (re-zoning)

i. If any changes occur, for example changes in production processes and/or machine, which could result in an increase in or redistribution of noise levels, it is necessary to re-assess the affected area.

ii. If there is a reduction in noise levels it is possible that re-assessment may result in areas previously classified as noise zones, being de-restricted.

iii. Owing to the aging and normal wear and tear of equipment, it is advisable to report the noise level measurements at intervals not exceeding two years.

iv. In the event where a particular area has been defined as a 'noise zone / task', the employer in such a workplace shall:

- ❖ Demarcate the boundaries of all noise zones / tasks in such workplaces by erecting notices to that effect in conspicuous places along such boundaries, and at all exits from and entrances to any room where the whole of such room constitutes a noise zone and

- ❖ Prohibit any person from entering a noise zone unless such person wears hearing protectors.

APPENDIX 3: HEARING CONSERVATION PROGRAMME

Objectives

An effective hearing conservation programme (HCP) is one that prevents hearing impairment as a result of exposure to noise while on the job.

Procedures

These include:

- Evaluation of noise exposures and the classification of operation or work areas as to level of exposure and degree of hazard.
- Control of hazardous noise exposures by engineering measures.
- Consideration of the elimination or reduction of noise exposures in the planning of new operations and the purchase of new equipment or machinery.
- Use of administrative measures, such as personnel rotation so that work in noisy areas is shared among several employees who work at quiet stations for the rest of the day.
- Use of personal hearing protective devices, such as earplugs or muffs whenever noise exposure cannot be adequately controlled by engineering or administrative measures.
- Measurement of the hearing ability of employees exposed to noise.

The goals and objectives of the HCP should be discussed at all levels of management. Full co-operation between management and labour is essential for an effective HCP.

Management, from the top level down to first line supervisors, must believe in, support and understand the reasons and objectives of the programme. Employees must also understand that the prime purpose of such a programme is to protect their hearing.

When should a hearing conservation programme be considered?

Whenever persons:

- Have difficulty communicating by speech because of noise.
- Hear noises or ringing in their ears after working in the noise for several hours (tinnitus).
- Suffer temporary loss of hearing that has the effect of muffling speech and certain other sounds after several hours of exposure to noise.

A hearing conservation programme should, of course be implemented when noise exposures are at or above the recommended limits.

Basic information concerning hearing loss and noise exposure

The employee is entitled to a rational explanation of the noise problem in his working environment. It is important that this explanation produces neither apathy nor hysteria, but an appreciation of the problem in its proper perspective. Employees should be told that while it is highly unlikely that total loss of hearing will result from excessive noise exposure, partial losses are possible, and in the initial stages these losses are not readily apparent to the individual.

The basic information concerning hearing loss and noise exposure is listed below and represents the consensus of experts in the field:

a. Exposure to loud noise can result in temporary hearing losses, and repeated exposure can lead to permanent hearing losses.
b. In the case of temporary hearing loss from exposure to noise, normal hearing usually returns after a rest period. The necessary period may be minutes, hours, days or even longer, depending upon the individual and the severity and length of exposure.
c. Permanent hearing loss may occur as a result of the aging process, disease, injury or exposure to loud noises for extended periods of time.

The hearing loss associated with exposure to industrial noise is commonly referred to as noise induced hearing loss (NIHL). This type of hearing loss is due to the destruction of certain inner ear structures, which cannot be replaced or repaired.

d. The amount of both temporary and permanent hearing loss produced by a given noise exposure varies from person to person.
e. Noise induced permanent hearing loss is first evident as a reduction in the ability to hear the higher frequency sounds. As the problem continues, the reduction progresses through the frequency of sounds in the speech range. Therefore, most early noise induced hearing losses pass unnoticed unless they are detected by suitable hearing tests.
f. To prevent noise induced hearing loss an HCP should include:

- Noise exposure analysis
- Measurement of hearing ability (audiometry) and
- Provisions for control of noise exposure.

g. Four major factors characterise noise exposure:

- Overall noise level
- Composition of the noise
- Duration and distribution of exposure during a typical work day and
- Total time of exposure during work life.

h. Research studies indicate that any permanent effect on the hearing organ is unlikely unless it is preceded by a temporary threshold shift of the hearing level. An appropriate audiometry programme can detect this shift.

i. Audiometry measurements should include:

- Pre-employment and/or pre-placement hearing tests and
- Routine periodic follow-up tests.

These tests of hearing are an important part of the hearing conservation programme as they provide a record of the initial status of an employee's hearing, and make it possible to follow up any subsequent changes in hearing ability. Pre-employment and follow-up tests help to identify persons who may be highly susceptible to noise induced hearing loss. Test and re-test results will show whether the HCP is effective or not.

Hearing tests also provide other benefits. Pre-employment tests protect employers from assuming responsibility for hearing damage incurred on a prior job. Periodic tests, normally once per year, on employees exposed to low-risk environments can detect hearing loss due to off-the-job activities or to medical disorders.

When it has been established that noise induced hearing loss is likely to result from noise exposure (or has actually occurred), the main courses of action are:

Noise control

- Reducing the amount of noise produced by the source and connecting structures and
- Reducing the amount of noise transmitted through the air.

Administrative control

- Control of the time an employee spends in the noisy environment and
- Assignment to a job involving less noise exposure.

Personal protection

The most satisfier's method is to control the noise at source. Unfortunately, this is not always possible. When the amount of noise produced by the source cannot be sufficiently reduced, a combination of control methods may be required to conserve hearing.

Ear protectors - promotion of use

The most difficult part of an ear protection programme is getting the employees to wear the protectors regularly. In this effort it is absolutely necessary to have the full support of management.

Exposed employees must also be convinced of the necessity of wearing ear protection before their co-operation can be secured.

Employees can be encouraged to wear ear protectors by pointing out the advantages listed below:

a. Wearing ear protectors will prevent permanent hearing damage. In cases where a hearing loss has been suffered already, further damage will be prevented.

b. Wearing ear protectors will prevent temporary hearing loss and tinnitus (ringing in the ears). An employee who wears ear protectors will hear much better after work, enabling him to enjoy television and other communications more. He will not be annoyed as much by the sounds of tinnitus.

c. Wearing ear protectors in steady noise will allow an employee to hear speech at least as well as he could without protectors. Speech sounds and environmental noise will be reduced in like amounts so that any speech that could be heard without ear protectors can also be heard with ear protectors. The speech will merely be heard at a lower level, which will tend to make it more understandable. When wearing ear protectors, it may be difficult at first to adjust one's own voice to the proper level because it is not heard in the usual way and appears amplified.

d. Wearing ear protectors in unsteady noise may cause some communication difficulties during the quiet periods. It will be necessary to speak to others wearing ear protectors in a raised voice, which is tiring. At such times, the ear protectors may be removed until needed again.

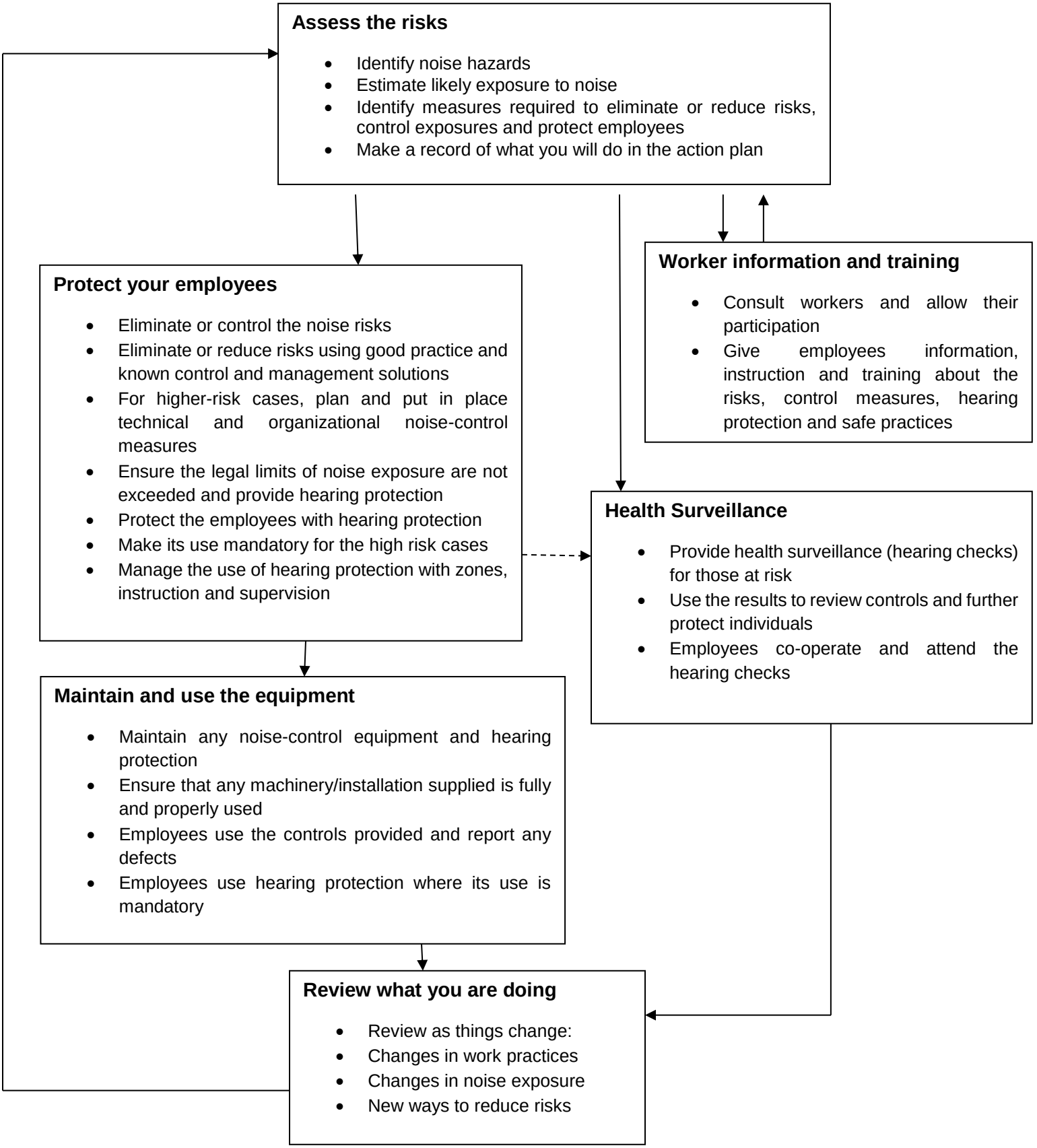
e. Wearing ear protectors will not impair the ability to hear any warning signals or sounds indicating malfunction of machinery that would be heard without ear protectors. Ear protectors will merely reduce the intensity of all sounds by about the same amount so that any changes in the sounds are still detectable.
   It may take some time to become accustomed to the lower intensity and somewhat different quality of familiar sounds. Re-education of the employee to recognize the "new sound" of a malfunction (like hot bearing) while wearing ear protectors is all that is required.

f. Wearing ear protectors will prevent sparks, chips, dirt and other foreign materials from entering the ear, thereby avoiding possible injury or infection. However, the employee must be sure his ear protectors are kept clean, particularly insert types. Daily use of soap and water is usually adequate.

g. Once workers become accustomed to wearing plugs, they can even wear them during sleep. This will enable employees working nights to get proper rest in the daytime, as doorbells, telephones and neighborhood noise will not disturb them.

Wearing ear protectors on a noise job is said to improve efficiency, reduce fatigue and add to the overall comfort of the workplace. Although these claims are probably true, they have not been confirmed by controlled experiments.

APPENDIX 4: MANAGING NOISE RISKSPROCESS FLOW



Annex 7: Baseline Air Quality Report

Report:

Ambient Air Quality Measurement

Prepared for:

Kenya Petroleum Refineries Limited

Mombasa,Kenya

Prepared by:

Labworks East Africa Limited

Nairobi,Kenya

Date:

December 2020

REPORT INFORMATION

Reference	LBEA/12-018-20
Report Title	Ambient Air Quality Measurement Report
Date Submitted	15th February 2021
Client:	Kenya Petroleum Refineries Limited (KPRL)
Project Location	Changamwe, Mombasa County
Contract No.	SO/30316 KPRL/PE/010-LP/2020-2021
Prepared by	Martha Ayieko Email: martha@labworksea.com
Signed	
Reviewer	Mark Owuondo Email : technichal@labworksea.com
Signed	
Status	Final Report
LABWORKS EA LIMITED	

Changamwe Findings

Carbon Monoxide (CO)

From the results, the carbon monoxide levels at the LPG and Blending area were within the guideline values as set by EMCA air quality regulations 2014 while the level at the Truck loading and Laboratory exceeded the set guideline values by EMCA air quality regulations.

Nitrogen Oxides (NOX) and Sulphur Oxides (SOX)

The NOx and SOx analysis results indicate that at all the sampling points the levels are within the guideline values set by EMCA air quality regulations 2014. Sulphur dioxide ranged between <1.57µg/m3 and 34.28µg/m3 while the levels of Nitrogen dioxide ranged between 5.6 µg/m and 11.5µg/m.

Particulate Matter

According to the results obtained at all the points in Changamwe sampled for PM10 and PM 2.5 have exceeded the limits according to the Environmental Management and Co-ordination Act (Air Quality), Regulations, 2014, IFC/World Bank standard and the World Health Organization Air quality guidelines.

The high dust levels could be attributed to the ongoing demolition and construction activities along refinery road during the measurement period. During the measurements, the weather was dry with moderate winds enhancing the lifting and transport of particulate matter.

Volatile Organic Compounds (BTEX)

The VOC results from the sampling point LPG, Blending area, Truck loading and Laboratory were recorded as 390, **831**, **1,156** and **1,320** µg/m3 respectively. This indicated that the levels at the blending area, Laboratory and Truck Loading were above the stipulated guidelines in the EMCA (Air Quality) Regulations, 2014 of 600 µg/m3.

Hydrocarbons (Top 5)

Ambient air quality results for hydrocarbons for the sampled points; LPG, Blending area, Truck Loading and Laboratory were all within the guideline set by EMCA air quality regulations 2014.

Portreiz Findings

Particulate matter (PM 10 and PM 2.5)

According to the results obtained at all the monitoring points in this area sampled for PM10 and PM 2.5 have exceeded the limits, according to the Environmental Management and Co-ordination Act (Air Quality), Regulations, 2014, IFC/World Bank standard and the World Health Organization Air quality guidelines.

1.0 INTRODUCTION

1.1 Project Background

Lab Works East Africa Limited was contracted by Kenya Petroleum Refineries Limited to carry out Ambient Air Quality (AQ) assessment at their plant located in Changamwe, Mombasa County. This report prepared in fulfilment of both internal and statutory requirements. The report details the measurements undertaken on the **16th – 22nd** December 2020 at the occupier's premises to enable quantification of the Ambient Air Quality Levels.

1.2 Project Scope

The scope of the project entailed compiling a final report based on the Air quality analysis results. The following parameters were assessed during the survey (Box 1-1)

Box 1-1: Air Quality Parameters

Carbon monoxide (CO)
Nitrogen dioxide (NO_2), and Sulphur Dioxide (SO_2)
Particulate matter (PM_{10} & $PM_{2.5}$)
Sulphur dioxide (SO_2),
Volatile organic compounds (BTEX)
Hydrocarbons (C_XH_Y)

1.3 Monitoring Locations

Air quality sampling was done at seven points within and outside the plant premises as shown in **Table 1-1** below-:

Table 1-1: Monitoring Locations

ID	Description of Sampling Point	GPS Location
MP 01	Refinery Road	S 04°17.24' E 039°37.23.70'
MP 02	Truck Loading	S 04°00.979' E 039°37.38'
MP 03	Blending Area	S 04°01.044' E 039°37.39'
MP 04	Magongo Road	S 04°15.18' E 039°37.13.55'
MP 05	KPC Input	S 04°052.32' E 039°37.16.55'
MP 06	Portreiz Near KPA	S 04°02.597' E 039°37.38

4.0 AIR QUALITY ANALYSIS AND RESULTS

4.1 Particulate Matter Results - Changamwe

Table 4-1: PM 10 results - Changamwe

Monitoring Points	Description	Time (mins)	Volume	Concentration (ug/m^3)	Probable Dust Sources	WHO Air Quality Guidelines PM 10	EMCA Air Quality Regulations 2014
MP 1	Refinery road	660	3.30	424	Vehicular Movement	**50µg/m3**	**150µg/m3**
MP 2	Truck Loading	360	1.80	389	Vehicular Movement		
MP 3	Blending Area	540	2.70	3407	Vehicular Movement Ongoing Construction works		
MP 4	Point near Magongo Road	720	3.60	1500	Vehicular movement		
MP 5	KPC input	360	1.80	279	Vehicular movement		

Table 4-2: PM 2.5 results - Changamwe

Monitoring Points	Description	Time (mins)	Volume	Concentration (ug/m^3)	Probable Sources	WHO Air Quality Guidelines PM 2.5	EMCA Air Quality Regulations 2014
MP 1	Refinery road	420	2.10	190	Vehicular Movement Dust from ongoing road construction works.	**25µg/m3**	**75 µg/m3**
MP 2	Truck Loading	360	1.80	333	Vehicular Movement		
MP 3	Blending Area	540	1.80	278	Vehicular Movement Ongoing Construction works		
MP 4	Point near Magongo Road	720	1.80	56	Vehicular movement		
MP 5	KPC input	360	1.80	111	Vehicular movement Wind		

4.2 Particulate Matter Results - Portreiz

Table 4-3: PM 10 results - Portreiz

Monitoring Points	Description	Time (mins)	Volume	Concentration (ug/m^3)	Probable Sources	WHO Air Quality Guidelines PM 10	EMCA Air Quality Regulations 2014
MP 6	Portreiz Point near KPA	720	3.60	250	Vehicular Movement	**50µg/m3**	**150µg/m3**
MP 2	Portreiz – Near Gate	660	3.30	727	Vehicular Movement		

Table 4-4: PM 2.5 results - Portreiz

Monitoring Points	Description	Time (mins)	Volume	Concentration (ug/m^3)	Probable Sources	WHO Air Quality Guidelines PM 10	EMCA Air Quality Regulations 2014
MP 6	Portreiz Point near KPA	720	3.60	278	Vehicular Movement Wind	**25µg/m3**	**75 µg/m3**
MP 2	Portreiz – Near Gate	660	3.30	278	Vehicular Movement		

4.3 Sulphur Dioxide and Nitrogen Dioxide Results

Table 4-5: NOX and SOX Results

Monitoring Points	Description	SO_2 µg/m3	NO_2 µg/m3	EMCA Air Quality Regulations
				24 hours
MP 1	LPG	3.20	5.6	**SOx -125 µg/m3** **NOx -150 µg/m3**
MP 2	Blending Area	1.57	11.4	
MP 3	Laboratory	34.28	11.5	
MP 4	Truck Loading	1.57	9.0	

Table 4-6: CO Analysis Results

Monitoring Points	Description	CO Concentration mg/m3	Time	EMCA Air Quality Regulations (8 hours)
MP 1	LPG	3.90	8 hrs	**5 mg/m3**
MP 2	Blending Area	4.30	8 hrs	
MP 3	Laboratory	**6.20**	8 hrs	
MP 4	Truck Loading	4.36	8 hrs	

4.4 Hydrocarbon Results

Table 4-7: Hydrocarbon Results

Point	Location	Benzene	Toluene	Ethyl-Benzene	mp-Xylene	O-Xylene	Pentane,2,2,4trimethyl-	Pentane	Total Hydrocarbon
MP 1	LPG	BDL	46	142	112	36	BDL	7.3	343.3
MP 2	Blending Area	193	221	113	200	104	BDL	BDL	**831**
MP 3	Laboratory	100	390	219	295	152	BDL	BDL	**1156**
MP 4	Truck loading	BDL	305	259	327	197	222	BDL	**1310**
EMCA Air Quality Guideline	**600 µg/m3**								

[1]BDL- Below Detection Limit

4.5 Volatile Organic Compounds Results

Table 4-8: VOCs Results

Location	Description	Benzene	Toluene	Ethyl-Benzene	mp-Xylene	O-Xylene	Total VOCs	EMCA Air Quality Regulations
MP 1	LPG	54	46	142	112	36	390	**600 µg/m³**
MP 2	Blending Area	193	221	113	200	104	**831**	
MP 3	Laboratory	100	390	219	295	152	**1156**	
MP 4	Truck loading	232	305	259	327	197	**1320**	

5.0 CONCLUSION AND RECOMMENDATION

The results of the assessment along with our recommendations are provided below. Please note that sampling results are representative of potential air quality pollutant levels on the particular day of sampling. The air quality sampling was done at seven monitoring locations for the following parameters -:

- Carbon monoxide (CO)
- Nitrogen dioxide (NO2) and Sulphur Dioxide (SO2)
- Particulate matter (PM10 & PM2.5)
- Sulphur dioxide (SO2),
- Volatile organic compounds (BTEX)
- Hydrocarbons (CXHY)

Particulate matter (PM)

Section 4-1 and 4-2 of this report presents the ambient air quality results for Particulate matter sampling at all monitoring locations. The results indicate that both the PM 2.5 and PM 10 levels exceeded the maximum recommended guidelines as stipulated in the World Health Organization, (WHO) and Environmental Management Coordination Act (EMCA, 2014) Air quality guidelines.

NOx and SOx

For Sulphur dioxide (SOx) and Nitrogen dioxide (NOx), the results as shown in section 4.3 of this report indicate that the levels of for both the parameters, were within the WHO and EMCA , 2014 air quality guidelines .

Carbon monoxide (CO)

The air quality results for carbon monoxide samplings indicate that the levels at all monitoring points are within the EMCA, 2014 air quality regulations. .

Hydrocarbons

The total hydrocarbon results at the Laboratory and the Truck loading exceed the recommended EMCA, 2014, standard guidelines.

Volatile organic compounds

The VOC results from LPG, Blending area, Truck loading and Laboratory recorded 390, 831, 1156 and 1320 $\mu g/m^3$ respectively indicating that the levels at the blending area, Laboratory and Truck Loading were above the stipulated guidelines in the EMCA (Air Quality) Regulations, 2014 of 600 $\mu g/m^3$.

5.1 Recommendation

Air dispersion modelling could be done for the plant sources, to determine better the fallout zones to be marked for monitoring. The company should develop a dust management plan that will include Water sprinkling at regular interval in dust generating areas.

Annex 8: Baseline Soil Test Results

KENYA PETROLEUM REFINERIES LIMITED- MOMBASA
P.O Box 90401-80100
Refinery Road, Mombasa
Kenya

SOIL QUALITY ANALYSIS REPORT

KENYA PETROLEUM REFINERIES LIMITED - MOMBASA

JUNE 2022

CSI International Limited
Howse & McGeorge Centre, Factory St, Off Bunyala Road, Building No. 10, Industrial Area
P. O. Box 47846-00100, Nairobi, Kenya
Tel : +254 712603528/723479111/705204610
Email: info@csiinternationalke.co.ke; http://www.csiinternationalke.co.ke
Contact Person: Okowa George

DOCUMENT RELEASE INFORMATION	
CLIENT	KENYA PETROLEUM REFINERIES LIMITED-MOMBASA
CONTRACT/ORDER NUMBER	LPO
CONTACT PERSON	NAME: DIANA NTHIWA HEALTH, SAFETY & ENVIRONMENT TECHNOLOGIST +254724831943 EMAIL: Diana.N.Nthiwa@kprl.co.ke
PROJECT TITLE	ANNUAL STATUTORY SOIL & AMBIENT AIR SAMPLING & MEASUREMENT FOR YEAR 2022 AT KPRL
PURPOSE OF MEASUREMENT	ENVIRONMENTAL COMPLIANCE
DATE OF MONITORING	JUNE 10 & 11, 2022
REVISION STATUS	FINAL

PROJECT QUALITY ASSURANCE AND QUALITY CONTROL				
REV.	**DATE**	**PREPARED BY**	**REVIEWED BY**	**AUTHORIZED BY**
1	30/06/2022	GEORGE OINDO Quality Assurance Manager	GEORGE OKOWA Laboratory Manager	DICKSON ANDALA EIA/EA Expert

This Soil Quality Analysis Report has been carried out to the best of our knowledge and ability and within the terms of the contract with the client and is limited to the exercise of reasonable care. This report is not intended to relieve the establishment from their contractual obligations. This report reflects our findings as at the time and place of intervention and is issued under the CSI International Limited terms and conditions of service.

Executive Summary

CSI International Limited sampled and analyzed soil samples at Kenya Petroleum Refineries Limited - Mombasa from various sampling locations with strict adherence to the standard procedures. These included Composite Cells 4 & 5; 11 & 14; 12 & 13; 2, 6 & 7; and all Cells 15. The results indicated that all the parameters tested (heavy metals, TPH and PAH) were within the permissible confines of Dutch guidelines. The summation of the levels of TPH parameters lacked permissible limits from the Dutch guidelines, thus, was represented with initials np which translate to not provided. The HSE department at Kenya Petroleum Refineries Ltd (KPRL) should continue with periodical assessment of soil quality status for purposes of proactive pollution abatement. Considering the levels of parameters analyzed in the soil samples, it is concluded that the activities at Kenya Petroleum Refineries Ltd (KPRL), in Mombasa have not presented any negative effect on the soil at the sampled locations. It is hereby recommended that the HSE department at Kenya Petroleum Refineries Ltd (KPRL) should continue with periodical assessment of soil quality status for purposes of proactive pollution abatement.

Table of Contents

1. Introduction

Soil quality refers to the status of the soil in terms of the concentrations a variety of pollutants in the soil. It is worth noting that the quality can be influenced by the ongoing activities. Therefore, it is prudent to carry out soil sampling and analysis in order to quantify the chemical parameters for a variety of reasons that are not limited to protection of human health, crops, vegetation, ecosystems and as well as for planning purposes. All these are geared towards protecting the environment. In this assignment, EPA Method 1664, Revision B and CSI International Ltd testing procedures (CSITP003) were referenced for analysis and the Dutch guidelines used to draw conclusions regarding compliance of the assessment findings.

1.1 Date of Soil Sampling For Quality Analysis

Soil sampling at Kenya Petroleum Refineries Limited- Mombasa for quality testing was carried out on June 10 and 11, 2022.

1.2 Sampling Locations

The Soils for evaluation were collected at the following locations given in Table 1.2.

Table 1.2: Location of sampling points

Location	GPS
14	4°00'43.5"S 39°36'53.8"E
11	4°00'45.9"S 39°36'56.8"E
13	4°00'47.5"S 39°36'50.9"E
12	4°00'47.6"S 39°36'54.6"E
4	4°00'57.1"S 39°37'05.2"E
5	4°00'52.2"S 39°36'58.7"E
6	4°00'51.5"S 39°37'04.7"E
2	4°00'49.0"S 39°37'10.7"E
7	4°00'50.0"S 39°37'05.5"E

1.3 Composite soil samples

The composite soil samples were obtained from the following cells: Composite Cells 4 & 5; 11 & 14; 12 & 13; 2, 6 & 7; and All Cells 15.

1.4 Soil Pollutants analysed during the evaluation were

1.4.1 Total Petroleum Hydrocarbons (TPH)

1.4.2 Polycyclic Aromatic Hydrocarbons (PAH)

1.4.3 Heavy metals (Cd, Cr, Co, Cu, Pb, Zn, Hg)

2. Objectives of soil quality analysis

2.1 To quantify the levels of TPH and PAH in the soil samples from Cells 4 & 5, 11 & 14, 12 & 13, and 2, 6 & 7.

2.2 To quantify the levels of heavy metals in the soil samples from all 15 cells.

2.3 To propose to the management of Kenya Petroleum Refineries Limited- Mombasa about measures that should be undertaken to maintain the levels of pollutants.

3. Methodology/Procedure

3.1 Sampling Procedure

A 1 kg soil sample from each location were taken using stainless-steel soil auger within 15 – 30 cm. The samples were cleaned of plant and other debris, air-dried under shade then ground to pass through a 2 mm sieve. Soil weights of 1 and 5 g were used to analyze for heavy metals and organic compounds (TPH and PAH), respectively.

3.2 Sample Preparation and Analysis for heavy metals

Aqua regia (HNO_3-HCl 1:3v/v) mixture was used for digesting 1 g soil sample in a block digester equipment for 60 minutes. The samples were brought to an appropriate volume with deionized water and analysed on AAS following CSI procedures (CSISP003) developed from ISO standards.

3.3 Sample Preparation and Analysis for Petroleum Hydrocarbons (TPH) and Polycyclic Aromatic Hydrocarbons (PAH)

Sample preparation and analysis was done using EPA Method 1664, Revision B.

4. Results

The average levels of TPH and PAH, and heavy metals are given in Tables 4a and b, respectively.

Table 4a: Levels of TPH and PAH

Sampling Location	TPH (mg/Kg)	PAH (mg/Kg)
Cells 4 & 5	0.127	0.0743
Cells 11 & 14	0.074	0.044
Cells 12 & 13	0.030	0.0174
Cells 2, 6 & 7	0.016	0.009
Target Value	**np**	**1**
Intervention Value	**np**	**40**

Target values are quoted from the Dutch guidelines; np-not provided

Table 4b: Levels of Heavy metals

PARAMETER	Method	Results	Target Value
Chromium as Cr, mg/Kg	CSITP003	<0.01	**100**
Copper as Cu, mg/Kg	CSITP003	0.070	**36**
Zinc as Zn, mg/Kg	CSITP003	1.36	**140**
Calcium as Ca, mg/Kg	CSITP 003	29.82	**np**
Manganese as Mn, mg/Kg	CSITP 003	8.0	**np**
Iron as Fe, mg/Kg	CSITP 003	121.0	**np**
Cadmium as Cd, mg/Kg	CSITP003	<0.001	**0.8**
Lead as Pb, mg/Kg	CSITP003	0.30	**85**
Arsenic as, mg/Kg	CSITP003	<0.001	**29**
Selenium as Se, mg/Kg	CSITP003	<0.001	**np**
Mercury as Hg, mg/Kg	CSITP003	<0.001	**0.3**
Titanium as Ti, mg/Kg	CSITP003	<0.001	**np**
Tungsten as W, mg/Kg	CSITP003	<0.001	**np**
Molybdenum as Mo, mg/Kg	CSITP003	<0.001	**35**

Target values are quoted from the Dutch guidelines

5. Summary of findings and conclusion

All the parameters tested (heavy metals, TPH and PAH) posted levels that were within the permissible confines of Dutch guidelines. However, the summation of levels of TPH parameters lacked permissible limits from the Dutch guidelines, thus, were represented with initials np, which translate to not provided. Considering the levels of parameters analyzed in the soil samples, it is concluded that the activities at Kenya Petroleum Refineries Ltd (KPRL), in Mombasa have not presented any negative effect on the soil.

6. Conclusion

The HSE department at Kenya Petroleum Refineries Ltd (KPRL) should continue with periodical assessment of soil quality status for purposes of proactive pollution abatement.

References

i. https://www.esdat.net/environmental%20standards/dutch/annexs_i2000dutch%20environmental%20standards.pdf. Pp 51.

ii. CSI International Ltd Test Procedures (CSITP003).

iii. Environmental Protection Agency. (2010). Method 1664, Revision B: n-Hexane Extractable Material (HEM; Oil and Grease) and Silica Gel Treated n-Hexane Extractable Material (SGT-HEM; Non-Polar Material) by Extraction and Gravimetry. Pp 35.

Appendix 1: CSI International Ltd Certifications

nema
mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Telcom Wireless: 020-2183718, 020-2101370, 020-2103696
Mobile Line: 0724 253 398, 0723 363 010, 0735 013 046
Incident Line: 0786 101 100

P. O. Box 67839 - 00200
Popo Road, Nairobi, Kenya
Email: dgnema@nema.go.ke
Website: www.nema.go.ke

NEMA/21/2/VOL.III **13th March 2017**

CSI International
1st Floor, Quincy Mall
Langata
P.O. Box 47846-00100
NAIROBI.

RE: LABORATORY DESIGNATION BY NEMA.

Pursuant to your application for designation, your laboratory was inspected and evaluated based on ISO 17025 for laboratory competence to carry out tests and samplings.

Your laboratory qualified and has in principle, been designated to undertake **Drinking Water, Effluent, Air Quality, and soil Analysis** subject to the attached terms and conditions.

You will however await the due process of laboratory gazettement.

ZEPHANIAH OUMA
FOR: DIRECTOR GENERAL

FORM 7 (r.15(2))

nema
mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/16800

Application Reference No: NEMA/EIA/EL/21728

M/S **CSI International Limited**
(individual or firm) of address

P.O. Box 47846-00100 NAIROBI

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Firm of Experts**
registration number **10445**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **3/11/2022** Expiry Date: **12/31/2022**

Signature…..

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2015 Certified

Appendix 2: Certificate of Analysis (COAs)

CSI INTERNATIONAL
P. O. Box 47846-00100,
Nairobi, Kenya.
+254 705204610/ +254 725692535.
www.csiinternationalke.co.ke

Serial No: CCSI06064

CERTIFICATE OF ANALYSIS

Client: Kenya Petroleum Refineries Limited
P.O BOX 90401 - 80100, GPO Mombasa

Sample Type: Soil

Sampled by: CSI International Limited (Edwin Odongo)

Sample ID: Composite Cells 11 & 14 TPH
Lab Batch No.: 22/0257

Lab. Ref.: CSI06064

Date Received: 13/06/2022 **Date Analysis Started:** 14/06/2022 **Date Completed:** 17/06/2022

Date Of Release: 17/06/2022

PARAMETER	Method	Results	[1]Standard (Max Limits)
Chemical			
Total Petroleum Hydrocarbons (TPH)			
C5 - C12, mg/Kg	CSITP033	0.009	Np
C12 - C28, mg/Kg	CSITP033	0.023	Np
C28 - C44, mg/Kg	CSITP033	0.042	Np
BTEX			
Toluene, mg/Kg	ISO 16265	0.014	Np
Xylene, mg/Kg	ISO 16265	0.016	Np
Benzene, mg/Kg	ISO 11423	0.012	Np
PAH			
Naphthalene, mg/Kg	CSITP033	0.005	Np
Anthracene, mg/Kg	CSITP034	0.007	Np
Chrysene, mg/Kg	CSITP035	0.009	Np
Pyrene, mg/Kg	CSITP036	0.008	Np
Flouranthrene, mg/Kg	CSITP037	0.008	Np
Flourene, mg/Kg	CSITP038	0.007	Np

BDL Means < = Less than; below detection level of 0.001
NP-No Limits Provided for these parameters
To maintain the correct history ensure that the next sample sent from this Source is labelled: Composite CellS 11 & 14 TPH

Authorization Signatures

For Chemistry Lab:	Reviewed By:	Authorised By:
Gloria Masitsa	George Oindo	George Okowa
Chemical Analyst	Quality Assurance Manager	Laboratory Manager
17/06/2022	17/06/2022	17/06/2022

CSI INTERNATIONAL
Quality Perfonance Through Technology

CSI INTERNATIONAL
P. O. Box 47846-00100,
Nairobi, Kenya.
+254 705204610/ +254 725692535.
www.csiinternationalke.co.ke

KENAS/TL/48

CERTIFICATE OF ANALYSIS

Serial No: CCSI06065

Client: Kenya Petroleum Refineries Limited
P.O BOX 90401 - 80100, GPO Mombasa

Sample Type: Soil

Sampled by: CIS Int. Limited (Edwin)

Sample ID.: All 15 Cells Heavy Metals
Laboratory Batch No.: 22/0257

Lab. Ref.: CSI06065

Date Received: 13/06/2022 **Date Analysis Started:** 14/06/2022 **Date Completed:** 16/06/2022

Release Date: 17/06/2022

PARAMETER	Method	Results	[1]Standard (Max Limits)
Chemical			
Chromium as Cr, mg/Kg	CSITP003	<0.01	np
Copper as Cu, mg/Kg	CSITP003	0.070	np
Zinc as Zn, mg/Kg	CSITP003	1.36	np
Calcium as Ca, mg/Kg	CSITP 003	29.82	np
Manganese as Mn, mg/Kg	CSITP 003	8.0	np
Iron as Fe, mg/Kg	CSITP 003	121.0	np
Cadmium as Cd, mg/Kg	CSITP003	<0.001	np
Lead as Pb, mg/Kg	CSITP003	0.30	np
Arsenic as As, mg/Kg	CSITP003	<0.001	np
Selenium as Se, mg/Kg	CSITP003	<0.001	np
Mercury as Hg, mg/Kg	CSITP003	<0.001	np
Titanium as Ti, mg/Kg	CSITP003	<0.001	np
Tungsten as W, mg/Kg	CSITP003	<0.001	np
Molybdenum as Mo, mg/Kg	CSITP003	<0.001	np

< 0.001/0.01- below detection level of 0.001/0.01 mg/Kg
NP- No Reference values quoted for these parameters
APHA - American Public Health Association
KS -Kenyan Standard
ISO - International Organization for Standardization
CSITP - CSI International Laboratories Work Procedure. Adopted from KS, ISO and APHA Methods
To maintain the correct history ensure that the next sample sent from this Soil Source is labeled: All 15 Cells Heavy Metals.

Authorization Signatures

For Chemistry Lab:
Masitsa
Gloria Masitsa
Chemical Analyst
17/06/2022

Reviewed By:
George Oindo
Quality Assurance Manager
17/06/2022

Authorised By:
George Okowa
Laboratory Manager
17/06/2022

CSI INTERNATIONAL
Quality Performance Through Technology

CSI INTERNATIONAL
P. O. Box 47846-00100,
Nairobi, Kenya.
+254 705204610/ +254 725692535.
www.csiinternationalke.co.ke

Serial No: CCSI06065

CERTIFICATE OF ANALYSIS

Client: Kenya Petroleum Refineries Limited
P.O BOX 90401 - 80100, GPO Mombasa

Sample Type: Soil

Sampled by: CSI International Limited (Edwin Odongo)

Sample ID: All 15 Cells TPH
Lab Batch No.: 22/0257

Lab. Ref.: CSI06065

Date Received: 13/06/2022 **Date Analysis Started:** 14/06/2022 **Date Completed:** 17/06/2022

Date Of Release: 17/06/2022

PARAMETER	Method	Results	[1]Standard (Max Limits)
Chemical			
Total Petroleum Hydrocarbons (TPH)			
C5 - C12, mg/Kg	CSITP033	0.006	Np
C12 - C28, mg/Kg	CSITP033	0.015	Np
C28 - C44, mg/Kg	CSITP033	0.026	Np
BTEX			
Toluene, mg/Kg	ISO 16265	0.009	Np
Xylene, mg/Kg	ISO 16265	0.010	Np
Benzene, mg/Kg	ISO 11423	0.007	Np
PAH			
Naphthalene, mg/Kg	CSITP033	0.003	Np
Anthracene, mg/Kg	CSITP034	0.004	Np
Chrysene, mg/Kg	CSITP035	0.006	Np
Pyrene, mg/Kg	CSITP036	0.005	Np
Flouranthrene, mg/Kg	CSITP037	0.005	Np
Flourene, mg/Kg	CSITP038	0.004	Np

BDL Means < = Less than; below detection level of 0.001.
NP-No Limits Provided for these parameters
To maintain the correct history ensure that the next sample sent from this Source is labelled: All 15 Cells TPH.

Authorization Signatures

For Chemistry Lab:	Reviewed By:	Authorised By:
Masitsa		
Gloria Masitsa	George Oindo	George Okowa
Chemical Analyst	Quality Assurance Manager	Laboratory Manager
17/06/2022	17/06/2022	17/06/2022

CSI INTERNATIONAL
Quality Performance Through Technology

CSI INTERNATIONAL
✉: P. O. Box 47846-00100,
Nairobi, Kenya.
✆: +254 705204610/ +254 725692535.
🖃: www.csiinternationalke.co.ke

Serial No: CCSI06066

CERTIFICATE OF ANALYSIS

Client: Kenya Petroleum Refineries Limited
P.O BOX 90401 - 80100, GPO Mombasa

Sample Type: Soil

Sampled by: CSI International Limited (Edwin Odongo)

Sample ID: Composite Cells 2, 6 & 7 TPH
Lab Batch No.: 22/0257

Lab. Ref.: CSI06066

Date Received: 13/06/2022 **Date Analysis Started:** 14/06/2022 **Date Completed:** 17/06/2022

Date Of Release: 17/06/2022

PARAMETER	Method	Results	[1]Standard (Max Limits)
Chemical			
Total Petroleum Hydrocarbons (TPH)			
C5 - C12, mg/Kg	CSITP033	0.002	Np
C12 - C28, mg/Kg	CSITP033	0.005	Np
C28 - C44, mg/Kg	CSITP033	0.009	Np
BTEX			
Toluene, mg/Kg	ISO 16265	0.003	Np
Xylene, mg/Kg	ISO 16265	0.004	Np
Benzene, mg/Kg	ISO 11423	0.003	Np
PAH			
Naphthalene, mg/Kg	CSITP033	0.0011	Np
Anthracene, mg/Kg	CSITP034	0.0014	Np
Chrysene, mg/Kg	CSITP035	0.0018	Np
Pyrene, mg/Kg	CSITP036	0.0017	Np
Flouranthrene, mg/Kg	CSITP037	0.0016	Np
Flourene, mg/Kg	CSITP038	0.0014	Np

BDL Means < = Less than; below detection level of 0.001
NP-No Limits Provided for these parameters
To maintain the correct history ensure that the next sample sent from this Source is labelled: Composite Cells 2,6 & 7 TPH

Authorization Signatures

For Chemistry Lab:	Reviewed By:	Authorised By:
Masitsa		
Gloria Masitsa	George Oindo	George Okowa
Chemical Analyst	Quality Assurance Manager	Laboratory Manager
17/06/2022	17/06/2022	17/06/2022

CSI INTERNATIONAL
P. O. Box 47846-00100,
Nairobi, Kenya.
+254 705204610/ +254 725692535.
www.csiinternationalke.co.ke

Serial No: CCSI06067

CERTIFICATE OF ANALYSIS

Client: Kenya Petroleum Refineries Limited
P.O BOX 90401 - 80100, GPO Mombasa

Sample Type: Soil

Sampled by: CSI International Limited (Edwin Odongo)

Sample ID: Composite Cells 4 & 5 TPH
Lab Batch No.: 22/0257

Lab. Ref.: CSI06067

Date Received: 13/06/2022 **Date Analysis Started:** 14/06/2022 **Date Completed:** 17/06/2022

Date Of Release: 17/06/2022

PARAMETER	Method	Results	[1]Standard (Max Limits)
Chemical			
Total Petroleum Hydrocarbons (TPH)			
C5 - C12, mg/Kg	CSITP033	0.017	Np
C12 - C28, mg/Kg	CSITP033	0.040	Np
C28 - C44, mg/Kg	CSITP033	0.070	Np
BTEX			
Toluene, mg/Kg	ISO 16265	0.0240	Np
Xylene, mg/Kg	ISO 16265	0.0280	Np
Benzene, mg/Kg	ISO 11423	0.0200	Np
PAH			
Naphthalene, mg/Kg	CSITP033	0.0080	Np
Anthracene, mg/Kg	CSITP034	0.0120	Np
Chrysene, mg/Kg	CSITP035	0.0150	Np
Pyrene, mg/Kg	CSITP036	0.0140	Np
Flouranthrene, mg/Kg	CSITP037	0.0135	Np
Flourene, mg/Kg	CSITP038	0.0118	Np

BDL Means < = Less than; below detection level of 0.001.
NP-No Limits Provided for these parameters
To maintain the correct history ensure that the next sample sent from this Source is labelled: Composite Cells 4 & 5 TPH.

Authorization Signatures

For Chemistry Lab:	Reviewed By:	Authorised By:
Gloria Masitsa	George Oindo	George Okowa
Chemical Analyst	Quality Assurance Manager	Laboratory Manager
17/06/2022	17/06/2022	17/06/2022

CSI INTERNATIONAL
Quality Performance Through Technology

CSI INTERNATIONAL
✉: P. O. Box 47846-00100,
Nairobi, Kenya.
✆: +254 705204610/ +254 725692535.
🖳: www.csiinternationalke.co.ke

Serial No: CCSI06068

CERTIFICATE OF ANALYSIS

Client: Kenya Petroleum Refineries Limited
P.O BOX 90401 - 80100, GPO Mombasa

Sample Type: Soil

Sampled by: CSI International Limited (Edwin Odongo)

Sample ID: Composite Cells 12 & 13 TPH
Lab Batch No.: 22/0257

Lab. Ref.: CSI06068

Date Received: 13/06/2022 **Date Analysis Started:** 14/06/2022 **Date Completed:** 17/06/2022

Date Of Release: 17/06/2022

PARAMETER	Method	Results	[1]Standard (Max Limits)
Chemical			
Total Petroleum Hydrocarbons (TPH)			
C5 - C12, mg/Kg	CSITP033	0.004	Np
C12 - C28, mg/Kg	CSITP033	0.009	Np
C28 - C44, mg/Kg	CSITP033	0.017	Np
BTEX			
Toluene, mg/Kg	ISO 16265	0.006	Np
Xylene, mg/Kg	ISO 16265	0.007	Np
Benzene, mg/Kg	ISO 11423	0.005	Np
PAH			
Naphthalene, mg/Kg	CSITP033	0.0020	Np
Anthracene, mg/Kg	CSITP034	0.0027	Np
Chrysene, mg/Kg	CSITP035	0.0035	Np
Pyrene, mg/Kg	CSITP036	0.0032	Np
Flouranthrene, mg/Kg	CSITP037	0.0032	Np
Flourene, mg/Kg	CSITP038	0.0028	Np

BDL Means < = Less than; below detection level of 0.001.
NP-No Limits Provided for these parameters
To maintain the correct history ensure that the next sample sent from this Source is labelled: Composite Cells 12 & 13 TPH.

Authorization Signatures

For Chemistry Lab:
Masitsa
Gloria Masitsa
Chemical Analyst
17/06/2022

Reviewed By:
George Oindo
Quality Assurance Manager
17/06/2022

Authorised By:
George Okowa
Laboratory Manager
17/06/2022

Appendix 3: Project Participants and Titles

NAME	TITLE
Dickson Andala, PhD	CEO, EIA/EA Expert
Mr. Okowa George	Laboratory Manager
George Oindo, PhD	Quality Assurance Manager, EIA/EA Expert
Victor Shikuku, PhD	Head of Laboratory Services
Mr. Edwin Odongo	Head Environmental Sampling & Analysis
Mr. Hanington Muhati	EIA/EA Expert
Ms. Gloria Masitsa	Application Chemist

Annex 9: Vent Stack Design Report

CONSULTANCY SERVICES FOR FRONT-END ENGINEERING DESIGN FOR THE PROPOSED LPG IMPORT, STORAGE, AND HANDLING FACILITY

CHANGAMWE MOMBASA

VENT STACK

Document No: 22206-CAL-1001

Client Reference Project No.
KPC/PU/OT – 241/PROJECTS/KPRL/21 – 22

B	2-Sep-2022	Climate Data Updated	MFS		EN		KZ	
A	1- Sep -2022	Issued for Internal Review	RAK		MFS		KZ	
Rev	Date	Description	Initial	Signature	Initial	Signature	Initial	Signature
			Prepared by		**Checked by**		**Approved by**	

CLIENT:

KENYA PIPELINE COMPANY LIMITED
Kenpipe Plaza, Sekondi Road, Off Nanyuki Road, Industrial Area, P.O. Box 73442 – 00200 Nairobi, Kenya

CONSULTANT:

R&E MODERN TECHNOLOGIES LIMITED
Eastern Bypass, Pondo Arcade, 3rd Floor Suite AC3 Post Office Box Number 50692-00200, Nairobi
info@rnemoderntechnologies.co.ke

CONSULTANT:

PETROCHEM ENGINEERING SERVICES
B-69, Block No. 18, Gulshan-e-Iqbal Karachi-75300, Pakistan
info@petrochemengg.com.pk

TABLE OF CONTENTS

PREFACE

In 2005, the Ministry of Energy (MOE) of the Republic of Kenya undertook a 'Study on Demand of LPG in the East African Region and Preliminary Design of the required infrastructure within Kenya to meet the Demand'. The study recommended the construction of an LPG facility at Mombasa among other phased investments.

A major challenge identified is the lack of sufficient LPG storage and supply infrastructure which results in the importation and handling of uneconomical batches of LPG, resulting in high retail prices. The market competition is also limited by an absence of common user import and distribution infrastructure which would facilitate an Open Tender (OTS) import system. Further, illicit supply chain activities interfere with a fair competition platform.

The industry currently relies on Oil marketers' import storage facilities which are not sufficient to cater to the fast-growing LPG demand. Due to its inadequate capacity, the country suffers high landed prices of LPG and huge demurrage incurred by LPG ships.

The above results in constraints in competitive sourcing for bulk LPG supplies that would ensure lower cost supply and pricing that would otherwise be achieved through OTS.

It was therefore recommended that a large common user LPG facility be constructed in a suitable location that complies with local and international standards. This will allow for economies of scale, reducing unit operation costs, the benefit of which can be passed to the end-users.

This document presents the Conceptual Design of the proposed LPG import, storage, and handling facility at Changamwe Mombasa.

The proposed handling and storage Facility will primarily receive LPG from pressurized LPG ships berthed at the newly constructed Kipevu Oil Terminal (KOT-2) Jetty into the LPG storage tanks using a product import line.

The purpose of this report is to size the vent stack adequate for the safe relief of LPG in the environment on the basis of allowable permissible exposure limit of hydrocarbon and pollutants. The proposed system has 8 pumps operating at 50 m^3/hr to truck loading and 2 pumps for MGR with a total of 10 loading bays capable of handling 50 m3/hr each, the relief of each pump and loading bays goes to a vent stack from a header. This relieved flow must be properly dispersed in the environment and capable of preventing any cloud formation as LPG is heavier than air which forms a combustible cloud. On the other hand, the vent stack must also be suitable to handle and disperse the LPG so that it is within the permissible limit of exposure as limited by the environment controlling agencies/ authorities.

1.0 BASIC REFERENCE DATA

1.1 The following meteorological data was taken as a reference for the calculation:

a) Average Temperature 30 ^{0}C.

b) Average Wind Speed 6.3 m/s (Ref: Attached as Annexure III)

c) Site Reference Elevation 50 m

2.0 DESIGN BASIS

2.1 The following design basis is selected for the sizing vent stack:

a) Gas Temperature is 30 ^{0}C.

b) Gas Composition

i. Case-I

- (100% propane).
- Average Gas Molecular Weight is 51.

c) Relieving flow must be higher than the feeding flow of the system in order to reduce the system pressure i.e. in case all the PSVs attached to the stack header pops-up, the vent stack must be capable of relieving all the LPG to the atmosphere safely.

d) Phase I i.e. 30,000 MT storage facility design provides for 10 road tanker loading racks in the absence of MGR loadings and where MGR will be an available option, 2 Rail Tank loading racks, and 8 road tanker loading racks.

e) Above corresponds to 10 pumps connected to road tanker loading racks in absence of MGR or 8 pumps connected to road tanker loading along with 2 pumps connected to MGR.

f) All of the pumps have a capacity of 50 m3/h each, with a recirculation line back to LPG storage.

g) In case of any emergency i.e. shut down of gantry either truck or MGR, recirculation line shall be operational however for sizing purposes of Vent Stack a case has been

established where the recirculation line is not activated and line pressure increased to the design pressure.

h) Above case corresponds to block discharge and sizing of PSV has been done on the same basis.

i) In case of general power failure, all pumps will be shut down hence no overpressure scenarios are foreseen.

j) Sizing of a vent stack on the basis of depressurization has not been considered as the major case because, all depressurization shall be done under a controlled environment where different layers of protection are provided that including blow-down valves, LPG recovery compressor as well as system isolation shutdown valves.

k) Sizing case has been selected under the following conditions:

i.	Total No of Pumps Operational	10 Nos
ii.	Each Pump Flow Rate	50 m^3/h
iii.	Total No of PSV	10 Nos
iv.	Emergency Scenario / Pump Fail	05 Nos
v.	Total No of PSV Routed to Vent	05 Nos

l) Diameter of the vent stack is so selected that the exit velocity is 150 m/sec (500 ft/sec) for excellent dispersion as per API 521 sizing criteria.

m) Lower flammability limit (LFL) of propane is 2.1% corresponds to 50 gm/m^3, PEL (permissible exposure limit) of propane (1.8 g/m3) by NIOSH (National Institute of Occupational Safety and Health Organization). PEL is utilized to calculate the height of the stack in order to keep the environment safe while considering the worst conditions.

n) Class A of the climate was selected as per classification by Pasquill Stability Classes as mentioned in Table below.

Table 19.1 Stability Classifications*

Surface Wind Speed[a] m/s	Day Incoming Solar Radiation			Night Cloudiness[e]	
	Strong[b]	Moderate[c]	Slight[d]	Cloudy (≥4/8)	Clear (≤3/8)
<2	A	A–B[f]	B	E	F
2–3	A–B	B	C	E	F
3–5	B	B–C	C	D	E
5–6	C	C–D	D	D	D
>6	C	D	D	D	D

NOTES:
a. Surface wind speed is measured at 10 m above the ground.
b. Corresponds to clear summer day with sun higher than 60° above the horizon.
c. Corresponds to a summer day with a few broken clouds, or a clear day with sun 35–60° above the horizon.
d. Corresponds to a fall afternoon, or a cloudy summer day, or clear summer day with the sun 15–35°.
e. Cloudiness is defined as the fraction of sky covered by clouds.
f. For A–B, B–C, or C–D conditions, average the values obtained for each.

* A = Very unstable
B = Moderately unstable
C = Slightly unstable
D = Neutral
E = Slightly stable
F = Stable

Regardless of wind speed, Class D should be assumed for overcast conditions, day or night.

Adapted from Turner, 1970.

o) Isopleth concentration of Propane and Butane is so selected that the relieving flow contains Propane content in a permissible limit i.e. 800 ppm for Butane gas and 750 ppm for Propane gas by NIOSH (National Institute of Occupational Safety and Health Organization).

3.0 CONCLUSION

3.1 On the basis of the dispersion modeling analysis attached in Annexure - I, the following results are concluded for the safe venting of the LPG;

Vent Stack Diameter	0.475 m
Vent Stack Height	15 m
Gas Exit Velocity	149.9 m/s
Safe location for vent stack	100 meters away from any frequent human mobility area

3.2 Dispersion modeling layout has been attached as Annexure-II

Annexure – I

DISPERSION MODELING ANALYSIS

CALCULATION FOR VENT DISPERSION IN ATMOSPHERE

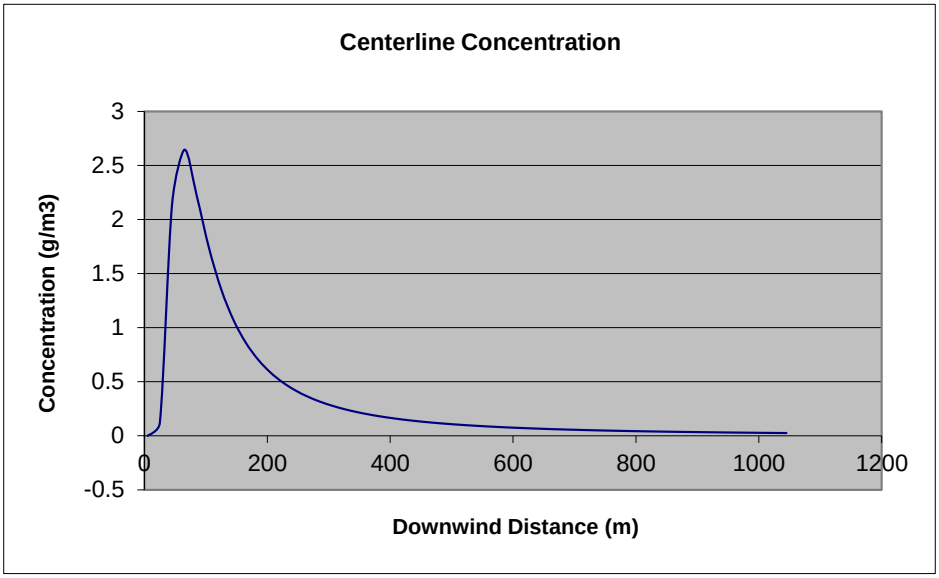
ITEM	Vent Stack	Service	Hydrocarbon Discharge / LPG / Propane		
Case	Maximum Relief Case				
STACK DATA					
Diameter		[D]	[m]	0.475	
Sectional Area		[As]	[m2]	1.77E-01	
Height		[H]	[m]	15	
EFFLUENT GAS					
Gas Flow Rate		[Ws]	[kg/s]	34.72	
Gas Molecular Weight		[MWs]	[- -]	32.5	
Gas Temperature		[T]	[°C]	30	
Gas Density		[Rs]	[kg/m3]	1.30689338	
Gas Exit Velocity		[Vs]	[m/s]	149.93215	
Pollutant Name			[- -]		
Pollutant Rate		[Wp]	[g/s]	29513.8889	
Pollutant Molecular Weight			[- -]	51	Average Molecular Weight
METEO DATA					
Stability Class			[- -]	A	
Ambient Temperature		[Ta]	[°C]	30	
Air Density		[Ra]	[kg/m3]	1.31882146	
Wind Velocity		[u1]	[m/s]	6.3	
at Ref. Elevation		[z1]	[m]	2	
Exponent for wind speed		[p]	[- -]	0.12	
Wind Speed @ Stack Elev.		[uS]	[m/s]	8.02320522	
RELEASE HEIGHT					
Buoyancy Flux		[F]	[m4/s3]	0.75037043	
Stable Condition Flag		[sf]	[- -]	0	
Stability parameter		[S]	[1/s2]	1	
Light Wind & Calm Flag		[lwf]	[- -]	0	
x* parameter		[x*]	[m]	11.699717	
Plume rise		[Dh]	[m]	2.15286066	
Effective Stack Height		[H]	[m]	17.1528607	
CONCENTRATION PARAMETER					
Parameter for Sig_y		[k1]	[- -]	0.22	
Parameter for Sig_y		[k2]	[- -]	1	
Parameter for Sig_y		[k3]	[- -]	0.0001	
Parameter for Sig_y		[k4]	[- -]	-0.5	
Parameter for Sig_z		[k5]	[- -]	0.2	
Parameter for Sig_z		[k6]	[- -]	1	
Parameter for Sig_z		[k7]	[- -]	0	
Parameter for Sig_z		[k8]	[- -]	1	
Start Distance		[Lb]	[m]	5	
Distance Step		[Lx]	[m]	20	
End Distance		[Le]	[m]	1045	
Isoplet Concentration Butane		[Ca]	g/m3	1.9	
			ppmv	926.793062	
Isoplet Concentration Propane		[Cb]	g/m3	1.8	
			ppmv	878.01448	

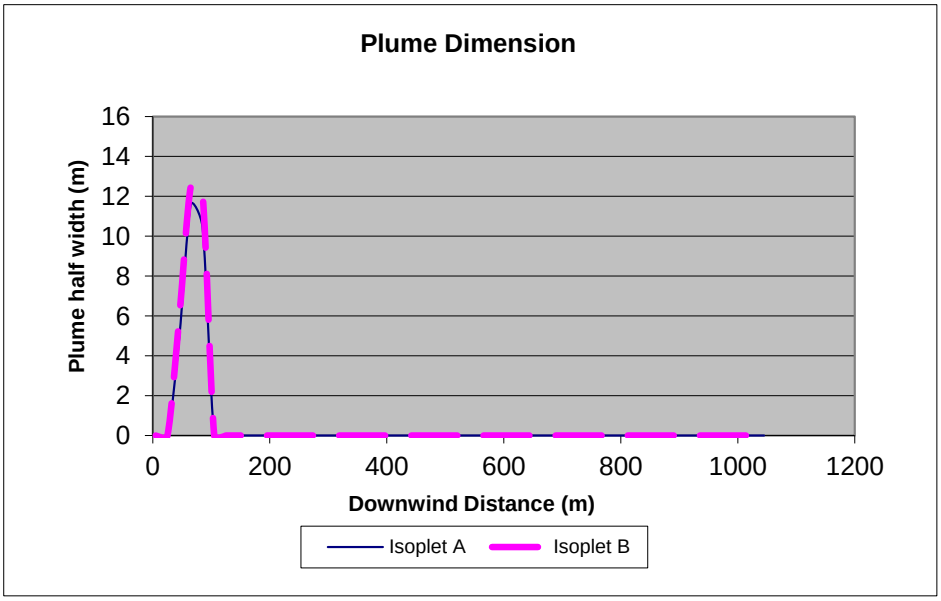
N°	DATE	ISSUES AND REVISIONS	PREP.	CKD.	APPR.
B	02/09/22	ISSUED FOR REVIEW	RK	RAK	MFS

CALCULATION FOR VENT DISPERSION IN ATMOSPHERE

Distance Downwind [m]	Sig_y [m]	Sig_z [m]	Centerline Concentr. g/m3	Isoplet A Width [m]	Isoplet B Width [m]
5	1.0997251	1	1.3742E-61	N.A.	N.A.
25	5.49313786	5	0.1186246	N.A.	N.A.
45	9.8777999	9	2.14227351	4.83939145	5.8284207
65	14.2537503	13	2.64617211	11.6018913	12.5129329
85	18.6210281	17	2.22336474	10.4399989	12.1032394
105	22.9796718	21	1.7381874	N.A.	N.A.
125	27.3297197	25	1.35436361	N.A.	N.A.
145	31.6712101	29	1.07029228	N.A.	N.A.
165	36.0041808	33	0.86099085	N.A.	N.A.
185	40.3286693	37	0.70477266	N.A.	N.A.
205	44.6447132	41	0.58610122	N.A.	N.A.
225	48.9523495	45	0.49430716	N.A.	N.A.
245	53.251615	49	0.42208013	N.A.	N.A.
265	57.5425466	53	0.36435419	N.A.	N.A.
285	61.8251805	57	0.3175621	N.A.	N.A.
305	66.0995529	61	0.27914826	N.A.	N.A.
325	70.3656999	65	0.24725046	N.A.	N.A.
345	74.623657	69	0.22048969	N.A.	N.A.
365	78.8734599	73	0.19782923	N.A.	N.A.
385	83.1151437	77	0.17847878	N.A.	N.A.
405	87.3487434	81	0.16182804	N.A.	N.A.
425	91.574294	85	0.14740013	N.A.	N.A.
445	95.7918299	89	0.13481832	N.A.	N.A.
465	100.001386	93	0.12378195	N.A.	N.A.
485	104.202995	97	0.11404888	N.A.	N.A.
505	108.396692	101	0.10542236	N.A.	N.A.
525	112.582511	105	0.09774128	N.A.	N.A.
545	116.760485	109	0.09087269	N.A.	N.A.
565	120.930647	113	0.08470614	N.A.	N.A.
585	125.093031	117	0.07914929	N.A.	N.A.
605	129.247669	121	0.07412443	N.A.	N.A.
625	133.394594	125	0.06956584	N.A.	N.A.
645	137.533838	129	0.06541761	N.A.	N.A.
665	141.665434	133	0.06163194	N.A.	N.A.
685	145.789414	137	0.0581678	N.A.	N.A.
705	149.905809	141	0.05498979	N.A.	N.A.
725	154.014651	145	0.05206722	N.A.	N.A.
745	158.115973	149	0.04937344	N.A.	N.A.
765	162.209804	153	0.04688516	N.A.	N.A.
785	166.296176	157	0.04458197	N.A.	N.A.
805	170.37512	161	0.04244596	N.A.	N.A.
825	174.446667	165	0.0404613	N.A.	N.A.
845	178.510847	169	0.03861401	N.A.	N.A.
865	182.567691	173	0.03689168	N.A.	N.A.
885	186.617228	177	0.03528327	N.A.	N.A.
905	190.659489	181	0.03377894	N.A.	N.A.
925	194.694503	185	0.03236987	N.A.	N.A.
945	198.722301	189	0.03104818	N.A.	N.A.
965	202.74291	193	0.02980678	N.A.	N.A.
985	206.756361	197	0.02863926	N.A.	N.A.
1005	210.762683	201	0.02753988	N.A.	N.A.
1025	214.761905	205	0.02650341	N.A.	N.A.
1045	218.754054	209	0.02552514	N.A.	N.A.

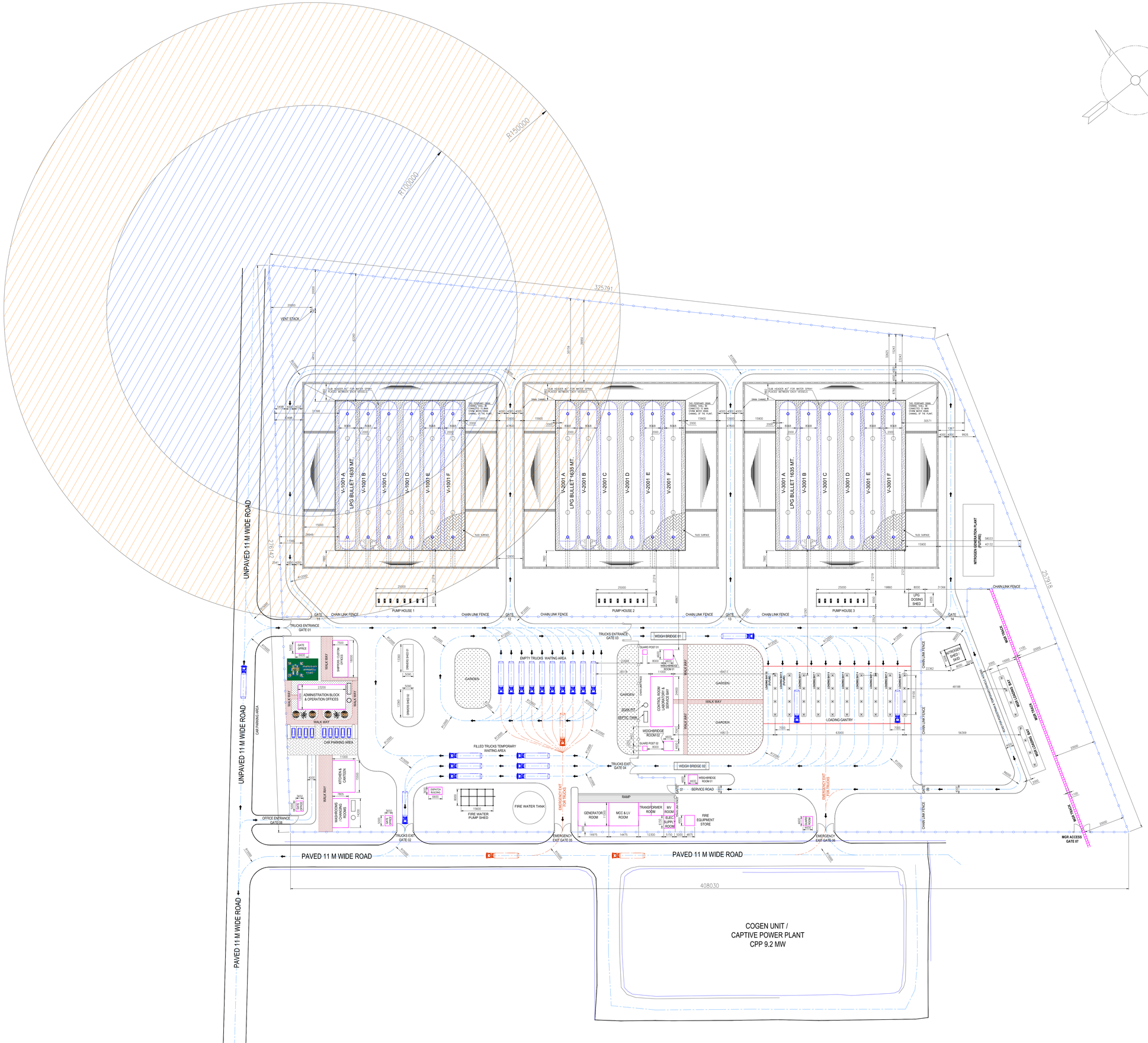
CALCULATION FOR VENT DISPERSION IN ATMOSPHERE





Annexure – II

DISPERSION MODELING LAYOUT



LEGEND:-

FOR 150m RADIUS

FOR 100m RADIUS

REVISIONS

REVISION	DESCRIPTION	DATE
REV B	ISSUED FOR INTERNAL REVIEW	03/10/2022
REV A	ISSUED FOR INTERNAL REVIEW	01/09/2022

LEAD CONSULTANT(LOCAL)

R&E MODERNTECHNOLOGIES
P.0 BOX 50692-00200 NAIROBI
CELL: 0729 389 494 ,0771217752
email.moderntechnologies@gmail.com

LEAD CONSULTANT (INT'L)

PES Petrochem Engineering Services
An ISO 9001-2015 certified company
B-69, Block No. 18, KDA Scheme No.24, Gulshan-e-Iqbal, Karachi-75300. Pakistan. E-Mail: info@petrochemengg.com.pk, Website: www.petrochemengg.com.pk Tel: (92-21) 34821379, 34827782, Fax: (92-21) 34994054

CLIENT

KENYA PIPELINE COMPANY
Address: Kenpipe Plaza, Sekondi Road, Off Nanyuki Road Industrial Area, Nairobi
Postal Address: P. O. Box 73442 – 00200,
Telephone: 020 2606500-4

PROJECT TITLE

CONSULTANCY SERVICES FOR DETAILED ENGINEERING DESIGN FOR THE PROPOSED LPG IMPORT,STORAGE AND HANDLING FACILITY AT CHANGAMWE MOMBASA

DRAWING TITLE

LAYOUT FOR DISPERSION MODELING

DESIGNED BY	SCALE	PAPER SIZE	STATUS
FS	1:500	A0	R
DRAWN BY	**CHECKED BY**	**DATE**	**SHEET NO**
MMH	KZ	OCT 2022	01
DRAWING NO	**PROJECT NO**		
22206-LDM-1001	KPC/PU/OT-241 /PROJECTS/KPRL/21 -23		

Annexure – III

CLIMATE DATA

station_Name	YY	MM	Wind Direction	Wind Speed
MOI INTERNATIONAL AIRPORT - MOMBASA	**1990**	1	125.8	5.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1990**	2	140.8	5.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1990**	3	146.1	5.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1990**	4	146.3	5.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**1990**	5	183.5	7.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1990**	6	173.1	6.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1990**	7	186.7	7.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**1990**	8	177.3	7.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**1990**	9	178.9	7.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**1990**	10	148.1	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**1990**	11	112.4	5.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1990**	12	104.9	5.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1991**	1	84.7	5.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**1991**	2	88.9	7.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1991**	3	90.5	5.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**1991**	4	161.0	7.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1991**	5	184.0	7.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1991**	6	165.8	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**1991**	7	177.0	6.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**1991**	8	146.0	5.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**1991**	9	152.1	6.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1991**	10	134.6	5.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1991**	11	102.3	4.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1991**	12	92.9	5.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**1992**	1	89.5	7.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1992**	2	80.2	7.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**1992**	3	85.6	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1992**	4	149.8	7.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1992**	5	186.5	7.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1992**	6	181.5	7.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**1992**	7	183.3	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**1992**	8	182.6	7.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1992**	9	178.3	6.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**1992**	10	136.2	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**1992**	11	110.7	5.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**1992**	12	120.1	4.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**1993**	1	102.2	5.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**1993**	2	80.7	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**1993**	3	97.8	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1993**	4	150.5	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**1993**	5	187.5	7.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**1993**	6	180.5	8.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1993**	7	165.8	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**1993**	8	155.4	5.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**1993**	9	144.0	5.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**1993**	10	132.7	5.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**1993**	11	82.2	4.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1993**	12	59.9	3.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**1994**	1	71.0	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**1994**	2	88.0	6.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**1994**	3	80.7	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1994**	4	164.1	7.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**1994**	5	190.0	7.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1994**	6	170.0	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**1994**	8	170.4	6.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1994**	9	146.4	5.7

MOI INTERNATIONAL AIRPORT - MOMBASA	**1994**	10	144.7	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1994**	11	107.9	4.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**1994**	12	91.5	4.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1995**	1	74.4	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1995**	2	79.9	5.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1995**	3	88.0	5.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1995**	4	157.7	6.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1995**	5	159.9	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**1995**	6	161.4	6.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1995**	7	171.9	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**1995**	8	164.7	6.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1995**	9	143.5	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1995**	10	115.2	5.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1995**	11	85.4	4.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**1995**	12	75.1	4.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**1996**	1	91.7	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**1996**	2	64.8	4.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1996**	3	88.3	4.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1996**	4	164.5	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**1996**	5	187.5	6.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**1996**	6	163.4	6.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**1996**	7	163.1	6.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1996**	8	154.8	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1996**	9	142.8	6.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1996**	10	144.8	6.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1996**	11	93.4	4.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**1996**	12	66.9	5.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**1997**	1	92.9	7.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1997**	2	79.1	7.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1997**	3	102.4	6.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**1997**	4	153.1	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1997**	5	156.4	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1997**	6	194.5	7.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1997**	7	182.2	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**1997**	8	158.8	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1997**	9	142.5	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1997**	10	144.3	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1997**	11	99.2	3.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1997**	12	90.4	3.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1998**	1	92.5	3.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1998**	2	102.7	4.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**1998**	3	91.6	3.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**1998**	4	133.4	4.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**1998**	5	148.4	5.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**1998**	6	169.2	6.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**1998**	7	169.2	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1998**	8	153.9	6.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1998**	9	149.6	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1998**	10	121.1	4.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1998**	11	90.8	4.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**1998**	12	65.0	4.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1999**	1	77.1	5.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1999**	2	71.8	5.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**1999**	3	84.9	4.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1999**	4	159.8	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1999**	5	147.6	5.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**1999**	6	158.5	6.6

MOI INTERNATIONAL AIRPORT - MOMBASA	**1999**	7	180.3	6.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**1999**	8	156.7	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**1999**	9	150.1	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**1999**	10	130.6	5.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**1999**	11	94.7	4.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**1999**	12	77.2	4.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2000**	1	79.9	6.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2000**	2	87.5	6.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2000**	3	108.1	6.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2000**	4	168.7	7.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2000**	5	163.5	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2000**	6	166.4	6.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2000**	7	176.3	6.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2000**	8	183.0	7.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2000**	9	153.2	6.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2000**	10	138.7	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2000**	11	87.4	4.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2000**	12	92.6	4.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2001**	1	90.3	5.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2001**	2	88.0	5.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2001**	3	111.9	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2001**	4	165.8	6.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2001**	5	176.4	7.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2001**	6	173.9	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2001**	7	164.1	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2001**	8	178.1	7.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2001**	9	143.6	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2001**	10	143.7	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2001**	11	95.5	5.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2001**	12	80.0	6.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2002**	1	103.0	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2002**	2	97.2	7.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2002**	3	111.9	5.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2002**	4	161.1	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2002**	5	158.4	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2002**	6	168.1	8.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2002**	7	166.5	7.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2002**	8	171.5	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2002**	9	164.9	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2002**	10	141.5	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2002**	11	89.8	3.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2002**	12	95.1	3.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2003**	1	65.5	5.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2003**	2	74.2	5.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2003**	3	77.5	4.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2003**	4	142.4	5.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2003**	5	164.0	6.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2003**	6	170.4	5.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2003**	7	185.7	6.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2003**	8	153.4	5.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2003**	9	169.8	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2003**	10	139.4	5.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2003**	11	125.5	5.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2003**	12	135.3	6.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2004**	1	116.7	5.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2004**	2	71.6	4.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2004**	3	76.3	4.1

MOI INTERNATIONAL AIRPORT - MOMBASA	**2004**	4	123.5	4.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2004**	5	172.7	7.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2004**	6	182.5	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2004**	7	185.5	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2004**	8	172.0	6.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2004**	9	150.4	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2004**	10	132.1	5.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2004**	11	109.3	4.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2004**	12	90.1	5.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2005**	1	90.7	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2005**	2	96.4	6.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2005**	3	91.7	4.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2005**	4	135.3	5.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2005**	5	183.6	7.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2005**	6	164.2	5.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2005**	7	170.7	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2005**	8	119.6	4.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2005**	9	126.2	4.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2005**	10	128.8	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2005**	11	90.5	4.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2005**	12	76.9	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2006**	1	76.7	6.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2006**	2	65.0	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2006**	3	89.7	4.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2006**	4	156.7	5.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2006**	5	162.1	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2006**	6	188.1	7.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2006**	7	156.9	6.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2006**	8	142.4	5.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2006**	9	140.5	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2006**	10	130.9	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2006**	11	112.4	4.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2006**	12	104.8	5.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2007**	1	82.8	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2007**	2	92.8	7.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2007**	3	98.3	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2007**	4	136.9	6.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2007**	5	177.3	8.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2007**	6	153.2	8.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2007**	7	143.3	7.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2007**	8	164.4	8.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2007**	9	156.8	7.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2007**	10	126.0	6.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2007**	11	88.2	5.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2007**	12	81.7	6.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2008**	1	92.7	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2008**	2	73.2	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2008**	3	122.5	6.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2008**	4	169.4	8.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2008**	5	167.3	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2008**	6	167.9	7.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2008**	7	159.6	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2008**	8	164.0	7.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2008**	9	143.2	6.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2008**	10	120.8	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2008**	11	91.1	5.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2008**	12	126.4	7.7

MOI INTERNATIONAL AIRPORT - MOMBASA	**2009**	1	135.1	8.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2009**	2	118.7	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2009**	3	87.0	6.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2009**	4	138.1	8.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2009**	5	139.8	8.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2009**	6	144.3	8.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2009**	7	161.4	9.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2009**	8	154.4	8.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2009**	9	138.0	8.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2009**	10	102.2	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2009**	11	61.8	5.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2009**	12	65.0	5.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2010**	1	88.4	7.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2010**	2	65.6	6.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2010**	3	71.2	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2010**	4	104.8	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2010**	5	167.5	8.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2010**	6	168.9	9.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2010**	7	153.4	8.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2010**	8	152.0	8.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2010**	9	142.6	7.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2010**	10	104.3	6.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2010**	11	69.6	5.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2010**	12	59.3	5.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2011**	1	94.2	8.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2011**	2	90.1	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2011**	3	77.8	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2011**	4	129.5	7.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2011**	5	168.7	8.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2011**	6	150.6	7.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2011**	7	176.2	8.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2011**	8	149.3	6.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2011**	9	157.8	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2011**	10	151.9	5.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2011**	11	131.9	4.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2011**	12	100.8	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2012**	1	109.7	7.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2012**	2	98.0	7.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2012**	3	96.3	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2012**	4	165.3	7.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2012**	5	188.2	8.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2012**	6	191.9	7.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2012**	7	195.6	7.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2012**	8	184.1	6.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2012**	9	180.1	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2012**	10	162.9	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2012**	11	139.1	5.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2012**	12	128.9	5.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2013**	1	116.9	7.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2013**	2	9.5	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2013**	3	13.9	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2013**	4	17.4	8.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2013**	5	18.5	8.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2013**	6	139.7	7.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2013**	7	16.8	7.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2013**	8	15.6	6.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2013**	9	14.8	7.1

MOI INTERNATIONAL AIRPORT - MOMBASA	**2013**	10	143.6	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2013**	11	87.4	5.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2013**	12	7.1	5.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2014**	1	116.0	8.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2014**	2	95.5	8.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2014**	3	117.0	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2014**	4	146.4	7.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2014**	5	180.5	9.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2014**	6	143.3	6.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2014**	7	153.5	7.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2014**	8	143.8	6.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2014**	9	151.1	7.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2014**	12	100.1	4.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2015**	1	96.1	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2015**	2	96.6	6.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2015**	3	130.7	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2015**	4	167.8	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2015**	5	201.9	7.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2015**	6	196.5	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2015**	7	194.9	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2015**	8	184.3	6.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2015**	9	180.9	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2015**	10	162.5	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2015**	11	134.3	4.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2015**	12	105.3	5.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2016**	1	92.9	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2016**	2	122.1	5.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2016**	3	103.1	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2016**	4	170.7	6.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2016**	5	191.9	7.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2016**	6	183.8	8.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2016**	7	216.1	8.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2016**	8	204.5	7.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2016**	9	171.7	5.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2016**	10	156.9	5.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2016**	11	116.1	5.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2017**	1	108.1	6.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2017**	2	99.1	6.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2017**	3	119.5	5.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2017**	4	185.2	7.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2017**	5	202.8	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2017**	6	200.5	7.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2017**	7	193.4	6.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2017**	8	187.6	6.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2017**	9	183.2	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2017**	10	156.7	5.6
MOI INTERNATIONAL AIRPORT - MOMBASA	**2017**	11	124.2	4.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2017**	12	118.6	5.5
MOI INTERNATIONAL AIRPORT - MOMBASA	**2018**	1	111.7	6.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2018**	2	107.6	5.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2018**	3	132.8	4.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2018**	4	194.2	6.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2018**	5	207.2	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2018**	6	200.5	6.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2018**	7	201.0	6.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2018**	8	190.2	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2018**	9	179.8	6.2

MOI INTERNATIONAL AIRPORT - MOMBASA	**2018**	10	164.0	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2018**	11	141.8	4.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2018**	12	113.5	5.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2019**	1	119.8	6.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2019**	2	108.0	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2019**	3	105.4	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2019**	4	165.4	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2019**	5	199.3	7.3
MOI INTERNATIONAL AIRPORT - MOMBASA	**2019**	6	200.4	7.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2019**	7	197.5	7.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2019**	8	187.3	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2019**	9	184.9	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2019**	10	166.4	5.0
MOI INTERNATIONAL AIRPORT - MOMBASA	**2019**	11	164.4	4.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2019**	12	151.0	4.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2020**	1	136.5	5.8
MOI INTERNATIONAL AIRPORT - MOMBASA	**2020**	2	102.9	4.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2020**	3	166.1	5.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2020**	4	197.8	6.2
MOI INTERNATIONAL AIRPORT - MOMBASA	**2020**	5	209.5	7.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2020**	6	204.2	7.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2020**	7	202.4	8.1
MOI INTERNATIONAL AIRPORT - MOMBASA	**2020**	8	190.8	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2020**	9	181.2	6.4
MOI INTERNATIONAL AIRPORT - MOMBASA	**2020**	10	172.0	5.9
MOI INTERNATIONAL AIRPORT - MOMBASA	**2020**	11	129.9	4.7
MOI INTERNATIONAL AIRPORT - MOMBASA	**2020**	12	113.1	5.2
				6.3

Annex 10: Practicing License of the Lead ESIA Expert

FORM 7 (r.15(2))

nema
mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/18223

Application Reference No: NEMA/EIA/EL/23808

M/S **Kennedy Kijana**
(individual or firm) of address
P.O. Box 254720964333 Nairobi

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**

General

registration number **1254**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **12/30/2022** Expiry Date: **12/31/2023**

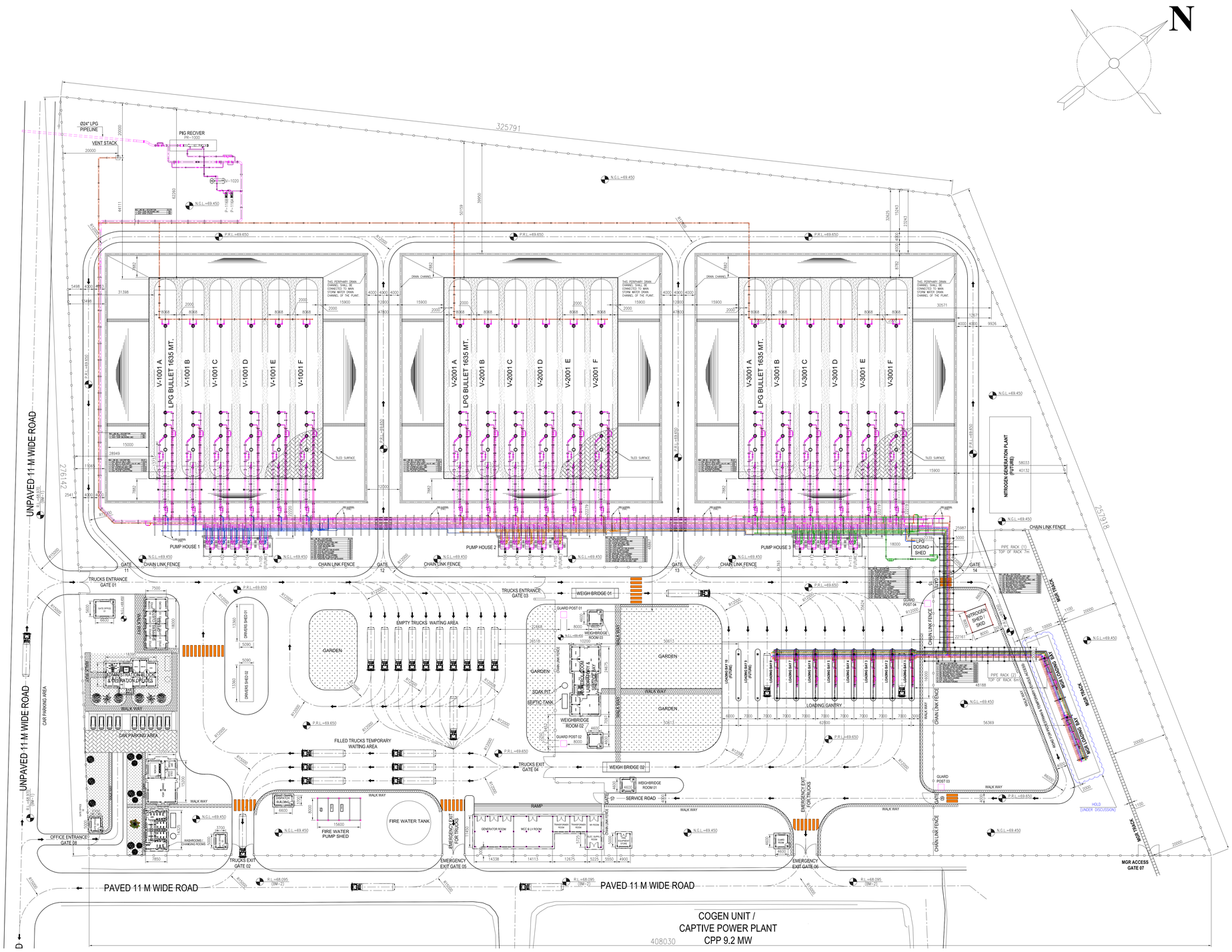
Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

Annex 11: Summary of the Bill of Quantities

Annex 12: Site Development Layouts



LEGENDS:

- LPG
- BUTANE
- PROPANE
- INTERMIX LPG
- NITROGEN

NOTES:

1. ALL LEVELS ARE IN METERS UNLESS OTHERWISE STATED.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
3. ALL PIPING LEVEL (B.O.P.) ARE W.R.T. THE NGL. (i.e. 69.450m)

REVISIONS

REVISION	DESCRIPTION	DATE
REV 0	ISSUED FOR REVIEW	28/11/2022

LEAD CONSULTANT(LOCAL)

R&E MODERN TECHNOLOGIES LTD

R&E MODERNTECHNOLOGIES
P.0 BOX 50692-00200 NAIROBI
CELL: 0729 389 494, 0771217752
email.moderntechnologies@gmail.com

LEAD CONSULTANT (INT'L)

PES Petrochem Engineering Services
An ISO 9001-2015 certified company
B-69, Block No. 18, KDA Scheme No.24, Gulshan-e-Iqbal, Karachi-75300. Pakistan. E-Mail: info@petrochemengg.com.pk, Website: www.petrochemengg.com.pk Tel: (92-21) 34821379, 34827782, Fax: (92-21) 34994054

CLIENT

KENYA PIPELINE COMPANY
Address: Kenpipe Plaza, Sekondi Road, Off Nanyuki Road Industrial Area, Nairobi
Postal Address; P. O. Box 73442 – 00200,
Telephone: 020 2606500-4

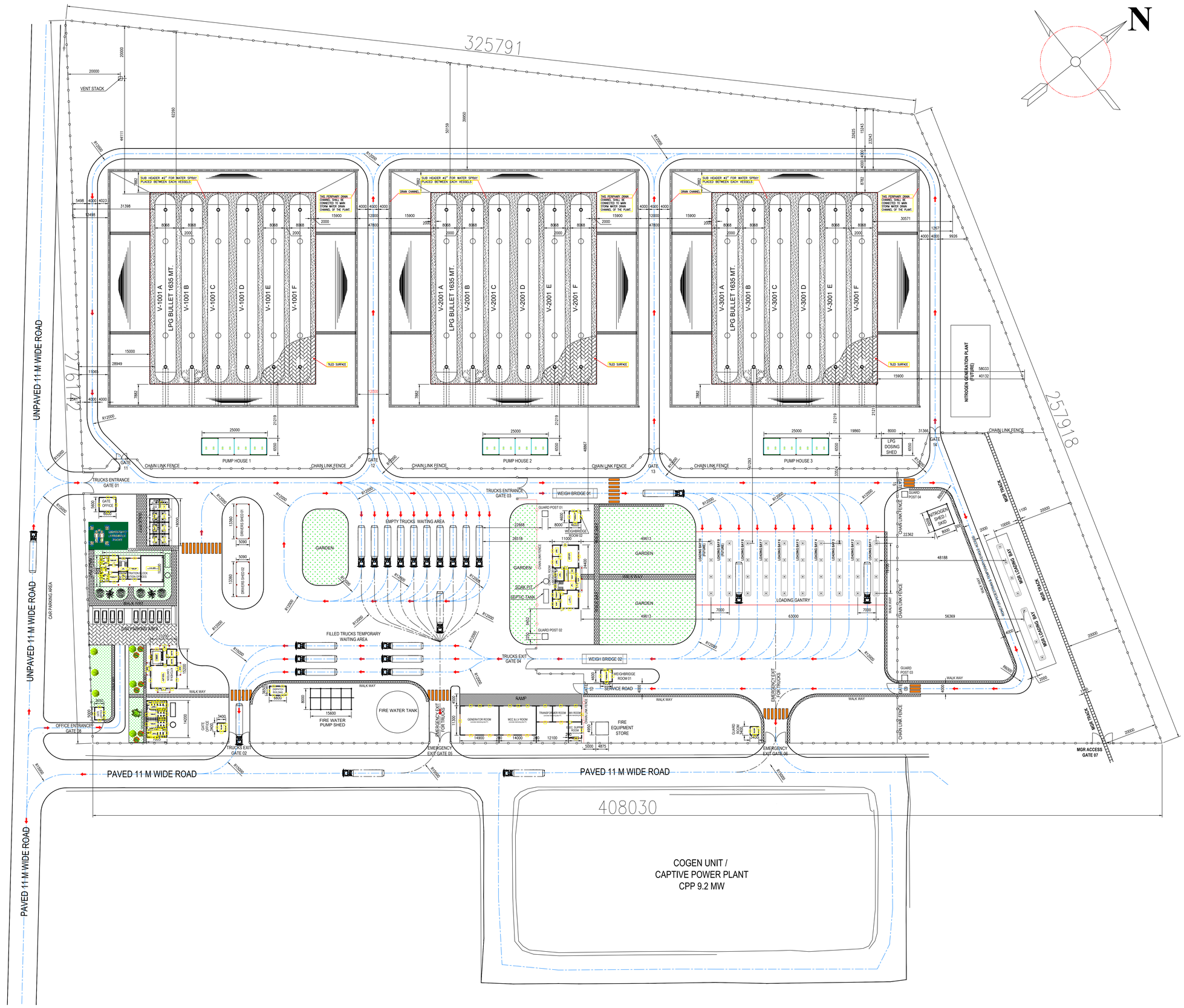
PROJECT TITLE

CONSULTANCY SERVICES FOR FRONT END ENGINEERING DESIGN FOR THE PROPOSED LPG IMPORT,STORAGE AND HANDLING FACILITY AT CHANGAMWE MOMBASA

DRAWING TITLE

PIPING LAYOUT

DESIGNED BY	SCALE	PAPER SIZE	STATUS
ZR	1:500	A0	R
DRAWN BY	**CHECKED BY**	**DATE**	**SHEET NO**
ZR	KZ	NOV 2022	01
DRAWING NO	**PROJECT NO**		
22206-PL-1001	KPC/PU/OT-241 /PROJECTS/KPRL/21 – 22		



GENERAL NOTES:

1. SAFETY DISTANCES LIKE VESSEL/TANK SHELL TO ADJACENT VESSEL/TANK SHELL, VESSEL/TANK SHELL TO PROPERTY LINE (BOUNDARY WALL) HAVE BEEN KEPT AS PER NFPA-58, API 2510, EMMUA, KENYA STANDARD (KS 1938-3:2012 & KS 1938-2:2012) REQUIREMENTS.
2. FIRE FIGHTING SYSTEM SHALL BE DESIGNED AS PER NATIONAL FIRE PROTECTION ASSOCIATION (NFPA-20, 22, 24 & 30) REQUIREMENTS AND API-2510A REQUIREMENTS.
3. FIRE PUMPS SHALL BE OF NFPA-20 TYPE WITH UL LISTING/FM APPROVAL.
4. FIRE WATER PUMPING SYSTEM SHALL HAVE 100% STANDBY ARRANGEMENT.
5. FIRE WATER NETWORK SHALL BE PRESSURIZED ALL THE TIME WITH THE HELP OF JOCKEY PUMP.
6. ALL RISK AREA SHALL BE PROTECTED BY FIREWATER MONITORS/HYDRANTS.
7. FIRE WATER STORAGE TANK SHALL HAVE A CAPACITY OF 4-HOURS FIRE FIGHTING.
8. LPG TANK TRUCK DECANTING/LOADING GANTRY SHALL HAVE FIRW WATER COOLING SYSTEM.

COVERED AREA

DESCRIPTION	AREA (SQ.m)
TOTAL PLOT AREA	937044.37
TOTAL MOUND AREA	25278.18

PLANT AREA SCHEDULE

DESCRIPTION	SIZE (m x m)	AREA (SQ.m)
ADMINISTRATION BLOCK	12.0x23.20	278.40
GUARD ROOM	4.60x4.60	21.16
ELECTRIC SUPPLY ROOM	5.15x6.15	31.67
MV ROOM	5.15x6.30	32.44
TRANSFORMER ROOM	12.30x6.30	77.49
MCC & LV ROOM	14.47x11.30	163.51
GENERATOR ROOM	14.97x11.30	169.16
DISPATCH BUILDING	6.60x3.65	24.09
WASHROOMS/CHANGING ROOMS	7.80x14.20	110.76
KITCHEN & CANTEEN	15.50x11.0	170.50
CONTROL ROOM	11.0x24.40	268.40
GATE OFFICE	3.65x5.0	18.25
WEIGH BRIDGE ROOM 01	4.60x4.60	21.16
WEIGH BRIDGE ROOM 02	4.60x4.60	21.16
GUARD POST	2.25x2.25	5.06
SHIPPERS / CUSTOM OFFICES	7.50x18.0	135.0
FIRE WATER PUMP SHED	15.60x8.0	124.80
PRODUCT PUMP SHED (3 NOS)	25.0x6.55	491.25
GANTRY	63.0x19.10	1203.30
FIRE EQUIPMENT STORE	4.87x4.95	24.10
DRIVER SHED (2 NOS)	5.09x13.36	136.0
FIRE WATER TANK		254.50
LPG DOSING SHED	8.0x6.55	52.40
NITROGEN SHED / SKID	8.0x8.0	64.0
TOTAL AREA		3898.56

REVISIONS

REVISION	DESCRIPTION	DATE
REV C	ISSUED FOR CLIENT FINAL APPROVAL	14/10/2022
REV B	ISSUED FOR INTERNAL REVIEW	03/10/2022
REV A	ISSUED FOR INTERNAL REVIEW	01/09/2022

LEAD CONSULTANT(LOCAL)

R&B MODERNTECHNOLOGIES

P.O BOX 50692-00200 NAIROBI
CELL: 0729 389 494, 0771217752
email.moderntechnologies@gmail.com

LEAD CONSULTANT (INT'L)

PES Petrochem Engineering Services
An ISO 9001-2015 certified company

B-69, Block No. 18, KDA Scheme No.24, Gulshan-e-Iqbal, Karachi-75300. Pakistan. E-Mail: info@petrochemengg.com.pk, Website: www.petrochemengg.com.pk Tel: (92-21) 34821379, 34827782, Fax: (92-21) 34994054

CLIENT

KENYA PIPELINE COMPANY

Address: Kenpipe Plaza, Sekondi Road, Off Nanyuki Road Industrial Area, Nairobi
Postal Address: P. O. Box 73442 – 00200,
Telephone: 020 2606500-4

PROJECT TITLE

CONSULTANCY SERVICES FOR DETAILED ENGINEERING DESIGN FOR THE PROPOSED LPG IMPORT,STORAGE AND HANDLING FACILITY AT CHANGAMWE MOMBASA

DRAWING TITLE

PROPOSED PLOT PLAN (OPTION-3)

DESIGNED BY	SCALE	PAPER SIZE	STATUS
AH	1:500	**A0**	**R**
DRAWN BY	**CHECKED BY**	**DATE**	**SHEET NO**
ZR	KZ	SEP 2022	**01**

DRAWING NO 22206-LDM-1001

PROJECT NO KPC/PU/OT-241 /PROJECTS/KPRL/21 – 22