

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT STUDY REPORT
FOR**

**THE PROPOSED CONSTRUCTION OF A SMALL SCALE LIQUIFIED
PETROLEUM GAS IMPORT AND STORAGE TERMINAL PLANT OF 1,000 METRIC
TONNES CAPACITY WITH AN ADDITIONAL 10,000 METRIC TONNES FLOATING
STORAGE LOCATED ON PLOT NUMBER BLOCK XLVII/173 WITHIN CORMACO
SUPPLY BASE, MOMBASA COUNTY.**



Prepared for

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Prepared by:



Our Future, Our Responsibility

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ACKNOWLEDGEMENT

This study report has been prepared as an endeavour to comply with the legal requirements as stipulated in Section 58 (2) of the Environmental Management and Coordination Act, EMCA CAP 387, and the Environmental (Impact Assessment and Audit) Regulations, 2003.

Tropospace Consultancy Limited takes this opportunity to thank the management of Mansa East Africa Limited (the Proponent) for contracting us to conduct this Environmental/Social Impact Assessment for the proposed LPG Terminal to be located on Plot LR number Mombasa/Block XLVII/173, Comarco Supply Base, Mombasa County.

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

The production of this study report was a collective effort of various stakeholders. Sincere appreciation to the neighbours of Comarco supply base and members of the general public for participating in the public consultation through Baraza, interviews and survey questionnaires.

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DECLARATION

This study report has been prepared with authority from the proponent for presentation to the National Environment Management Authority (NEMA) in accordance to legal requirements as stipulated in the Environmental Management and Coordination Act (EMCA CAP 387) and the Environmental (Impact Assessment and Audit) Regulations, 2003. All the information in this report is true and accurate to the best of our knowledge.

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ASSIGNMENT: To carry out an environmental/social impact assessment study for the proposed LPG Terminal

REPORT TITLE: Proposed Construction of an LPG Import and Storage Terminal of 1000 MT Capacity and 10,000 floating storage to be Located on Plot Number Block Xlvii/173 Comarco Supply Base, Mombasa County

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ACRONYMS

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

EXECUTIVE SUMMARY

Mansa East Africa Limited herein referred to as the proponent proposes to establish a LPG Terminal of 1000 MT above ground tanks, 10,000 MT floating storage vessel & other associated facilities and amenities on Plot Number Block XLVII/173, within Comarco Supply Base, Mombasa County and on coordinates 4.065603, 39.6547717 Latitude and Longitude respectively.

This ESIA study report has been undertaken by Tropospace Consultancy Limited Team of experts (NEMA registered and licensed experts). The firm of Experts was commissioned by the proponent to undertake the ESIA study in accordance to the legal requirements as stipulated in section 58 (2) of the Environmental Management and Coordination Act (EMCA CAP 387) and the Environmental (Impact Assessment and Audit) Regulations, 2003 and all other relevant laws applicable to this project.

The proposed development activities will mainly involve civil, mechanical and electrical works associated with the installation of the LPG tanks and its associated facilities. In addition, the Installation of floating storage and its infrastructure will be done as per the design drawings which should meet the ERC standards. The main activities to be carried out in the development of the proposed project include excavations or earth works, installation of above the ground tanks, Installation of the floating storage and other associated facilities. The proposed project is expected to commence upon obtaining all statutory approvals which among them include but not limited to; NEMA approval, ERC approvals, County Developmental approvals, KPA approval and the Kenya maritime approvals.

The project site is located on the Kenya ports Authority leased industrial land. The neighbourhood is characterized by shipping companies, warehouses and Bandari School. The project area is served by Mikanjuni Road and Taib Bin Nasir roads all within Ganjoni Location.

Project Objective

The proposed LPG terminal is aimed at increasing the supply of LPG within the coast region and the Country as a whole. The government of Kenya has already enacted policies to promote use of LPG and ban on use of wood as a means of clean energy production.

Project Cost Estimate

The proponent has undertaken a preliminary estimate of the total project cost using experienced consultants. The estimated total project cost is approximately Kenya shillings Five Hundred million. (Kshs. 500,000,000).

Project Description:

Technical Description

The proposed project entails:

- i. Installation of two above ground LPG tanks of 250 metric tonnes with an additional two tanks of 250 tonnes to be installed at a later stage
- ii. Utilisation of an initial 6,000 metric tonne floating storage vessel (probably no older than 5 years but always less than 15 years of age) and its infrastructure before moving to a larger 10,000 metric tonne floating storage vessel.
- iii. Pipe works and civil works.
- iv. Installation of tanker loading/unloading gantry premises.
- v. Paint works
- vi. Weighbridge installation
- vii. Fire and emergency systems. Water reservoir fitted with pump systems. Fire hydrants, LPG leak detection and Emergency shutdown systems.
- viii. Construction of office ablutions, washrooms and a waste water system connected to the municipal sewer.

The proposed project will be designed, installed and operated in compliance with applicable national and international EHS guidelines and standards. Mansa East Africa Limited will put in place all mechanisms, processes and procedures to eliminate mitigate, control identified risks and promote continuous improvement. In addition, the proponent will apply HSEQ guidelines in all planning, construction, operational and decommissioning phases of the project. The fire system will automatically be integrated into the LPG operations to ensure that the fire and emergency Shutdown systems operate independently to isolate LPG supply and activate the emergency shutdown systems. In the event of an emergency, the facility will have integrated emergency shutdown buttons placed at strategic locations for the staff to isolate the plant and activate emergency systems.

An elaborate environmental and social management and monitoring plan (ESMMP) on all phases of this project has been prepared. The ESMP details comprehensive environmental protection strategies. The ESMMP contains the management programmes and plans for handling the adverse environmental impacts.

Construction Phase

The contractor will barricade the site in accordance to the County by-laws and erection appropriate warning/ informative signs (bill boards) at the site. The contractor will also provide appropriate traffic control along the access to the site. Compaction and watering of loose soils on all unpaved access areas will be done to minimize air pollution and erosion by the agents of soil erosion including water and wind. Workers on site will be provided with appropriate personal protective equipment (PPE) and encouraged to use during operations. The same workers will be continuously reminded of Environmental, Health and Safety best practice during their tool box

meeting. The contractor will maintain on site a well-stocked first aid box and at least one trained first aider during operation hours.

Consultations will be done with Kenya Port authority to incorporate the LPG terminal installation of the Floating storage and its infrastructure into the Marine traffic plan.

Sewerage system will be properly designed (using approved materials), installed and effectively drained. Surface drainage system will be made in a way that will direct all potentially contaminated surface waters from the site into an oil/water interceptor. The contractor will also put in place effective and efficient solid waste disposal systems. In this case, solid waste will include excavated soil and debris, which will be properly disposed of by backfilling or dumping in grounds approved by the County.

Upon completion of the construction, measures will be undertaken to restore the affected biodiversity through landscaping; i.e. planting of trees and grasses to cover unpaved areas. The contractor and the proponent will implement the proposed mitigation and monitoring plan in order to protect the environment from any negative impacts.

Operational Phase

The proponent will put in place formal operation procedures which guarantee high operating standards in the areas of environmental, health and safety management. The proponent will also ensure that prior to engaging or assigning anybody any task within the plant, the individual undergoes full induction training on the operating standards developed for the plant. This measure will guarantee safe operations.

The proponent will provide personal protective equipment to all employees based on the PPE evaluation. In addition, a continuous awareness creation for employees by the proponent on health and safety matters. The proponent will develop and implement a sound emergency response plan. Adequate fire management plan will be implemented for the envisaged worst-case scenario. Procedures for utilities to be developed so as to optimize on their use. The staff will be encouraged to turn off unnecessary lights and not to leave water taps running. Workers will be provided with appropriate personal protective equipment (PPE) and encouraged to use them during operations.

A complete firefighting system will be provided after completion of the project. The equipment should be clearly indicated in the design plan, and in the report. This will be installed or provided at strategic points. The fire extinguishers will be serviced accordingly i.e. after every six months to ensure effective and efficient performance when required.

Emergency shut downs (ESDs) will be installed in strategically locations around the facility to enable quick power cut off from all the operations in the case of emergency. In addition, gas leakage detectors and adequate fire hydrants will be installed. An adequately stocked “First Aid Box” will be provided and the facility employees will be properly trained on how to administer first aid. Sound solid waste management systems and procedures will be implemented. This will

involve provision of solid waste collection bins; segregation of waste at source, appointing a reputable garbage collector etc. during operation phase.

The drainage and interceptor maintenance will be carried out regularly, including cleaning the interceptors of foliage, rubbish and grit. Sewerage system will be regularly maintained. The proponent will implement the proposed mitigation and monitoring plan in order to protect the environment from any negative impacts.

Decommissioning phase

Decommissioning refers to the final disposal of the project and associated materials at the expiry of the project life span or when the proponent opts out of the LPG business. During this stage, the proponent will be expected to demolish the site and remediate the soil.

During the decommissioning phase, the contractor will put in place effective and efficient waste disposal systems. Waste, including excavated soil and debris will be properly disposed of by backfilling or dumping in grounds approved by the County Government.

Potential Positive impacts of the proposed project

The proposed project will have positive impacts to the society and the general environment. Some of the benefits include the following: -

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

Potential negative environmental impacts

Anticipated Impacts

The anticipated impacts during the project's entire cycle namely, construction, operation and decommissioning phase include;

- i. Land degradation and contamination due to construction activities;
- ii. Air pollution;
- iii. Noise nuisance during construction;
- iv. Contamination of water resources due to construction activities;
- v. Solid and liquid waste generation;
- vi. Dust nuisance during construction phase of the project;
- vii. Limited Vegetation loss;

- viii. Increase in vehicular traffic in the area both from construction vehicles as well as during operational phase of the facility.
- ix. Increased demand for water and electricity supply to the area;
- x. Impacts of solid waste from the proposed LPG terminal
- xi. Occupational accidents and diseases.

Table 2: Showing some of the project negative impacts and their proposed mitigation measures.

Expected Negative Impacts	Recommended Mitigation Measures
Solid waste generation	<ul style="list-style-type: none"> ● Ensure solid waste generated at the plant is regularly disposed of appropriately at authorized dumping areas. Use of integrated solid waste management of options i.e. source reduction, recycling, composting and re-use, combustion and sanitary land filling. ● Carry out environmental awareness training to construction workers and plant employees during operation. ● A NEMA licensed private company to be contracted to collect and dispose solid waste on regular basis.
Release of sewage to the environment	<ul style="list-style-type: none"> ● Effluent disposal to be channelled into an existing sewer line. ● Apply for an effluent discharge license from NEMA. ● Conduct regular inspection for the system to ensure it works effectively.
High demand for water	<ul style="list-style-type: none"> ● Create water conservation awareness. ● Install a discharge meter at water outlets to determine and monitor total water usage. ● Ensure water taps are not running when not in use. ● The management to conserve water e.g. by avoiding unnecessary toilet flushing. ● Promptly detect and repair of water pipes and tank leaks.
Security	<ul style="list-style-type: none"> ● Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premise.
Fire control	<ul style="list-style-type: none"> ● Fire extinguishers to be placed at strategic positions. ● Emergency shutdown devices (ESD) to shut down the plant in situation of fire. ● Servicing of fire extinguishers as is necessary. Always inspect electricity wires. ● Sufficient water storage tank with connected water network and firefighting nozzles.
High demand for electricity	<ul style="list-style-type: none"> ● Switch off electrical appliances and lights when not in use. ● Install occupational sensing lights at various locations such as storage areas which are not in use all the time. ● Install energy saving fluorescent tubes.

	<ul style="list-style-type: none"> ● Monitor energy use during the operation of the project and set targets for efficient use. ● Sensitize workers to use energy efficiently.
Dust disturbance	<ul style="list-style-type: none"> ● Avoid excavation works in extremely dry weather. ● Regular sprinkling of water to be done on open surface and dusty grounds during dry season until paving is done. ● Ensure strict enforcement of on-site speed limit regulations. ● Covering of all haulage vehicles carrying sand, aggregate and cement. ● Stockpiles of fine materials (e.g. sand and ballast) should be wetted or covered with tarpaulin during windy conditions. ● Access roads and exposed ground must be wetted at a frequency that effectively keeps down the dust. ● Workers in dusty areas on the site should be issued with dust masks during dry and windy conditions. ● Providing appropriate enclosure for the concrete mixer and ● Use of dust nets during construction.
Noise disturbance	<ul style="list-style-type: none"> ● Sensitize construction drivers to avoid running of vehicles engines or hooting especially when passing through sensitive areas such as churches, schools, residential areas or hospitals. ● Ensure the construction machinery are well kept in good condition. ● Sensitize construction drivers and machinery operators to switch off engines when not in use. ● Trees to be planted on site to provide some buffer against noise propagation. ● Ensure all generators and heavy machines are insulated or placed in an enclosure to minimize ambient noise levels. ● Restrict noisy construction activities to normal working hours (8am -5pm). ● Inform local residents beforehand, via notices and advisories, of pending noisy periods and solicit their tolerance well before the commencement works. ● Workers operating equipment that generate noise should be equipped with noise protection gear including ear muffs and plugs. Workers operating equipment generating noise levels greater than 80dBA continuously for 8 hours or more should use earmuffs. ● Limit pick-up trucks and other small equipment to an idling time of five minutes, observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible. ● All construction equipment should be regularly inspected and serviced.

Marine Traffic/Road Traffic control	<ul style="list-style-type: none"> ● Consultations will be done by the proponent and the Kenya Port Authority to incorporate Installations of the Floating storage and its infrastructure. In addition, KPA is required to incorporate LPG terminal in the Marine master plan. ● Appropriate traffic signs to other motorists should be placed along the main road in the vicinity of construction site. Notices/advisories will be issued to pending traffic inconveniences and solicit tolerance by local residents before the commencement of construction works. ● As far as possible, transportation of construction materials should be scheduled for off-peak traffic hours. ● Flagmen should be employed to control traffic and assist construction vehicles as they enter and exit the project site. ● Maintain on site a record of incidents and accidents. ● The Floating storage and its infrastructure installation to be incorporated into the KPA marine master plan
Contamination of underground water sources	<ul style="list-style-type: none"> ● Ensure all works are done as per the approved designs ● Ensure regular inspection of all piping within the project area

Environmental and Social Management and Monitoring Plan for the proposed LPG Plant.

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

- i. Solid waste management plan.
- ii. Sewage management plan.
- iii. Noise management plan.
- iv. Dust management plan, and
- v. Occupational Hazards Management Plan.

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

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

Environmental and Social Management and Monitoring Plan for the proposed Project

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

- i. Monitoring of the achievements of specific plans of the environmental and social management plan, performance criteria and fulfilment of objectives;
- ii. Systematic inspection of workplace;
- iii. Surveillance and monitoring of the work environment, including the organization of work and activities involved;
- iv. Monitoring of workers' health; and
- v. Monitoring of compliance with laws, regulations and requirements.
- vi. Environmental conservation and related activities in the area;
- vii. Work related injuries, ill health (including record keeping and monitoring of sickness/absence), disease and accidents;
- viii. Losses such as damage to property;
- ix. Deficient safety and health performance including OHSMS failures;

Decommissioning plan for the project.

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

Table 3: Summary of demolition plan

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

Evaluation of alternatives

Project relocation alternative

Relocation is one of the alternatives for this project. In this case, the proponent will have to move the project to another site instead of implementing it on the proposed site. This is not however a feasible option considering that:

- i. At the moment, the proponent has no alternative sites for relocation.
- ii. Finding and acquiring land to accommodate the scale, type and size of the project and completing official transaction may take longer and delay the project.

- iii. Even if the land was to be obtained, there is no guarantee that such land would be suitable in terms of environmental, health and safety requirements; accessibility and zoning based on land use.

The No action alternative

The other best alternative to address the significant impacts is the No action alternative. This alternative will ensure that things remain unchanged. The environment therefore will not be tampered with. This option is not feasible. This is due to:

- i. It results in losses to the project proponent and other stakeholders, society and the Government.
- ii. The proponent will continue to pay high taxes/land rate on the underutilized property.
- iii. Lack of the facility amounts to forfeiture of economic benefits that would accrue to the proponent, the public and the government, and it could also discourage investors wishing to invest in the sector.
- iv. Lack of creation of employment, hence, effect on socio-economic empowerment of the society.

Alternative design and technology

The proponent would also have opted to adopt alternative design and technology. This option too is not feasible since the adopted technology in this project is a brain child of various professionals including architect, engineers, and surveyors and environmental consultants who have vast experience in the LPG and oil industry regulations and standards both local and international and they settled for the best as a way of fostering best practice within the industry. From the analysis, it becomes apparent that all the available alternatives are not viable hence inappropriate for this project.

Conclusion and Recommendation

Considering the proposed project location, design and construction technology, operational management by the proponent of the proposed LPG terminal to undertake this project, mitigation measures that will be put in place and the potential to encourage industrialization in Mombasa County, the implementation of this project is of paramount importance and beneficial not only to the proponent but also to the people of Mombasa County and the entire country at large. It is therefore our wish to recommend the project to go on with full compliance with the requirements of the law.

TABLE OF CONTENTS

ACKNOWLEDGEMENT	ii
DECLARATION	iii
ACRONYMS	iv
EXECUTIVE SUMMARY	v
CHAPTER ONE	1
1.0 BACKGROUND INFORMATION	1
1.1 Project Background	1
1.2 Terms of Reference (TOR) for the ESIA Process	2
1.3 Project Objectives	2
1.4 Data collection	2
1.4.1 Review of secondary data	3
1.4.2 Interviews	3
1.4.3 Public Meetings and Barazas	3
1.4.4 Baseline environmental survey	3
1.5 Assessing significance of Impacts	3
1.6 Purpose of this Report	4
CHAPTER TWO	5
2.0 PROJECT DESCRIPTION	5
2.1 Proposed project location	5
2.2 Proposed Project Description	5
2.2.1 Nature of the Project	5
2.2.2 Project Design	5
2.2.3 Pumps	6
2.2.4 Fire and emergency systems	6
2.3 Project activities	7
2.3.1 Construction phase	7
2.3.2 Operational phase	7
2.4 Material, products and by-products and disposa	18
2.4.1 Construction Phase	8
2.4.2 Operational phase	8
2.4.3 Decommissioning phase	8

CHAPTER THREE.....	10
3.0 BASELINE INFORMATION.....	10
3.1 Project Location.....	10
3.1.1 Site ownership.....	10
3.2 Administrative units.....	10
3.3 Physical environment.....	10
3.3.1 Topography.....	10
3.3.2 Soils.....	10
3.3.3 Water Resources and Sanitation.....	11
3.3.4 Climate, Rainfall, Temperature and Disaster Risk Vulnerability Profile.....	11
3.4 Biological environment.....	12
3.4.1 Flora.....	12
3.4.2 Fauna.....	12
3.4.3 Forests.....	12
3.5 Land Use and Zoning.....	12
3.6 Infrastructure.....	12
3.6.1 Roads, Harbour and Rail Network.....	12
3.6.2 Energy supply and Access.....	13
3.6.3 Water.....	13
3.6.4 Telecommunication and Postal Network.....	13
3.7 Socio-Economic profile.....	13
3.7.1 Population Size and Composition.....	13
3.7.2 Cooperatives, Trade, Commerce and Financial Institutions.....	13
3.7.3 Agriculture, Livestock and Fisheries	14
3.7.4 Education Institutions.....	14
3.7.5 Markets and Urban Centres.....	14
3.7.6 Mining.....	14
3.7.7 Tourism.....	14
3.7.8 Employment.....	15
3.7.9 Health.....	15
CHAPTER FOUR.....	17
4.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK.....	17
4.1 National Legal Framework.....	17

4.1.1 The Constitution of Kenya, 2010.....	17
4.1.2 Vision 2030.....	18
4.2 National Policies.....	18
4.2.1 The National Environment Policy, 2013.....	18
4.2.2 National Policy on Water Resources Management and Development (Sessional Paper No.1 of 1999).....	18
4.2.3 The Draft National Energy and Petroleum Policy 2015.....	19
4.2.4 Policy on Environment and Development.....	19
4.2.5 The Land Policy (Sessional Paper No. 3 of 2009).	20
4.2.6 The Kenya Health Policy (2012 – 2030)	20
4.2.7 The National Environmental Sanitation and Hygiene Policy, (2007).....	20
4.3 National Regulatory Frameworks.....	20
4.3.1 Environmental Management and Co-ordination Act, CAP 387.....	20
4.3.2 EMCA Related Regulations.....	21
4.3.3 Other Environment, health and safety, physical planning related laws.....	23
4.3.4 Lands Act, 2012 No. 6 of 2012.....	31
4.4 International Environmental and Social Impact Provisions and Safeguards.....	31
4.4.1 International Environmental Guidelines.....	31
4.4.2 World Bank’s safeguard policies.....	32
4.4.3 World Bank Safeguard Policy 4.01-Environmental Assessment.....	32
4.4.4 Petroleum Industry Guidelines.....	33
4.4.5 Identified Applicable Performance Standards, January 2012.....	33
4.4.6 The International Code for the Security of Ships and Of Port Facilities.....	33
4.4.7 The World Bank Group’s Environmental, Health and Safety (EHS) Guidelines	34
4.4.8 Bamako Convention on the Ban of the Import into Africa and the Control of Trans boundary Movement and Management of Hazardous Wastes within Africa, 1991.....	34
4.5 National Institutional Framework.....	34
4.5.1 National Environment and Management Authority.....	34
CHAPTER FIVE.....	35
5.0 PUBLIC CONSULTATION AND PARTICIPATION.....	35
5.1 Objectives of Public Consultation and Participation.....	35
5.2 Methodology.....	35
5.2.1 Site Reconnaissance.....	35
5.2.2 Questionnaire Administration.....	35

5.2.3 Findings.....	36
5.3. Summary of major concerns (questionnaires& interview sessions).....	37
CHAPTER SIX.....	40
6.0 ENVIRONMENTAL AND SOCIAL IMPACTS AND THEIR MITIGATIONS.....	40
6.1 Introduction.....	40
6.2 Positive Impacts.....	40
6.3 Impact Classification.....	40
6.4 Environmental and social negative impacts during pre-construction stage.....	42
6.4.1 Social Impacts.....	42
6.4.2 Environmental Impacts.....	42
6.5 Negative impacts during project construction phase.....	42
6.5.1 Social and environmental impacts.....	42
6.6 Negative Impacts during Post-construction.....	49
6.6.1 Social Impacts.....	49
6.6.2 Project decommissioning.....	50
CHAPTER SEVEN.....	51
7.0 PROJECT ALTERNATIVES.....	51
7.1 The proposed site.....	51
7.2 No Project Alternative.....	51
7.3 Site Alternatives.....	51
7.4 Alternative Technology.....	52
7.5 Alternative Construction materials.....	52
CHAPTER EIGHT.....	53
8.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN.....	53
8.1	
Introduction.....	53
8.2 Approach to environmental impact management.....	53
8.3 Responsibility and Accountability.....	54
8.4 Management of Contractors.	55
8.5 Training, Awareness and Capacity Building.....	56
8.7 Incident handling and Reporting.....	56
8.8 Checking and corrective action	57
8.9 Corrective Action.....	57

8.10 Reporting	57
CHAPTER NINE	72
9.0 PROJECT DECOMMISSIONING	72
9.1 Overview	72
9.2 Removal of liquefied petroleum gas storage tanks	72
9.3 Description of the project’s decommissioning activities	72
CHAPTER TEN	80
10.0 CONCLUSION AND RECOMMENDATIONS	80
10.1 Conclusion	80
10.2 Recommendations	80
REFERENCES	82
APPENDICES	83

List of tables

Table 1: participating consultants and staff	ii
Table 2: showing some of the project negative impacts and their proposed mitigation measures	ix
Table 3: summary of demilotion plan	xii
Table 4: The Kenya Standards available for the petroleum sub-sector	29
Table 5: Summary of issues and comments provided during public participation (as per questionnaires administered and interview response)	37
Table 6: Assessment criteria of significant impacts	41
Table 7: Potential environmental impacts	41
Table 8: Showing the Environmental and Social Management in Monitoring plan	58
Table 9: decommissioning plan	74

List of figures

Figure 1: Satellite image showing the location of the proposed project site within Cormarco supply base in Mombasa County, (Source: Google Earth)	
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CHAPTER ONE

1.0 BACKGROUND INFORMATION

The annual LPG consumption in Kenya stood at 148,800 MT according to the report published by PIEA in the third quarter of 2016. Even more promising is the fact that LPG consumption has increased about 59% between 2003 and 2016 according to reports available in the Petroleum Industry subsector in Kenya. Despite this rapid growth, LPG Consumption in Kenya still compares poorly with world statistics at 95.5Ktoe against a world average of 1434Ktoe and 384Ktoe in low income economies (Ministry of energy report-MOE). This consumption has however been rising at a steady pace. At an average growth of 14% annually (PIEA 2016) it is projected that the country will have 70% LPG penetration by the year 2030. However, this growth has mainly been concentrated in urban and peri-urban areas of Kenya.

The energy sector contributes 20% of tax revenue and makes up 4% of the GDP according to Kenyan budget estimates of 2016. It is therefore urgent and important that such a crucial sector is supported fully to realize its potential especially in the rural areas. LPG development as a source of energy is a major part of this initiative. The annual demand for energy in Kenya is rising. Last year for instance, it was estimated that the country's annual energy demand grew about 15%. This requires diversified energy sources to support a growing economy and ensure sustainability.

It is estimated that over 97 percent of Kenya's nine million households rely on traditional sources of cooking energy (Dalberg, 2013). It is important to note that many households practice energy stacking, supplementing modern energy such as LPG with alternative sources of fuel such as wood, charcoal and kerosene. A deliberate effort has to be made to guide a household's hands to choose more efficient, more economical energy sources, LPG therefore should be at the forefront of this energy ladder.

1.1 Project Background

For a very long time, many development projects worldwide didn't take into account the effects of projects on the environment. This led to much environmental degradation which caused environmental problems. Some of these problems have been irreversible and costly. In Kenya for instance, the policies, programs and strategies did not integrate environmental issues into development. A comprehensive environmental policy was therefore needed to take care of the environment in a holistic way. This was achieved through enactment of the Environmental Management and Coordination Act (EMCA), CAP 387.

The Act stipulates that Environmental Impact Assessment be carried out on projects in the Second Schedule. It is in response to this provision that this study report has been prepared. The proposed project entails the construction of an LPG Terminal at Cormaco Supply Base, Mombasa County. The proponent, Mansa East Africa Limited is a company incorporated in Kenya under

the Companies Act (Cap. 486). The proposed LPG terminal will be of 1,000 metric tonnes above ground LPG tanks and its infrastructure and a floating storage of 10,000 metric tonnes at Comarco supply base, Mombasa County.

1.2 Terms of Reference (TOR) for the ESIA Process

The Terms of Reference of the Environmental Impact Assessment study included the following:

- i. Importance of the facility
- ii. Standards, legal and regulatory framework
- iii. Proposed facility-location
- iv. Neighbouring facilities
- v. Environmental degradation likely to arise from the construction activities
- vi. Risks associated with any fire outbreaks.
- vii. Environmental risks associated with the Spillage/Leakage of the stored products (impacting soil and groundwater).
- viii. Environment mitigation and management measures to address the above potential risks,
- ix. Environmental Monitoring Plan
- x. Time Frame for executing the work
- xi. Conclusions and recommendations

1.3 Project Objectives

The main objective is to prepare an ESIA study report for the proposed 1,000 metric tonnes above ground LPG tanks and its infrastructure and a floating storage of 10,000 metric tonnes at Comarco supply base and to ensure the proposed development takes into consideration appropriate measures to mitigate any adverse impacts to Human and Natural environment

1.4 Data collection

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

The following techniques were used:

1.4.1 Review of secondary data

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

1.4.2 Interviews

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

1.4.3 Public Meetings and Barazas

The experts convened meetings with the Ganjoni area local chief, community elders and members of the public and obtained views and concerns of the public in regards to the proposed LPG terminal. The participants views raised were meant to predict possible positive impacts and possible negative impacts to the natural environment and human environment. The public meetings also highlighted opinions of how negative impacts on the natural and human environment can be mitigated. Questionnaires and stakeholder list are annexed to this report.

1.4.4 Baseline environmental survey

Kenyan regulators through legislation have ensured that Environmental concerns have been integrated in the planning and implementation processes of any proposed projects in Kenya. The key objective is to mitigate conflicts with the environment at the vicinity; during implementation, operational and decommissioning phases. In addition, it is now mandatory for the proponents of such projects to carry out environmental and social impact Assessments (ESIAs), to enhance sustainable environmental management (SEM) as well as controlling and revitalizing the much-degraded environment. The environmental management is the mandate of National Environmental Management Authority (NEMA) in Kenya.

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

1.5 Assessing significance of Impacts

The first stage of impact assessment is identification of environmental activities, aspects and impacts. The significance of the impacts is then assessed by rating each variable numerically.

The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a value.

The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring. The values for likelihood and consequence of the impact can be represented in values a rating matrix and it is determined whether mitigation is necessary.

1.6 Purpose of this Report

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

CHAPTER TWO

2.0 PROJECT DESCRIPTION

2.1 Proposed project location

The proposed project will be developed on Plot L.R. No. Mombasa/Block XLVII/173, Comarco Supply Base, Mombasa County. The registered proprietor of the certificate of lease of land is Touchwood Investments Limited. Touchwood Investments Limited has subsequently issued a land lease agreement to Mansa east Africa Limited. Touchwood investment limited has a 33 years old lease (as at 1st January 2003) from Kenya Ports Authority. Geographically, the site is located on 4.065603, 39.6547717 Latitude and Longitude



Figure 1: Satellite Image showing the location of the proposed project site within Comarco Supply Base in Mombasa County, (Source: Google Earth).

2.2 Proposed Project Description

2.2.1 Nature of the Project

The proposed project involves establishment of an LPG Terminal that includes the internal road ways and concrete hardstands for loading and unloading bulk vehicles

2.2.2 Project Design

The proposed project is an LPG terminal of 1000MT capacity to be located on plot number block XLVII/173, at Comarco Supply Base, Mombasa County. The project will be done in two phases as summarized below:-

- i. Phase one design will entail construction and installation of the tanks with 2 x 250 tonne above ground LPG tanks & an interim operational capacity of 500t, fed from an approximately 6,000MTS floating storage together with ancillary infrastructure providing for the loading of road tankers and iso-containers for rail and other associated facilities and amenities.
- ii. Phase two of the project will as well include installation of 2 x 250 tonne above ground LPG tanks and an increase of floating storage to 10,000MTS to accommodate the increased storage and volumes.

The installation also includes the internal road ways and concrete hardstands for loading and unloading bulk vehicles. The road tanker loading / unloading gantry will require roadways for road tanker access to the loading / unloading gantry from the entrance of the premises which will be able to accommodate two (2) LPG road tankers at a time. The turnaround time for Road tankers will be in the region of 60-90 minutes allowing the processing of 12-18 road tankers in a standard 9-hour work day as required.

The facility will be fitted with breakaway connections and a full fire water deluge system which covers the vehicles whilst in the bay. The two vehicle loading bays will each comprise of an electronic weighbridge with automatic filling systems for safety purposes. Bulk tank installation will consist of 2 x 250 tonne (500cbm) LPG tanks that have been built in accordance with the requirements of Kenyan standard KS-1938-2006 Handling, storage, and distribution of liquefied petroleum gas in domestic, commercial, and industrial installations. The LPG tanks are to be coated with an approved undercoat and paint to prevent corrosion.

The tanks are all fitted with excess flow valves on all outlets and non-return valves on process lines. This is to ensure that the vessels will isolate in the event of a ruptured pipeline. In addition to this the tanks are fitted with ASA 300 manual actuation valves and the liquid lines have the added safety of pneumatically operated valves. The LPG tanks are fitted with Electronic tank gauging with high liquid level alarm to prevent over fill of the tanks. In conjunction with this the tanks will also be fitted with Magnate mechanical float gauges as redundancy.

2.2.3 Pumps

The pump discharge lines will be connected into a common manifold and will provide a piping network to all transfer operations.

2.2.4 Fire and emergency systems

The facility will have a 1500 000 litre fire water reservoir installed with a diesel driven fire pump set to provide a minimum of 800 m³/h of water a minute at 10 bar for the coverage of the following locations:

- Pump and equipment stations for the Aboveground tank installation.
- LPG road tanker unloading /loading facilities fire water deluge systems.
- 2 x 110 mm fire hydrants with 30 meters of Fire hose each and Quadra-fog hand held firefighting nozzles for Firefighting and LPG leak dispersion.
- 1 x Fire water monitor (Monsoon/Typhoon or equivalent) located to cover the site limits.

The fire system will be automatically integrated into the LPG operations to ensure that the fire and emergency shutdown systems operate independently to isolate the LPG supply and activate the fire water deluge systems in the event of an emergency. The facility will have integrated emergency shut-down buttons placed in strategic locations for the staff to isolate the plant and activate the emergency systems.

2.3 Project activities

The proposed project activities can be divided in two main phases;

2.3.1 Construction phase

- Construction and installation of the facilities, driveways and parking an office and control center.
- The budget estimates for executing the project are provided in the Appendix.
- The design layout of the facility is as in (Appendix)).
- The land under which the proposed project will be established measures approximately 1.5815 Acres.

2.3.2 Operational phase

Upon commissioning, the facility will involve the following operations:

- Receipt of products by ship and transferred into the above ground Storage Tanks (AST).
- This will be pumped to the gantry (loading) point controlled both manually and electronically from the control centre.

The trucks will load at the gantry and exit by road.

During the construction phase the following items will be relevant:

Product piping

The product piping will be undersea (ballasted) and aboveground on pipe supports and extends from the floating storage to the above ground tanks.

Electrical systems

The facility will be drawing power from the Municipal grid and will require the installation of a separate electrical supply and Transformer to accommodate the site requirements and future requirements. Mansa East Africa Ltd will install a transformer system to accommodate the new facilities power requirements. A standby generator will be installed on the premises to facilitate operations when the power infrastructure is down.

Office and storage building

The office block and store will be constructed within the facility to accommodate all services at the facility. There will be separate rooms for store, rest room as well as changing room for staff. The facility will have toilets separated and designated for ladies and gentlemen.

Others

Other associated facilities include a fire water tank, a fire fighting system, a diesel driven fire engine, a standby generator, parking bays, and driveways infrastructure.

2.4 Material, products and by-products and disposal

This project is designed as an LPG Terminal. The products will be received by sea, loaded into tankers and then distributed through roads and rail to different plants within the country.

2.4.1 Construction Phase

The materials that will be required during construction will include: stones, concrete building blocks, concrete paving blocks, ballast and sand, roofing tiles, cement, gravel, paving tiles, construction timber, paint, thinners, plumbing pipes and plastics. The wastes generated during this phase will include excavation materials (top soil), paint and thinner containers, wood, cement bags, paper and plastic packaging materials, metallic wastes, inert building and materials. All the solid wastes will be disposed of appropriately. Excavation materials will be dumped at a licensed dumping site and all records will be kept.

2.4.2 Operational phase

LPG will be the main product handled at the facility during the operational phase of the project. Losses of products into the environment constitutes a major hazard for this project and strict measures in facility design and operation has been taken to ensure no or minimum release into the environment. The facility will have bathroom facilities connected to the sewer system. During maintenance any wastes generated will be handled appropriately. Recycling will be encouraged as much as possible for the entire project cycle.

2.4.3 Decommissioning phase

Scrap metal, inert building materials and paint waste will be the main product at

decommissioning stage and this will be handled appropriately after being tested for any environmentally hazardous element.

CHAPTER THREE

3.0 BASELINE INFORMATION

3.1 Project Location

The proposed liquefied petroleum gas terminal plant is located on the leased Kenya Ports Authority industrial land, Mombasa County. Mombasa County is bordered to the North by Kilifi County, East by Indian Ocean, South by Kwale County, West by Kilifi and Kwale Counties. It lies between latitudes 3⁰56' and 4⁰10' South of the Equator and between longitudes 39⁰34' and 39⁰46' east of Greenwich Meridian. The County covers an area of 229.9 Km² and 65 Km² of water mass (200 nautical miles into the Indian Ocean).

3.1.1 Site ownership

The proposed project site is situated within the existing Comarco Supply base and it is an industrial zone. The proposed site is sub-leased from the Touchwood Investment Limited by the project proponent Mansa East Africa Limited (see Appendix).

3.2 Administrative units

The County is divided into six sub-counties of Mvita, Nyali, Chagamwe, Jomvu, Kisauni, and Likoni, and has thirty county assembly wards, twenty locations and thirty-five sub-locations. The proposed project site lies within industrial Comarco base in Mvita sub-county.

3.3 Physical environment

3.3.1 Topography

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

3.3.2 Soils

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

Along the coastal lowlands four soil types predominate;

- On the raised reefs along the shore well-drained, shallow (< 10 cm) to moderately deep, loamy to sandy soils predominate.
- On unconsolidated deposits in the quaternary sands zone (also referred to as Kilindini sands), is well drained moderately deep to deep, sandy clay loam and sandy clay, underlying 20 to 40 cm loamy medium sand.
- On the Kilindini sands there are areas with very deep soils of varying drainage conditions and colour, variable consistency, texture and salinity.
- On the Kilindini sands there are also 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.

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

3.3.3 Water Resources and Sanitation

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

3.3.4 Climate, Rainfall, Temperature and Disaster Risk Vulnerability Profile

Climate is influenced by monsoon winds with the rainfall pattern being characterized into long rains (April – June with an average of 1,040 mm) and short rains (end of October - December with an average of 240mm). The annual average rainfall for the county is 640mm. The annual mean temperature in the county is 27.9⁰C with a minimum of 22.7⁰C and a maximum of 33.1⁰C. The hottest month is February with a maximum average of 33.1⁰C while the lowest temperature is in July with a minimum average of 22.7⁰C. The climate regime in the county has led to two major agro-climatic zones which support existing coastal forests, marine and terrestrial ecosystems. The project area experiences same climatic conditions as the larger Mombasa County.

3.4 Biological environment

3.4.1 Flora

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

3.4.2 Fauna

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

3.4.3 Forests

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

3.5 Land Use and Zoning

Land in the County Mombasa County has number of land tenure regimes which include public land, private land and community owned land. Land use zoning includes mainly for residential; industrial and warehousing; physical infrastructure; social amenities; urban; agriculture; mining; and tourism activities. The proposed site is at Comarco Supply Base is an industrial zone.

3.6 Infrastructure

3.6.1 Roads, Harbour and Rail Network

The County has a total of 257.17Km of bitumen surface roads, 127Km of gravel surface roads and 91.29 Km of earth surface roads in the county. The County has 10 km of railway line and three railway stations. The County has one international airport and other smaller airstrips. The county well covered telecommunication and host both private and government communication facilities. The port of Mombasa is a key resource and the gateway to the East and Central African region. The port serves the entire region's export and import needs. Currently, the port has 19 deep-water berths with two additional berths nearing completion and two oil terminals. The proposed project site is accessed through Mikanjuni and Taib Bin Nasir access roads respectively.

3.6.2 Energy supply and Access

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

3.6.3 Water

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

3.6.4 Telecommunication and Postal Network

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

3.7 Socio-Economic profile

3.7.1 Population Size and Composition

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

3.7.2 Cooperatives, Trade, Commerce and Financial Institutions

There are over 38 banks and several microfinance institutions within the county which are important institutions as they offer credit facilities. The county has over 214 registered co-operative

societies and a total membership of 35,987. The number of active women groups and youth groups in the county are 877 and 884 respectively while self-help groups in the county are 782. There are several NGOs in the county with the main ones being DSW, WOFAK, CWD, EAWS, SOLWODI, ICRH (K), KANCO, AHF (K), MYWO, The Kenya Red Cross Society, Action Aid (K), World Vision, APHIA Plus Coast and Care International.

3.7.3 Agriculture, Livestock and Fisheries

The main crops under cultivation in the county include cassava, cucurbits family, maize, vegetables, millet and sorghum. The total acreage under food crop stands at 400 ha while the total acreage under cash crop is 500 ha.

The county has a considerable number of domestic livestock kept for domestic and commercial purposes. The main livestock bred in the county include goats, sheep, cattle, and poultry.

The county has 65 Km² of open water and an Exclusive Economic Zone extending 200 nautical miles into the Indian Ocean. There are 14 fish landing sites and one fish processing plant.

3.7.4 Education Institutions

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

3.7.5 Markets and Urban Centres

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

3.7.6 Mining

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

3.7.7 Tourism

The major tourist attractions include ancient tourist attractions and world heritage sites among them Fort Jesus Museum (a UNESCO World Heritage site), the Likoni Ferry Services and the gigantic Elephant Tusks mould, old town, the old Port, sandy beaches, the Mombasa Marine

Park, Haller Park and Butterfly Pavilion. There are over 430 beach and tour operator firms that provide various tourist-related services. The county has over 201 registered hotels and lodges with a total bed capacity of about 8,000 beds and average annually bed occupancy of 64 percent.

3.7.8 Employment

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

3.7.9 Health

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



View of the proposed project site with grass that will be affected during construction



**Way through which the pipes will pass to the sea
and CBM; and/or the Berth**

CHAPTER FOUR

4.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 National Legal Framework

4.1.1 The Constitution of Kenya, 2010

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

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

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

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

The proposed project activities will ensure that the ecological processes and the environment are not severely damaged through proper implementation of the proposed mitigation measures put in

place to ensure that the project construction, renovation, installation and operation activities do not adversely affect the surrounding environment.

4.1.2 Vision 2030

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

4.2 National Policies

4.2.1 The National Environment Policy, 2013

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

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

4.2.2 National Policy on Water Resources Management and Development (Sessional

Paper No.1 of 1999)

- i. The four specific objectives guiding in the management of water resources in Kenya include; Preserve, conserve and protect available water resources and allocate it in a sustainable, rational and economic way;
- ii. Supply water of good quality in sufficient quantities to meet the various water needs, including poverty alleviation, while ensuring the safe disposal of wastewater and environmental protection;
- iii. Establish an efficient and effective institutional framework to achieve a systematic development and management of the water sector; and
- iv. Develop a sound and sustainable financing system for effective water resources management, water supply and sanitation development.

4.2.3 The Draft National Energy and Petroleum Policy 2015

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

4.2.4 Policy on Environment and Development

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

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

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

The overall objective of the National Land Policy is to secure land rights and provide for sustainable growth, investment and the reduction of poverty in line with the Government's overall development objectives. Specifically, it seeks to develop a framework of policies and laws designed to ensure the maintenance of a system of land administration and management that will provide all citizens with the opportunity to access and beneficially occupy and use land; economically, socially, equitably, and environmentally sustainable allocation and use of land; effective and economical operation of the land market; efficient use of land and land-based resources; and efficient and transparent land dispute resolution mechanisms. The previously existing land laws have been repealed and the law consolidated into three statutes, namely the Land Act 2012, the Land Registration Act 2012 and the National Land Commission Act 2012.

4.2.6 The Kenya Health Policy (2012 – 2030)

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

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

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

4.3 National Regulatory Frameworks

4.3.1 Environmental Management and Co-ordination Act, CAP 387

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

Section 58.(1) Of the Act states "Notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya, any person, being a proponent of a project, shall, before financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second Schedule to this Act, submit a project

report to the Authority, in the prescribed form, giving the prescribed information and which shall be accompanied by the prescribed fee”. Environmental Management and Coordination Act CAP 387 provide a legal and institutional framework for the management of the environmental related matters. This EIA study has been conducted and the final report compiled pursuant to section 58 (1) of the EMCA Act and its respective stipulations.

4.3.2 EMCA Related Regulations

4.3.2.1 Environmental (Impact Assessment and Audit) Regulations, 2003

The Environmental Impact Assessment and Audit Regulations, 2003 are subsidiary regulations of EMCA, CAP 387 and stipulate the steps to be followed in undertaking an EIA study. The Regulations highlight the stages to be followed, information to be made available, role of every stakeholder and rules to be observed during the EIA process. This EIA study has been conducted as per the provisions and guidelines of the Environmental Impact Assessment and Audit Regulations, 2003; has been planned, designed, compiled and implemented based on the very regulations. It shall also be maintained and guided by the same regulations and an environmental audit study will be done periodically to monitor compliance with the set environmental standards.

4.3.2.2 EMCA (Water Quality) Regulations, 2006

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

4(1) every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act.

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

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

The proponent shall follow the necessary precautionary measures not to pollute underground water or surface water. The proponent will be required to immediately notify the authority any occurrence of pollution incidence at the site. Use of oils on site will be carefully done to control spills on the surface. Servicing of machines/trucks will be carried out at designated service bay.

The waste water from the construction site and construction works will be disposed into the storm water drain and into the main NAWASCL sewer line for safe disposal.

4.3.2.3 EMCA (Waste management) Regulations, 2006

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

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

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

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

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

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

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

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

For fixed installations, excessive vibration under these regulations is defined as any vibration emanating from the source and exceeds 0.5cm/s. Rules 5 and 6 of the regulations define noise levels for various types of activities that generate noise. The first schedule to the regulations defines permissible noise levels measured 30m from the boundary fence of a project. A noise license will be required during the construction phase of the project and a noise survey

conducted once operation is recommended for presentation to the Authority. The proponent shall implement these measures, ensure that all noise equipment, tools, vehicles, are in good working condition to reduce noise. The project contractor will be required to avoid carrying out noise emitting activities and work within the stipulated time periods plus carry out regular noise monitoring/acquire noise permit in extreme cases.

4.3.2.5 EMCA (Air Quality) Regulations, 2013

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

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

4.3.3.1 Water Act, 2002

Water in Kenya is owned by the Government, subject to any right of the user, legally acquired. However; this Act regulates conservation and management of all water resources within the republic, and related purposes.

In section 3 of part II, it states that every water resource is vested in the State, subject to any rights of user granted by or under this Act or any other written law. The Act also provides for establishment of a Water Resource Management Authority, whose aim is to manage and coordinate conservation and utilization of water resources at national scale. The Act will thus play a central role in guiding the exploitation and conservation of the limiting and scarce water resource throughout the project life.

4.3.3.2 The Penal Code CAP 63

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

4.3.3.3 Occupational Health and Safety Act No.15 of 2007 and the 2007 Subsidiary

legislation (Cap 514)

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

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

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

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

i) *(Safety and Health Committee) Rules 2004*

These rules came into effect on April 28th, 2004 and require that an Occupier formalize a Safety and Health (S&H) Committee if there are a minimum of 20 persons employed in the work place. The size of the S&H Committee depends on the number of workers employed at the place of

work. For a Proponent and Contractor, the Occupational Safety and Health Act and the S&H Committee Rules 2004 are important as they require compliance with the following measures:

- i. Posting of an Abstract of the Factories and Other Places of Work Act in key sections of each area of the workplace;
- ii. Provision of first aid boxes in accordance with Legal Notice No. 160: First Aid Rules of 1977;
- iii. Ensuring that there are an appropriate number of certified first aiders trained by a DOSHS approved institution and that the certification of these first aiders is current;
- iv. Provision of a General Register for recording amongst other things all incidents, accidents and occupational injuries;
- v. Appointment of a S&H Committee made up of an equal number of members from management and workers based on the total number of employees in the company;
- vi. Training of the S&H Committee in accordance with these rules;
- vii. Appointment of a S&H management representative by the Proponent;

The Safety & Health Committee must meet at least quarterly, take minutes, circulate key action items on bulletin boards and may be required to send a copy of the minutes to the DOSHS local office. Proper record keeping including maintenance of all current certificates related to inspection of critical equipment such as the tractor, transport vehicles and the generator, etc. Such inspections need to be undertaken by a competent person certified by the Director of the DOSHS.

ii) **(Noise Prevention and Control) Rules**

These rules have set minimum and maximum exposure limits beyond which workers and members of the public should not be exposed to noise without adequate means of protection. The rules also have limits for exposure out of workplaces. The rules have several recommendations on a comprehensive noise control program for workplaces that includes a requirement for medical examination of workers who are exposed to noise. The rules have also set the minimum noise levels that should emanate from a facility to public/neighbouring areas by day or by night. The proponent will provide functional earmuffs for those operating the noise emitting machines and those working in noisy environments; and keep on renewing their noise and vibration permit from NEMA. All in all, the project proponent will be required to adhere to all the stipulations of the OSHA Act, 2007 requirements and regulations.

iii) **Medical Examination Rules, 2005**

These rules provide for Occupiers to mandatorily undertake pre-employment, periodic and termination medical evaluations of workers whose occupations are stipulated in the Second

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

iv) **Fire Risk Reduction Rules, 2007**

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

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

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

4.3.3.4 The Work Injury Benefits Act (WIBA), 2007

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

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

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

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

time they will be working at the project site which will enable them get compensation in case of accident occurrence.

4.3.3.5 The Public Health Act CAP 242

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

4.3.3.6 The Land and Environment Court

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

4.3.3.7 The County Council Act Cap 265

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

4.3.3.8 The Physical Planning Act of 1996 CAP 286

The Act allows for prohibition or control over the use and development of land and building in the interest of proper and orderly development of an area. Section 30 states that any person who carries out development without permission will be required to restore the land to its original condition. It also states that no other licensing authority shall grant license for commercial or industrial use or occupation of any building without a development permission granted by the respective local authority.

Section 36 states that if in connection with a development application, a local authority is of the opinion that the proposed development activity will have injurious impact on the environment; the applicant shall be required to submit together with the application an environment impact assessment (EIA) report. EMCA, CAP 387 echoes the same by requiring that such an EIA is approved by the National Environmental Management Authority (NEMA) and should be

followed by annual environmental audits. The proposed project construction, installation and operation activities must be granted license by the relevant local authority as the EIA study process is in order with section 36 of this Act.

4.3.3.9 Traffic Act Cap. 403

In Section 51, only proper fuel should be used in vehicles. Similarly, vehicles should be well maintained to prevent any fumes/exhaust that could pollute the environment. All vehicles transporting construction materials will be granted permits authorising them to transport materials to the construction site plus all the equipment, lorries and heavy vehicle drivers will possess up to date driving licenses and certificates identifying them and the type of lorries/vehicles/equipments they are authorised to operate, plus deployment of traffic marshals to help control the traffic flow along Mikanjuni Road and Taib Bin Nasir access roads.

4.3.3.10 Building Code 2000

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

4.3.3.11 Energy Act

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

4.3.3.12 Weights and Measures Act, Cap 513

The above-named Act mandates the Weights and Measures Department to annually certify the mechanical pumps and dispensers in order to ensure that they are properly calibrated to dispense the right amounts of the petroleum products. During the certification exercise, the measuring mechanisms inside the pumps are sealed with a seal-mark of quality assurance. The Weights and Measures Department issues a Certificate of Verification for all the mechanical pumps which is usually valid for 1 year. The proponent shall apply for the Certificate of Verification from the Weights and Measures Department.

4.3.3.13 Merchant Shipping Act, 2009

This is an Act of Parliament to make provision for the registration and licensing of Kenyan ships, to regulate proprietary interests in ships, the training and the terms of engagement masters and

seafarers and matters ancillary thereto; to provide for the prevention of collisions, the safety of navigation, the safety of cargoes, carriage of bulk and dangerous cargoes, the prevention of pollution, maritime security, the liability of ship-owners and others, inquiries and investigations into marine casualties; to make provision for the control, regulation and orderly development of merchant shipping and related services; generally to consolidate the law relating to shipping and connected purposes of surveys, monitoring and inspections; restriction on trading in Kenyan waters; carriage of bulk cargoes and dangerous cargoes;

4.3.3.14 Climate Change Act, 2016

The Act provides a framework for mitigating and adapting to the effects of climate change on various sectors of the economy; facilitating and enhancing response to climate change; and providing guidance and measures on how to achieve low carbon climate resilient development, among other things. It lines up with international best practices and standards. It establishes the National Climate Change Council which is tasked with coordinating climate change issues.

4.3.3.15 Kenya Standards

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

Table 4: The Kenya Standards available for the petroleum sub-sector.

Standard	Description
KS1967: 2006	The Petroleum Industry – Storage and distribution of Petroleum Products in above ground bulk installations
KS1968: 2006	The Petroleum Industry – Electrical Installations in the distribution and marketing sector – Code of Practice
KS1969: 2006	The Petroleum Industry – The installation of underground storage tanks, pumps/dispensers and pipe work at the terminal plant and consumer installations – Code of Practice
KS200: Part 1: 2002	Specification for storage tanks for petroleum industry Part 1: Carbon steel welded horizontal cylindrical storage tanks (First Revision,

	2002)
KS1938-1: 2006	The Handling, storage and distribution of liquefied petroleum gas in domestic, commercial, and industrial installations – Code of Practice Part 1: Liquefied petroleum gas installations involving gas storage containers of individual water capacity not exceeding 500L and a combined water capacity not exceeding 3000L per installation
KS1938-2: 2005	Handling, storage and distribution of liquefied petroleum gas in domestic, commercial and industrial installations – Code of Practice – Part 2: Transportation of LPG in bulk by road
KS1938-3:2006	The handling, storage and distribution of liquefied petroleum gas in domestic, commercial and industrial installations – Code of Practice – Part 3: Liquefied petroleum gas installations involving storage vessels of individual water capacity exceeding 500L
KS1938-4: 2005	The handling, storage and distribution of liquefied petroleum gas in domestic, commercial and industrial installations – Code of Practice – Part 4: Storage and filling sites for refillable liquefied petroleum gas (LPG) containers of capacity not exceeding 15kg
KS ISO 4706: 1989	Refillable welded steel gas cylinders
KS ISO 11625: 1998	Gas cylinders – Safe handling
KS06-09: Part 3: 2001	Specification for welded low carbon steel gas cylinders exceeding 5-liters water capacity for low pressure liquefiable gas Part 3: Code of practice for filling, distribution and retailing of liquefied petroleum gas in cylinders (First Revision, 2001)
KS09: Part 4: 2002	Gas cylinders – Refillable welded steel cylinders for liquefied petroleum gas (LPG) Part 4: Requalification and inspection
KS 9-2: 2006	Liquefied petroleum gas cylinders Part 2: Safe use of liquefied petroleum gas (LPG) in domestic dwellings – Code of Practice
KS 2024: 2006	Gas cylinders – refillable welded steel cylinders for liquefied petroleum gas (LPG) – Procedure for checking before, during and after filling

4.3.4 Lands Act, 2012 No. 6 of 2012

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

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

Part VIII of the Act provides procedures for compulsory acquisition of interest in land. Section III (1) states that if land is acquired compulsorily under this Act just compensation shall be paid in full to all persons whose interest in the land have been determined. The Act also provides for settlement programmes. Any dispute arising out of any matter provided for under this Act may be referred to the Land and Environment Court for determination. The land on which the project is to be developed fully belongs to the proponent and has a valid land title deed as a proof of ownership.

4.4 International Environmental and Social Impact Provisions and Safeguards

4.4.1 International Environmental Guidelines

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

- i. **The Basel Convention:** Sets an ultimate objective of stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system.
- ii. **Kyoto Protocol:** Drawn up in 1997, pursuant to the objectives of the United Nations Framework Convention on Climate Change, in which the developed nations agreed to limit their greenhouse gas emissions, relative to the levels emitted in 1990.

This EIA study is also based on internationally respected procedures recommended by the World Bank, covering environmental guidelines. Reference has been made to the Environmental Assessment Operational Policy (OP) 4.01, and Environmental Assessment Source Book Volume II, which provides the relevant sectoral guidelines as discussed below;

4.4.2 World Bank's safeguard policies

The objective of the World Bank's environmental and social safeguard policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for bank and borrower staffs in the identification, preparation, and implementation of programs and projects. Safeguard policies have often provided a platform for the participation of stakeholders in project design, and have been an important instrument for building ownership among local populations, (World Bank, 1999-2006).

4.4.3 World Bank Safeguard Policy 4.01-Environmental Assessment

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

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

The requirements of the policy are similar to those of EMCA which aims to ensure sustainable project implementation. Most of the requirements of this safeguard policy have been responded

to in this report by evaluating the impact of the project, its alternatives, existing legislative framework and public consultation.

4.4.4 Petroleum Industry Guidelines

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

4.4.5 Identified Applicable Performance Standards, January 2012

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

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

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

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

and procedures to react to changing security levels; and ensure confidence that adequate and proportionate maritime security measures are in place.

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

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

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

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

4.5 National Institutional Framework

4.5.1 National Environment and Management Authority

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

CHAPTER FIVE

5.0 PUBLIC CONSULTATION AND PARTICIPATION

5.1 Objectives of Public Consultation and Participation

This involves consultation and knowledge sharing of the proposed development project's developmental attributes to the project area's socio-economic development. It aids in the proper implementation, operation and maintenance of the proposed project as well as presenting the local communities with the opportunity to own the project themselves hence creating a sense of belonging and ownership.

The key objectives of the public participation are to:

- i. Facilitate consideration of project alternatives, mitigation measures and trade-offs;
- ii. Ensure that important impacts are not overlooked and benefits are maximized;
- iii. Reduce conflict through early identification of contentious issues;
- iv. Provide an opportunity for the public to influence project activities in a positive manner;
- v. Improve transparency and accountability of decision-making; and increase public confidence in the Environmental Impact Assessment process and the proposed project's undertaking.

5.2 Methodology

Public participation was mainly achieved through site reconnaissance, direct interviews, observations, Baraza's and questionnaire administration.

5.2.1 Site Reconnaissance

Site reconnaissance for the proposed development project was conducted on the proposed project site situated within the Comarco Supply Base, Mvita Sub-County, and Mombasa County. It mainly involved site familiarization with the proposed site, the project area and included collection of primary data on biophysical, socio-economic and environmental characteristics of the site and the surrounding area.

5.2.2 Questionnaire Administration

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

5.2.3 Findings

The proposed project site borders mainly shipping companies, warehouses, Bandari School, and is located within Kenya Ports Authority's yard in an industrial zone within Ganjoni area. These neighbouring properties are at a safe distance from the project site hence negligible impacts expected to affect them.



Residents following on the proceedings of the public participation



Residents being addressed by the client representative during the public participation process

5.3. Summary of major concerns (questionnaires& interview sessions)

Table 5: Summary of issues and comments provided during public participation (as per questionnaires administered and interview response).

Negative Issue	Suggested measures/considerations
Risk of Fire	<ul style="list-style-type: none"> ● Installation of Emergency shut Down Devices, gas leakage detectors and Adequate Hydrants to adequately arrest the event of fire. ● Inspections and reviews of standard operation procedures by the Plant Health and safety personnel.
Public safety risks	<ul style="list-style-type: none"> ● Fence the construction site through erection of hoarding structures. ● Placing of proper safety signage.
Fugitive dust during excavation and transportation of raw materials to the site, and from cement dust during concrete mixing.	<ul style="list-style-type: none"> ● The proponent shall water the soil on the roads leading from and to the construction site to minimize dust. ● Have speed limit clearly marked on the road for drivers to follow. ● Excavation process must minimize dust to acceptable limits for residential zones. ● Air monitoring sampling shall be done on quarterly basis. ● The proponent has studied the wind direction and the construction activities will be carried out as per the wind direction; the design consideration ensuring minimization of windblown fugitive dust.
Noise pollution from the project construction activities	<ul style="list-style-type: none"> ● Provision of PPE's like earmuffs to workers to protect them from noise pollution that is very harmful to their health. ● Conduction of regular noise monitoring and evaluation tests to ascertain the levels of noise produced at the site. ● Awareness creation among workers on the risks of noise pollution on their health and importance of using PPE's

	<p>like earmuffs.</p> <ul style="list-style-type: none"> ● Conduction of regular medical check-ups for workers at the site to ensure that workers don't suffer in silence.
Water pollution	<ul style="list-style-type: none"> ● Re-using of the waste water from the site. ● Channelling of the waste water from project site to the main sewer line. ● Conduction of monitoring and evaluation for water purity and pollution levels at the site. ● Awareness creation on the importance of conserving and managing water, using water sparingly and recycling or re-using water at the site.
Oil spills and pollution	<ul style="list-style-type: none"> ● Establishment of an oil water separator for waste water before release into sewer line. ● Regular conduction of oil skimming.
Traffic Interruption	<ul style="list-style-type: none"> ● Issue notices/advisories of pending traffic inconveniences and solicit tolerance by local residents before the commencement of construction works. ● As far as possible, transportation of construction materials should be scheduled for off-peak traffic hours. ● Appropriate traffic warning signs, informing road users of a construction site entrance ahead and instructing them to reduce speed, should be placed along the main road in the vicinity of the entrance to the site during the construction period. ● Traffic marshal should be employed to control traffic and assist construction vehicles as they enter and exit the project site. ● Maintain on site a record of incidents and accidents.
Increased water demand	<ul style="list-style-type: none"> ● Create water conservation awareness. ● Install a discharge meter at water outlets to determine and

	<p>monitor total water usage.</p> <ul style="list-style-type: none"> ● Ensure water taps are not running when not in use. ● The management to conserve water e.g. by avoiding unnecessary toilet flushing. ● Promptly detect and repair of water pipes and tank leaks.
Gas leakage	<ul style="list-style-type: none"> ● Provision of gas leakage detectors ● Construction of the plant and considering all safety measures as advised by the engineers as well as the Health and safety personnel
Positive Comments	Improvement
Availability of affordable liquefied petroleum gas	<ul style="list-style-type: none"> ● Improved livelihoods. ● Improved business activities. ● Economic growth.
Increased employment opportunities	<ul style="list-style-type: none"> ● Improved livelihood standards of the local people through trainings and employment. ● Business and economic growth throughout the project cycle.

The businesses and area residents interviewed and consulted via questionnaire administration collectively pledged their support for the proposed development project citing availability of cheap and affordable gas supply, business growth and increased employment opportunities during all project implementation phases. They however noted a few safety risks to the public and the workers at the site that called for mitigation as well as suggesting corrective measures for the already identified safety risks and issues related to the proposed development project. Given the mutual consensus by the area businesses and the residents, NEMA is therefore urged to grant the proposed development project Environment Impact Assessment license for its timely implementation as the few impacts highlighted have been fully addressed in the Environmental and Social Management and Monitoring Plan provided in the Environment Impact Assessment study report.

CHAPTER SIX

6.0 ENVIRONMENTAL AND SOCIAL IMPACTS AND THEIR MITIGATIONS

6.1 Introduction

Operation of the proposed project will generate both positive and negative social, economic and environmental impacts. This study report details measures for monitoring and management of these impacts during the life cycle of the proposed project. During the establishment, installation, construction, and operation of the development project, the main responsibility for the incorporation and monitoring of mitigation measures will lie with the project proponent and the contractors undertaking the project.

6.2 Positive Impacts

- i. During project construction, installation, construction and operation, the local community will benefit from direct employment in provision of skilled, semi-skilled and casual labour where necessary.
- ii. Increase in the availability and access to cheap and affordable liquefied petroleum gas supply.
- iii. Sourcing of locally available construction materials like aggregates, sand, rocks, gravels, ballasts, hard core materials, cement thus boosting the local economy.
- iv. Creation of employment opportunities for the locals during the project implementation phases.
- v. Economic gains by the local communities, the lessor and the local government in terms of revenue generation.
- vi. Growth of small businesses like fast food kiosks, groceries providing daily meals to construction workers.
- vii. Increased community social responsibility activities between the project implementers and the local communities.
- viii. National and county economy improvement.
- ix. Infrastructural upgrade in the area.
- x. Exchange of technical knowhow and skills as many local people will learn how to use and do different jobs upon proper training and acquisition of the necessary requisite skills.

6.3 Impact Classification

Anticipated Significant Impacts

The impacts of the proposed project activities on the environmental elements are both positive and negative. The magnitude of each impact is described in terms of being significant, minor or permanent, short-term or long term, specific (localized) or widespread, reversible or irreversible.

Most of the impacts have been addressed in the proactive design of the project and other mitigation measures can only be guaranteed through active and responsible management committed to the propositions of the environmental management plan.

The adopted assessment criteria of the significant impacts are as shown in the table below:

Table 6: Assessment criteria of significant impacts

Key	Type of impact	Key	Type of impact.
++	Major positive impact.	+	Minor positive impact.
--	Major negative impact	-	Minor negative impact.
0	Negligible/zero impact	NC	No change
Sp	Specific/localized	W	Widespread.
R	Reversible	Ir	Irreversible.
Sh	Short term.	L	Long term.
T	Temporary	P	Permanent

On the basis of information gathered during both the desktop and field study, the potential environmental impacts of the proposed project are as tabulated below;

Table 7: Potential environmental impacts

Environmental Impact	Type of Impact
Contamination of air quality with emissions (gaseous, dust particulate matter).	Sh, T, --,Sp
Increased noise levels leading to nuisance to the residents.	Sh, T, Sp,--
Irreversible Noise Induced Hearing Loss for immediate employees.	--, Ir,Sp
Loss of soil cover, flora and habitat for some fauna.	-,Sp,R
Poor aesthetics.	P,Ir,Sp, --
Risk of people and animals falling into the excavated site foundation and trenches.	Sp,-
Increased waste production.	-
Accidents due to unsafe work practices, incompetency or occupational hazards.	-.Sh,
Risk to public safety i.e. to onlookers.	-

Water pollution by contaminants in the storm water and migration of fines into the nearby water bodies.	-,Ir
Risk of accidents due to increased vehicular movement in the area.	--, Sh, Sp
Loss of jobs leading to Stress, anxiety and frustrations.	-, Sp
Irresponsible social behaviour.	-,Sp
Creation of jobs for locals and Improved infrastructure.	P, L, ++

6.4 Environmental and social negative impacts during pre-construction stage

6.4.1 Social Impacts

- i. Spread in anti-social behaviour due to inter-racial and tribal interactions resulting in the spread of diseases like HIV/AIDS.
- ii. Increase in insecurity cases due to mingling of different people of different cultures.

6.4.2 Environmental Impacts

- i. Preparation of the area through site excavation and overburden soil removal.
- ii. Dust from the excavations meant to prepare the site for installation and construction activities.
- iii. Noise from the project activities like machine movement, welding and tanks' installations.
- iv. Risks to public safety as a result of proposed project activities implementation.

6.5 Negative impacts during project construction phase

6.5.1 Social and environmental impacts

Dust emission/Air pollution

The large number of machines, vehicles, construction activities like transportation of materials, excavation, will generate dusts and gaseous emissions from vehicles, Lorries, trucks, using fossil fuels. The pollutants generated by these activities are considered to be harmful to human health and other biotic communities in the area.

Potential mitigation measures

- i. Water will be sprinkled on the access road and within the site to minimize amount of dust emitted.
- ii. The proponent will be responsible for maintaining construction equipment and machines to minimize exhaust fumes released to the atmosphere.

- iii. Construction equipment and vehicles will be turned off when not used for extended periods of time.
- iv. Use of low sulphur or no sulphur diesel fuel.
- v. Stockpiles of the finished products (finest aggregates) for concrete mixing and construction will be constantly kept damp by the action of water misting through the utilization of water sprinklers or covering with tarpaulins.
- vi. Provision of mouth plugs and other gears to the workers to protect them from inhaling the dangerous gases.
- vii. Conduction of regular monitoring and evaluation of air pollution levels within the project area.

Excessive Noise and Vibrations

The main source of noise from the proposed development project will be from construction activities, tank installation works, and operation activities. This noise may reach a peak of 50-80 dB (A) one metre away from the source and constitute a hazard to the workers and an environmental nuisance to human receptors from the residential households in the vicinity of the project site. However, this noise lasts for only 5-10 seconds. It has been noted during noise monitoring surveys at existing construction sites, that noise produced varies between 60-65dB (A) approximately 30 metres away from the source.

The site is within an industrial area with similar activities being carried out hence the noise produced by the construction activities will not cause any nuisance to any identified human receptors. However a noise survey is recommended immediately operations begin, sampling positions will be at the site and from the neighbouring residential homes. The results will be submitted to the authority for review.

In the proposed project site, noise emission will be generated by the following activities:

- i. Excavation of the ground to remove the overburden soil,
- ii. Transportation of materials by trucks and lorries to the construction site,
- iii. Drilling and welding of steel metals for construction (fabrication activities),
- iv. The vehicular and truck movement within the site.
- v. Heavy machineries and equipment at the site.
- vi. Tank installation activities.

Noise and vibration can cause irreversible damage to human beings if not controlled.

Potential mitigation measures

- i. The machines and equipment should be serviced and inspected regularly.
- ii. Workers and other persons who will be near the construction areas to have personal protective equipment such as earmuffs, gumboots, overalls, helmets and earplugs.
- iii. Sensitize drivers to switch off vehicle engines when not in use and to avoid unnecessary hooting and revving of vehicles.

- iv. Machinery and transport vehicles should be well maintained and serviced to minimize noise resulting from friction.
- v. All works to be done during day time only, from 8am to 5pm.
- vi. Workers should be provided with personal protective equipment such as earmuffs and earplugs when operating noisy machinery and when in a noisy environment.
- vii. During the project duration, noise monitoring exercises will be carried out as part of the Environmental and Social Management and Monitoring Plan.
- viii. Permits for excess noise and vibration shall be obtained from the local NEMA office.

Impacts on flora & fauna

The only existing vegetation at the site consists of grown grasses and weeds which will be cleared to create space for constructing the concrete slab meant for the installation of bulk LPG storage tanks and its associated facilities. There is no endemic flora at the site hence environmental impact on the floral value of the site need not be considered as substantial. There are, however, no animal species in the area which can be considered endemic in nature save for the few birds and insects hence no specific habitats or niches that will be affected.

Potential mitigation measures

- i. Re-vegetate stockpiles that will not be used for some time.
- ii. Once the final landform is established during rehabilitation, re-vegetate areas to stabilise the landform and to give the vegetation maximum time to establish while the terminal is still in operation.
- iii. Once the project lifespan ends, during decommissioning (uninstall) the proponent shall replant the field with grasses and indigenous trees.
- iv. Establishing of a flower garden round the site through landscaping.

Surface drainage

The drainage of the general site is necessary to enhance effective flow of the much-anticipated surface run-off from impermeable areas within the site.

Potential mitigation measures

- i. Drainage around areas where hazardous materials are handled or stored should be captured and treated, to ensure that there is no movement of these substances into the environment.
- ii. Drainage works will be re-constructed to mimic natural drainage patterns.
- iii. Accumulated storm water from surface run-off and waste water from the terminal site shall be pumped from the site to prevent mosquitoes breeding and incidences of water related diseases such as bilharzia and accidents such as drowning.

Solid waste

During the project cycle, solid and liquid wastes will be generated which will require disposal in an appropriate and environmentally acceptable manner. If solid waste is not removed promptly away from the generation points it accumulates into large heaps posing a health hazard.

Wastes which will be generated include the following:

- i. General construction waste (e.g. scrap metal, concrete);
- ii. Excavated materials from earthworks (e.g. pile foundations, overburden soil);
- iii. Material and equipment wrappings;
- iv. Chemical wastes generated by general site practices (e.g. vehicle maintenance/servicing);
and
- v. Liquid wastes generated by site workers during occupation.

Potential mitigation measures

- i. Bins shall be placed in designated areas and be well labelled.
- ii. Sorting of solid wastes before disposal should be practiced.
- iii. Solid wastes which cannot be reused at the site to be collected by a licensed waste handler at regular intervals.
- iv. A storage skip shall be provided for storing accumulated waste temporarily before collection by a waste handler.
- v. All waste shall be handled, stored and transported as per the provisions of Waste Management Regulations of 2006.

Liquid waste

Effluent from toilets shall be channelled to the existing sewer line connection serving the area. Other types of liquid wastes such as waste water with cement during construction, storm water and waste water from other areas within the terminal will be directed into surface storm water drains and into sewer line.

- i. Water entering the tank should be minimized by using water wastage reduction means such as press only taps for taps and wash basins, water harvesting etc.
- ii. Carry out quarterly effluent discharge analysis and acquire an effluent discharge license.

Oil waste pollution

Petroleum oils and grease used in vehicles and construction machinery may spill or leak into the ground or water system within the area.

Potential Mitigation measures

- i. The designated garage/workshop section should be of hard surface and fitted with oil/fuel interceptor.
- ii. All vehicles and machineries must be serviced at the service bay which is built to the required specifications of a service bay.
- iii. The LPG terminal and storage plant should be constructed as per the requirements and the Various Kenyan Standards that have been published for the safe and environmentally sound management of petroleum related installations under the Physical Planning Act of 1996.
- iv. The bulk storage tanks should be designed in a manner that it does not allow for vapor escape.

Hazardous waste material management

Hazardous materials are known to pose serious risks if released to the environment. The management of hazardous materials must therefore include the appropriate storage of these materials, and preparation for leaks and spills to ensure that the risk of hazardous materials being released into the environment is minimized.

Potential mitigation measures

- i. Provide high-performance grease traps and oil traps near workshops and places where vehicles and machinery are parked.
- ii. Locate storage areas away from waterways or areas prone to flooding.
- iii. Line bunded storage areas with impervious material especially around the equipment
- iv. Such spillage must not be cleaned up by hosing, sweeping or otherwise releasing such contaminant into waterways. Equipment and soil contaminated by fuels, lubricants, and hazardous materials and clean up substances which cannot be salvaged must be disposed of in an approved waste facility.
- v. Develop contingency plans to address spills and leaks.

Visual intrusion

The construction of the terminal plant and its associated facilities/structures, their appearances will inevitably stand out of the existing natural surroundings, thereby creating a visual impact.

Potential mitigation measures

- i. Re-vegetation through tree and grass planting, and farming will be encouraged on the fertile soil stockpiles.
- ii. On completion of all works, the worked area shall be restored through grading, soil spreading and planting of vegetation.

Occupational Health and Safety (OHS)

As provided for in the Occupational Safety and Health Act of 2007; the safety of those in the workplace should be given the weight it deserves. Foods for the construction site workforce are usually provided by mobile individuals most of whom operate without license. This can compromise health of the workers especially if such foodstuffs are prepared un-hygienically.

The following will be given priority.

- i. Proper personal protective equipment i.e. safety boots, helmet, goggles, respiratory equipment and gloves shall be used at all times on the site as condition warrant and workers trained on the proper use of tools.
- ii. The proponent shall use barriers and guards as necessary to protect employees and visitors from physical hazards. Danger warning or **CAUTION** will be put at strategic places.
- iii. Firefighting equipment will be strategically placed, and all employees trained on how to use them.
- iv. Sanitary facilities shall be provided, and cleanliness shall be ensured as per set standards.
- v. A fully equipped first aid kit shall be provided and shall be managed by qualified persons.
- vi. Individual food vendors preparing food for the workers at the site shall be controlled and monitored to ensure that food is hygienically prepared.
- vii. Proper treatment of drinking water.

Accident prevention

The following rules will be observed to avoid accidents both during establishment, renovation, installation and operation of the liquefied petroleum gas terminal plant;

- i. Ensure that the operational manuals are available and accessible for every vehicle, equipment /machinery.
- ii. The proponent will ensure that all buildings, fixed plants, compressor room and mobile equipment are fitted with fire-fighting equipment, such as fire extinguishers, fire blankets.
- iii. Properly maintain all machinery and equipment to prevent premature failure or possible accidents.
- iv. Develop an emergency response plan.
- v. Maintain appropriate fire-fighting equipment at a work site.
- vi. Only properly trained employees to operate equipment or machinery and proper instructions in their safe operation shall be provided.

Impacts on traffic

Additional traffic density will occur during the construction and operation phases of the proposed project. Lorries and trucks accessing the site may be expected to contribute towards the high level prevailing traffic along the Mikanjuni Road and Taib Bin Nasir access roads.

Mitigation Measures

- i. Maximum speed limit within the project site area will be 40km/hr for both operation and personal vehicles.
- ii. Speed limits and all other road signs and traffic rules shall be strictly observed.
- iii. Vehicles will be used for the purposes to which they are intended only.
- iv. Deployment of traffic marshals in the affected road to control traffic flow.
- v. Road diversions to be properly seconded by properly done traffic signage.

Disaster management

Emergencies and disasters are a reality of everyday life. Workers/people must therefore be sensitised and prepared on how to react to either emergencies or disasters during the construction, installation, and operational phases of the terminal plant. Absence of such plans may be risky since there would be no guidelines on how to handle or control emergencies if they occur.

Mitigation Measures

- i. The proponent should initiate and develop effective Emergency Response Plan (ERP) to cater for various eventualities such as fire outbreaks, and other accidents/incidents that are likely to occur.
- ii. Emergency Response Plans must be properly documented and made available to all.
- iii. Regular drills should be conducted on possible incidences.

Emergency Preparedness and Response

An emergency preparedness and response plan shall be established and implemented to respond effectively to emergency situations on the site which include, but not limited to, fire, flooding, major incident occurrence and security alert. The emergency plan should establish evacuation procedures; assign responsibilities to specific individuals; provide notification to the Authority and outside agencies such as fire station, hospital, etc.; establish means of communications; assign locations for emergency centres; provide in-house emergency responses; and include site security and controlled access.

The information developed as part of the emergency plan should be documented and communicated as appropriate within the site to ensure that the site organization can respond to emergency situations. The Contractor should establish a program of training, drills and exercises to test and evaluate the effectiveness of the plan. The Contractor should at least once every six months, organize and table top emergency exercises based on likely site scenarios in which the key site personnel work through their emergency response roles and appropriate measures are adopted and implemented on the site.

Fire risk and control

Petroleum products present significant risk due to their inflammable nature. This implies that the proponent must put adequate measures in place to prevent and control fire.

Mitigation measures

- The site should be kept clean and free from fire hazards and litter.
- Avoid naked fires (post notices to prohibit smoking within the site).
- Electrical installation will be carried out by a competent and licensed electrician.
- Install fire control appliances (portable fire extinguisher; both CO₂, dry powder and water type, and sand buckets), and employees should be adequately instructed periodically on the use of the various fire appliances.
- Conduct regular fire drills-once a year.
- Regular repair and maintenance program for all equipment.
- Implement leakage detection mechanism.
- Observe safety measures e.g. use of mobile phones, lighting.
- Full compliance with Fire Risk Reduction Rules, 2007.

6.6 Negative Impacts during Post-construction

6.6.1 Social Impacts

Security

Security of the site and those working within it is of utmost significance.

Potential mitigation measures

- i. Being vigilant of undesired characters and restrict the area from any trespassing.
- ii. The project site should be secured using hoarding structure or a perimeter wall to keep away trespassers and be gated allowing only authorized personnel to access the site.
- iii. Deployment of security personnel from a contracted security firm to boost the site security.
- iv. Registering the vehicles and people visiting the site through recording of their details in a special book.

Socio-Economic Aspect

The decommissioning of the project/construction activities will lead to loss of jobs and income to workers in addition to loss of revenue to the proponent, the national, county, and the neighbouring local communities.

Mitigation measures

- i. The workers should be given adequate notice and all the dues due to them settled in good time.

- ii. Prior notification and psychological preparation of workers on the impending loss of job.
- iii. Sensitization of the workers of the impending job cuts.

6.6.2 Project decommissioning

In case the project has to be decommissioned, there will be many waste materials resulting from the stoppage of terminal plant's operations which will include metal equipment like bins, waste metals, concrete plant slabs, machinery, vehicles, pipes (water and gas), and equipment, etc.

Mitigation Measures

- i. Use of proper equipment and tools.
- ii. Supervision by competent engineers.
- iii. Provision of adequate personal protective equipment to all demolition workers.
- iv. Proper handling and disposal of debris.
- v. Remove all the underground facilities e.g. pipes, storage tanks, concrete slabs, weighbridge, and electric cables.
- vi. All the equipment and scrap metals should be removed from the site.
- vii. Backfilling any surface openings.
- viii. Restoring/rehabilitating the site to acceptable standards.
- ix. All the wastes to be disposed by NEMA authorized waste handler and to NEMA approved dump sites.

Increased HIV/AIDS and other Sexually Transmitted Infections (STIs)

The proposed project operation will result to immigration of people from outside the local areas in search of employment opportunities. Therefore, this increase of people in the project area may lead to increased incidences of sexually transmitted diseases which may exacerbate HIV/AIDS situation among the local residents.

Potential mitigation measures

- i. Avail condom dispensers at site to the construction staff and the latter occupants.
- ii. Strengthen advocacy through awareness training in HIV/AIDS and other Sexually Transmitted Infections to the community.
- iii. Encourage the use of preventive measures like condoms and abstinence.
- iv. Provide HIV/AIDS Counselling and testing services for workers at the construction site.

CHAPTER SEVEN

7.0 PROJECT ALTERNATIVES

7.1 The proposed site

The Proponent has only one proposed site for the construction of the liquefied petroleum gas import terminal plant for the storage and distribution of LPG. The site is located at Kenya Ports Authority premises who are the sole users of the land and has been subleased from Touchwood Investment Limited. The setting up of the LPG import terminal on the plot XLVII/173 at the Kenya Ports Authority is welcomed as the proponent plans to deliver the products by ship directly to the Storage tanks from a CBM or private berth on site. The CBM and berth will ease and facilitate LPG vessels offloading into the aboveground storage to be set up on the site. The facility will also have loading facilities for trucks to be able to load directly from the storage for distribution. This will help in reducing logistical constraints of transporting LPG vessels from one point to the next. There is no viable alternative to this site owing to the availability of private berth and CBM facility for ship docking and scarcity of appropriate development land in the area. The site is currently vacant and neighbours mainly shipping companies in the area, warehouses and Bandari School. The site has existing road infrastructure. Moreover, the proposed site is ideal because it is located away from the main KPA factory where the main cargo operations occur and hence would not compromise the safety of the factory operations and workers.

7.2 No Project Alternative

This means that the status quo remains, and the proponent will have to contend with the land being idle. This may lead to underutilization of the land and the proponent missing out on the good returns from the LPG sector and the economies of scale. The no-project alternative is not favoured as it simply deprives the local people, both the county and the national government of socio-economic and environmental benefits associated with the project operation like constant availability and reliability of fuel for lighting and energy for domestic use; reduced expenditure on LPG importation; limiting illegal vending of unlicensed gas; secure supply of LP gas which will provide the country with an environmentally friendly source of energy. It is therefore recommended that the alternative be disregarded based on economic grounds and overall project benefits to the people and area in general.

7.3 Site Alternatives

There is no an alternative site for the proposed development given that it is within an industrial zone and has all the requisite characteristics like easy accessibility given its location next to the area access roads, among other determinant factors. The plot has also been leased to the project proponent, and as such is under the ownership of the Mansa East Africa Limited. Additionally, the process and cost involved in searching and acquiring a new site is very tedious and involving. Changing the site will therefore result in time wastage resulting in delayed project

implementation and lost revenue. This will also lead to underdevelopment as it will discourage prospective developers from carrying out their intended project activities. For continued development and growth, the proponent should be allowed to carry out the proposed project on the already identified site.

7.4 Alternative Technology

Liquefied petroleum gas exists as either a gas (vapour) or as a liquid, when it is under a modest amount of pressure in gas bottles, cylinders, tanks and larger liquefied petroleum gas storage vessels. The proposed terminal plant intends to use ISO Certified tanks for storing and transportation converse to pipeline. Transportation from the terminal will be through large road tankers to rail heads, i.e. Rift Valley Railways in Port Rietz and Standard Gauge Railways in Miritini for wider circulation in the entire country. The technology involved will enable vapour displacement from the storage tanks of the liquefied petroleum gas carriers to feed back to the mound (and vice-versa) as a closed system to prevent major pressure changes between the LPG in storage at the mound and ship.

7.5 Alternative Construction materials

There is no alternative construction materials to the proposed materials of steel, metal, water, rocks, gravel, hard-core, ballast and cement, etc., given that they are the recommended and required standard materials for the implementation of the proposed development project. There will be solid and effluent wastes generated during the construction, installation and operational phases. Priority will be given to the reduction at source of the materials or containment of wastes where possible. Sewage/effluents will be connected to a reticulated sewage waste management system. Any reusable/recyclable materials will be disposed accordingly. This will call for a source reduction and waste segregation systems of waste management being implemented on the site. Sanitary land filling or collection by a licensed waste handler will be the last option for the proponent.

CHAPTER EIGHT

8.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

8.1 Introduction

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

8.2 Approach to environmental impact management

The proposed ESMP will be the responsibility of the Health Safety Environment department of the Mansa East Africa Limited. However, it will have links with other departments such as operation and maintenance. Table 3 presents the range of approaches that will be used to manage potential impacts of the proposed project.

Table 3: Approach used to potential negative impacts from the project

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

- i. The environment, health and safety management cycle has five broad components:
- ii. Planning.
- iii. Design implementation (covering the construction and operation phases)
- iv. Checking and corrective action
- v. Management review

8.3 Responsibility and Accountability

The Proponent will utilize the existing arrangements in the implementation of the ESMP during planning and design, construction, operation and decommissioning/closure. The Proponent is accountable for ensuring that resources are made available to effectively implement the ESMP and necessary environmental management measures arising from the project. The proponent will develop proposed organizational structure for the proposed Project, showing the reporting lines of staff to be involved in environmental management of the project. The Project Manager will take responsibility for the day to day running of the project and will oversee the detail of implementation of the ESMP during construction phase while during operational and decommissioning phases, will be managed by the plant Manager. The two managers, QEHS Manager, HSE will be responsible in implementation of the ESMP.

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

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

Table 3: Approach used to Manage Potential Impacts

<u>Role</u>	<u>Responsibility</u>
	Technical and organizational role of construction works
Engineering Manager	Overseeing Implementation of ESMP and supervising civil works.
Project Manager/	Undertake development of LPG facility in accordance with contract signed with the Proponent;
	Conform with procedures requirements while undertaking the Project Implement aspects of ESMP assigned to them.
Construction	Effective implementation of the ESMP performance reviews and

Manager	Remedial actions.
	Regular performance reviews
	Develop policies and procedures for the operation of the facility
QHSE Manager	environmental, social, health and safety issues oversee implementation of the ESMP
	Review and analysis of monitoring results and preparation of short reports to Project Manager.
	Planning of training programs for personnel in accordance with Relevant laws e.g. OSHA 2007.

8.4 Management of Contractors.

The Contractors will be responsible for implementation of some of the ESMP commitments. However, the Ultimate responsibility for meeting all commitments lies with the Proponent.

The Proponent will commit contractors to meeting the relevant responsibilities by means of specific conditions in the contracts of appointment. The Proponent will provide additional training to improve the capacity of the contractors in ESMP areas of concern.

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

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

The Construction Manager will be accountable for environmental (including social) management during the construction phase.

Specific responsibilities for the Construction Manager will include Regular performance reviews and undertake corrective and/or remedial action where this may be required. Regular

(at least monthly) liaison between the Construction Manager, the Project Manager and the HSE Manager and his/her team must be carried out. At the commencement of the construction phase, weekly meetings should occur.

Meetings should review implementation of ESMP requirements, highlight issues of concern, identify required interventions and prescribe corrective actions and schedule, and allocate budget and appoint responsible parties. The plant Manager should receive minutes of meetings and should be invited to attend meetings at least once in a month.

A code of practice for construction teams will be prepared and implemented. This code will

guide the management and behaviour of construction teams. The code will include items relating to health safety and community relations.

Information on the implications of construction will be disseminated before construction starts. Contracts will be key tools in managing many potential negative impacts such as transport related incidents. They will specify required environmental and social practices.

8.5 Training, Awareness and Capacity Building

The Proponent will ensure that all contractors' staff members are inducted on health and safety, environmental and emergency response procedures. The Proponent will use written (newsletter/posters/toolbox talks) and verbal (as part of routine briefings) communication methods to raise awareness on a range of health, safety and environmental issues

8.6 Monitoring and Compliance Assessment

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

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

- i. Internal environmental, health and safety inspections will be carried out once every week by EHS Executive;
- ii. (Minor non-conformances will be discussed during the inspection and recorded as a finding in the inspection report. Major non-conformances will be formally reported
- iii. EHS Manager, will arrange for initial and subsequent environmental audits and will provide relevant information required by relevant authorities including NEMA. The audit will be carried out in accordance with EMCA, CAP 387 and its subsidiary legislation, EIA/EA Regulations, 2003. Any negative findings arising from the audits will be addressed accordingly.

8.7 Incident handling and Reporting

An incident can arise from the following:

- i. Significant non-compliance with the ESMP identified during an internal inspection.
- ii. Any non-compliance identified by either the authorities or an external audit (
- iii. Accidents or spills resulting in potential or actual environmental harm.
- iv. Accidents that could result in injury to staff, visitors to site or the surrounding communities
- v. Significant complaints.

All incidents will be formally recorded and noted in the General Register in accordance with requirements of OSHA 2007.

8.8 Checking and corrective action

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

- i. Monitoring selected environmental quality variables as defined in the objectives and target
- ii. On-going inspections of the operational controls and general state of the operations.
- iii. Internal audits to assess the robustness of the ESMP or to focus on a particular performance issue.
- iv. External audits to provide independent verification of the efficacy of the ESMP.

8.9 Corrective Action

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

8.10 Reporting

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

Table 8: Showing the Environmental and Social Management and Monitoring Plan during the construction and operation phase

ENVIRONMENTAL AND SOCIAL IMPACT	STANDARD/GUIDELINE	MANAGEMENT AND MITIGATION	MONITORING ASPECT	RESPONSIBILITY	ESTIMATED COST (KSHS)
Procurement of construction & installation materials	EMCA, Cap 387. Building Code.	<ul style="list-style-type: none"> • The required standards and certification for procurement of all materials and appliances should be adhered to. • All installation materials and equipment to be from approved sources; • As far as possible, environmentally friendly and sustainable materials should be used; • The Project manager/supervising consultant should ensure that the contractors are instructed on the use of all materials that may have negative environmental (including health) effects. • If any material or substance is used that is at any point in the future deemed to be deleterious to health, then it must be replaced with an acceptable alternative. 	<ul style="list-style-type: none"> • Regular inspections during construction and installation. 	<ul style="list-style-type: none"> • Project contractor • Project proponent • Supervising Engineer. 	10,000
Solid Waste Generation.		<ul style="list-style-type: none"> • Encouraging point source waste segregation and sorting to ensure that generated solid waste materials produced during construction, operation and decommissioning activities are not mixed together for disposal. • Provision of colour coded waste bins for waste sorting and collection to ensure that different types of solid waste materials are handled as per the required measures. • Provision of a temporary solid waste holding/collection dumpsite or waste bin before the final solid waste disposal. • Contracting a NEMA registered/licensed solid waste 	<ul style="list-style-type: none"> • Availability of colour coded solid waste collection bins. • Availability of a duly signed and binding contract with solid waste handler. 	<ul style="list-style-type: none"> • The project proponent. 	50,000

		<p>handler to collect, transport and dispose the resultant solid waste materials in the NEMA designated dumpsites.</p> <ul style="list-style-type: none"> ● Public awareness creation amongst the workers and contractors on the legally stipulated measures for handling and managing solid waste materials produced at the site. ● Encouraging reuse, recycling and renewal of the generated solid waste materials to ensure that they don't go into waste. ● Ensuring for proper signage on good methods of waste handling, management and disposal amongst site occupants. ● Provision of litter bins in areas like the site offices and site workers' residence to ensure that all solid waste materials are properly collected for disposal. ● Encouraging timely and regular removal of solid waste materials from the site. 			
Installation works Health and safety risk	Public Health Act, Building Code, EMCA, Cap 387.	<ul style="list-style-type: none"> ● Adhere to safety regulations outlined in the local government Adoptive by-laws, Building Order 1968 (Building Code) and the Building Operations and Works of Engineering Construction (The Factories and Other Places of Work Act Cap 514). ● The project manager should ensure strict safety management through close attention to design, work procedures, materials and equipment. ● Limit renovations to hours with minimal office activity. 	<ul style="list-style-type: none"> ● Daily spot checks. ● Conduct regular spot checks. 	<ul style="list-style-type: none"> ● Supervising Engineer. 	30,000
Noise Pollution And Excessive Vibrations.	EMCA Cap 387	<ul style="list-style-type: none"> ● Conduction of regular noise and vibration pollution monitoring and surveys. ● Acquisition of noise and excessive vibration permits from NEMA before commencing the construction, 	<ul style="list-style-type: none"> ● Levelled, graded, and landscaped resultant site 	<ul style="list-style-type: none"> ● Project contractor. ● Project EHS officer. ● Project 	50,000

		<p>operation and decommissioning works.</p> <ul style="list-style-type: none"> ● Conduction of quarterly and regular medical check-ups for workers and site occupants to ensure that they are safe from dangers posed by noise and excessive vibrations ● Provision of personal protective equipment like ear muffs, ear plugs, to workers working in areas of high noise levels and excessive vibrations. ● Ensuring that noise produced from the construction works at the proposed project site does not exceed the NEMA recommended noise level (permitted noise level) of 80 decibels within such environment. ● Strictly carrying out the construction works within the NEMA and OSHA stipulated timeline of between 7 am in the morning to 5pm in the evening from Monday to Friday. ● Display of OSHA and NEMA noise and excessive vibration stipulations, management and control methods at the project site. ● Proper signage cautioning people against accessing noisy areas within the site. ● Regular servicing and maintenance of machines and vehicles at use at the site to avoid noise pollution. ● All revving vehicles and machines to be stopped to avoid noise pollution. ● Oiling and greasing of all movable parts of equipment, vehicles and machineries to ensure that reduced noise is produced. ● Public awareness creation on the dangers of excessive pollution and vibrations. 	<p>ground level after the project end.</p> <ul style="list-style-type: none"> ● Presence of vegetated site different from the previously occupied site during project construction . 	<p>environmental landscaping officer.</p>	
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<p>Atmospheric Emissions (Toxic Gases, Dust & Particulate Matter Emissions).</p>	<p>EMCA Cap 387.</p>	<ul style="list-style-type: none"> ● Workers shall be trained on management of air pollution from vehicles and machinery. All installation machinery shall be maintained and serviced in accordance with the contractor’s specifications; ● Vehicles delivering soil materials shall be covered to reduce spills and windblown dust; ● All installation machinery are maintained and serviced in accordance with the contractor’s specifications. ● Dust generating activities (excavation, handling and transport of soils) are not carried out during times of strong winds. ● Where appropriate water damping to be used to control dust. Particular attention to be paid when the wind is from the south or west. ● Limit traffic speed and restrict movement of vehicles as to minimize dust generation. ● Ensure all vehicles have complied with the requirements of Road Traffic Act and its subsequent regulations for emission control. ● Conduction of regular air pollution/quality monitoring tests to ensure that the atmospheric air is not polluted by project activities. ● Water sprinkling on dust emitting areas within the site to ensure for low/reduced dust emission. ● Employment of dust nets to ensure that minimal dust spread within the area of construction is encouraged. ● Provision of personal protective equipment to workers and site occupants like the mouth and nose dust muffs/plugs, ear plugs/muffs, nose muffs to ensure for little impacts on workers. 	<ul style="list-style-type: none"> ● Records of vehicles, machineries, and equipment maintenance / servicing. ● Records of personal protective gears provision. ● Availability of air quality monitoring records and data analysis. 	<ul style="list-style-type: none"> ● Project contractor. <ul style="list-style-type: none"> ● Project EHS officer. ● Air quality expert. 	<p>50,000</p>
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		<ul style="list-style-type: none"> ● Provision of gumboots, aprons and head gears like helmets for workers exposed to such conditions. ● Conduction of quarterly and periodic medical tests among the workers to ensure that their health is not affected by the emitted gases. ● Proper maintenance and servicing of all site vehicles, machineries and equipment to ensure that minimal exhaust is produced for a clean environment. ● Discouraging use of pollutant fuels like Sulphur or lead related fuels for construction machineries, vehicles and equipment to ensure for clean exhaust production. 			
Soil Alteration (Natural landscape/Surface Alteration).	EMCA Cap 387	<ul style="list-style-type: none"> ● Rehabilitating the resultant site land surface to the near original natural landscape as required by NEMA environmental laws. ● Vegetating the resultant site landscape to the required standards as prescribed in the environmental laws by planting grass, indigenous trees, and aesthetic flowers among other plant species. ● Levelling and grading the resultant landscape to the near original level to ensure that the resultant ground level is in line with the existing natural environmental landscape. ● Preserving the indigenous trees and vegetation within the site (if any). ● Ensuring that the removed overburden soil from the project construction site is properly returned to the site at the end of the project cycle for filling the resultant site. 	<ul style="list-style-type: none"> ● Levelled, graded, and landscaped resultant site ground level after the project end. ● Presence of vegetated site different from the previously occupied site during project construction. 	<ul style="list-style-type: none"> ● Project contractor. ● Project EHS officer. ● Project environmental landscaping officer. 	70,000
Transport Impacts (Traffic Snarl ups)	Kenya Traffic Act Cap 403	<ul style="list-style-type: none"> ● Creation of elaborate diversion routes if need be to ensure for proper flow of traffic along the to-be affected roads. 	<ul style="list-style-type: none"> ● Displayed road signs. ● Displayed road 	<ul style="list-style-type: none"> ● Project contractor. ● Project EHS officer. 	70,000

		<ul style="list-style-type: none"> ● Proper signage cautioning drivers plying the route of diversions ahead to avoid accident occurrence, and also on drive slowly. ● Deployment of traffic marshals to help control the flow of traffic along the to-be affected roads. ● Acquisition of traffic disruption permit from the traffic police before commencing the construction work and the subsequent traffic disruption activities. ● Displaying speed limits within the site to ensure that drivers drive their vehicles cautiously. ● Ensuring for the strict adherence to traffic rules and signs to ensure that no accident occurs along the route. ● Encouraging drivers to use vehicles for their meant purposes rather than misusing them. ● Establishing speed limits to be observed by motorists within the site in different areas. 	<p>speed limits within the site and its environs.</p> <ul style="list-style-type: none"> ● Availability of road traffic disruption permit. ● Presence of traffic marshals within the affected areas. ● Displayed brochures of traffic rules. 		
Water Emissions/pollution.	EMCA Cap 387	<ul style="list-style-type: none"> ● Conduction of water quality tests and monitoring to ensure that water pollution levels are put under strict control. ● Ensuring that hazardous substances like oil, grease and petroleum products are not released into water sources. ● Planting of cover vegetation in bare areas to ensure that soil erosion is curbed, and water pollution reduced. ● Constructing of well-established drainage channels in line with the natural environment landscape drainage systems to ensure that surface runoff water is properly channelled and drained where required. ● Ensuring that vehicle, machineries and equipment workshops and garages are established in areas where 	<ul style="list-style-type: none"> ● Water quality monitoring/testing/assessment records. ● Availability of effluent discharge license from NEMA for effluent disposal. ● Establishment of temporary washrooms for workers. 	<ul style="list-style-type: none"> ● Project contractor. <ul style="list-style-type: none"> ● Project EHS officer. ● Project engineer. 	20,000

		<p>they can't affect water sources through ensuring that the waste oil, fuel, grease or water is properly disposed.</p> <ul style="list-style-type: none"> ● Establishment of waste oil/grease traps to ensure that leaking and disposed waste oil/grease are trapped before penetration into the natural environment. ● Establishment of effluent discharge facilities like septic tanks and soak pits to ensure for safe disposal of effluent waste materials into the environment. ● Acquisition of effluent discharge license from NEMA before discharging liquid wastes into the natural environment. ● Construction of temporary washrooms for workers and site occupants to ensure that effluent wastes are properly handled. ● Display of posters and brochures containing NEMA stipulations and provisions on water conservation and management on different areas within the site to enhance public education on properly water handling and management methods. ● Acquisition of WRMA permits on water use and abstraction at the site. 	<ul style="list-style-type: none"> ● Documented WRMA water use and abstraction records for the site. 		
Effects on Biodiversity (Flora & Fauna).	EMCA Cap 387	<ul style="list-style-type: none"> ● Vegetation of the resultant construction site landscape to the near original existing natural landscape through different indigenous tree species and other vegetation plantation. ● Levelling and grading of the resultant construction site ground level with the existing natural ground landscape. ● Restoring animal habitats to their near original status. ● Ensuring that the removed construction overburden soil is returned to the resultant site where they were 	<ul style="list-style-type: none"> ● Healthy vegetation growing on the rehabilitated land. ● Graded and levelled construction site. 	<ul style="list-style-type: none"> ● Project contractor. ● Project EHS Officer. 	40,000

<p>Liquid waste (effluent) & hazardous waste pollution (oil leaks/spills, grease/ fuel, etc.).</p>	<p>EMCA Cap 387</p>	<p>removed earlier on.</p> <ul style="list-style-type: none"> ● Acquisition of effluent discharge license from NEMA before discharging effluent waste into the environment. ● Construction of oil/grease traps to ensure that there are no spillages on the environment. ● Provision of personal protective gears to people working in hazardous areas, like aprons, gumboots, mouth muffs, helmets, gloves, etc. ● Contracting of a NEMA licensed hazardous waste handler to collect, transport and dispose of hazardous waste materials in a legally required way. ● Construction of storm drainage channels adopting the natural environmental drainage channel and flow for proper transportation and disposal of resulting wastes. ● Location of garage and workshop in areas far away from water sources and environmental resources. ● Location of LPG storage tanks in secure areas away from public, water sources and key environmental resources. ● Proper signage like no smoking among others to caution the public of the imminent dangers looming. ● Cordoning off such areas to ensure for safety and maximum security to avoid accidents and injuries. ● Proper maintenance and servicing of equipment, machineries and vehicles to avoid fuel leakages or spillages. ● Establishment of effluent discharge points like soak points and septic tanks for liquid wastes and temporary washrooms for workers and site occupants in accordance with the Physical Planning Act stipulations. 	<ul style="list-style-type: none"> ● Availability of a binding contract between the project contractor and the NEMA registered hazardous waste handler. ● Availability of an up to date effluent discharge license from NEMA. 	<ul style="list-style-type: none"> ● Project contractor. ● Project EHS officer. ● Project engineer. 	<p>80,000</p>
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<p>Increased insecurity</p>		<ul style="list-style-type: none"> ● Registration at the gate on the site visitor’s book by all the guests and motorists accessing the site to ensure for accountability of the people and vehicles accessing site at all times. ● Cordoning off the site using barbed wire or temporary iron sheet materials to ensure for public safety of specifically roadside onlookers. ● Deployment of a security guard at the project site main gate to ensure for the security check-ups, registering of site accessing guests/motorists, and safety of site occupants all time. ● Proper signage to ensure that vehicles entering the site are well guided like, slow down, no speeding. ● Installation of security lights at the strategic points within the site compound to boost security status. ● Display of emergency response numbers’ posters in various areas within the site to improve security/emergency alert, management, and response. ● Conduction of security drills and trainings to improve workers social behaviours. ● Encouraging community policing to ensure for smooth coexistence between site workers and community members. ● Establishment of a main site entry point through gate erection to control project access point. 	<ul style="list-style-type: none"> ● Book register for site guests and motorists accessing the site all time. ● Presence of security guard manning the project site all time. 	<ul style="list-style-type: none"> ● Project contractor. EHS ● Project officer. 	<p>20,000</p>
<p>Accidents/Incidents (Injuries to Site Workers, Fire Hazards, Occupational Health & Safety Risks)</p>	<p>Occupational Health and Safety Act, 2007 Fire Risk Reduction Rules, 2007</p>	<ul style="list-style-type: none"> ● Proper signage and awareness creation amongst workers to ensure that their safety is guaranteed, like provision of fire exits among others. ● Conducting fire drills and fire safety trainings amongst workers to ensure that they are well informed when it comes to dealing with such incidences. ● Organizing first aid training to workers to equip them 	<ul style="list-style-type: none"> ● Availability of proper signage. ● Records of equipment and machineries servicing and maintenance. 	<ul style="list-style-type: none"> ● Project engineer. <ul style="list-style-type: none"> ● Public health officer in charge of the area. 	<p>60,000</p>

	Public Health Act, Factories and Other Places of Work Act, Labour laws	<p>with first aid skills necessary during emergencies.</p> <ul style="list-style-type: none"> ● Provision of fire blankets and firefighting equipment in different areas within the site to help during fight against fire outbreak. ● Establishment of fire assembly point within the project site compound for emergencies. ● Provision and display of emergency hotline numbers important during emergencies to workers. ● Provision of personal protective equipment to workers like helmets, gumboots, gloves, goggles, ear and mouth muffs among others. ● Provision of adequate and well-maintained sanitary facilities for workers. ● Developing an emergency response plan for the project site important during emergencies. ● Proper maintenance and servicing of all site machineries and equipment to avoid immature occurrence of accidents or injuries. ● Provision of fully stocked first aid kit for first aid administration in case of emergency occurrence within the project site. ● Machineries, vehicles and equipment to be driven only by trained workers capable of operating them as per their qualifications. ● Provision of fully equipped first aid kit. ● Provision of firefighting equipment. ● Provision of proper and well-maintained sanitary facilities to workers. ● Provision of treated water for drinking. ● Ensuring public health provisions are observed during food handling. 	<ul style="list-style-type: none"> ● Number of trainings, drills conducted to workers. ● Records on the trainings and drills conducted. ● Availability of a fully stocked first aid kit. ● Availability of firefighting equipment. 		
Visual Impacts.		<ul style="list-style-type: none"> ● Encouraging environmentally friendly designs and 	<ul style="list-style-type: none"> ● Healthy and 	<ul style="list-style-type: none"> ● Project contractor. 	10,000

		<p>plans conforming to the respective surrounding environment.</p> <ul style="list-style-type: none"> • Ensuring that the development conforms to the local area's current and future land uses to ensure that the area's aesthetic value is upheld. • Levelling and grading the resultant project site to the near original landscape to conform to the existing natural landscape. • Vegetating the resultant project site through planting of trees, flowers, grass, to ensure that it matches the surrounding natural project environment. • Landscaping the resultant landscape to improve the aesthetic value of the resultant project site. 	<p>well growing planted vegetation.</p> <ul style="list-style-type: none"> • Improvement in aesthetic value of the resultant environment in comparison with the existing natural environment. 	<p>EHS</p> <ul style="list-style-type: none"> • Project officer. • Project Landscaping officer. 	
Unprecedented Job Loss.		<ul style="list-style-type: none"> • Organizing stress management training programmes for workers. • Encouraging the workers to save their money with such bodies as the National Social Security Fund for future use. • Conducting counselling and psychological guidance sessions with workers to ensure that they are psychologically prepared for anything anytime. • Provision of prior and adequate information before job termination or job loss to the workers. • Proper and timely compensation plus payment of all dues and benefits accrued to the workers before job loss. • Advise the workers appropriately on ways of finding new job opportunities to ensure that they are not affected at all by such occurrences. 	<ul style="list-style-type: none"> • Number of trainings offered. • Number of counselling and psychological guidance sessions conducted and provided to the workers. 	<ul style="list-style-type: none"> • Project contractor. • Project EHS officer. 	10,000
Increased prevalence of HIV/AIDS &		<ul style="list-style-type: none"> • Providing HIV/AIDS prevalence training workshops and seminars to ensure that workers are well conversant with the disease. 	<ul style="list-style-type: none"> • Number of counselling and psychological 	<ul style="list-style-type: none"> • Project EHS officer. 	15,000

Other Sexually Transmitted Infections.		<ul style="list-style-type: none"> ● Conduction of regular and continuous HIV/AIDS testing among the workers and site occupants. ● Regular counselling of the HIV/AIDS affected persons within the site to ensure that there is no discrimination. ● Availing medical drugs for the affected workers working within the site. ● Hiring of a professional counsellor to aid in counselling workers and site occupants on the benefits of promoting positive social behaviours. ● Establishment of counselling programmes and groups amongst workers to improve their interrelationships. ● Provision of condoms amongst workers for prevention initiatives. ● Proper awareness creation through provision of brochures, display of posters informing people of the dangers of irresponsible sexual intercourse, drug abuse amongst other irresponsible social behaviours. 	guidance sessions conducted and provided to the workers.		
Erosion control	EMCA, Cap 387	<ul style="list-style-type: none"> ● Earthworks should be controlled so that land that is not required for the construction works is not disturbed. Wherever possible, earthworks should be carried out during the dry season to prevent soil from being washed away by the rain. ● Excavated materials and excess earth will be kept at appropriate sites approved by the supervising engineer and the earth dumping sites designed in such a manner as to facilitate natural water discharge; 	● Daily spot checks.	<ul style="list-style-type: none"> ● Contractor ● Supervising Engineer. 	10,000
EMP DURING OPEATION PHASE					
Fire and safety	Public Health Act. Fire Risk	<ul style="list-style-type: none"> ● Place portable fire extinguishers at suitable locations, according to the activities in the installation programme; 	● Daily spot checks.	<ul style="list-style-type: none"> ● Contractor; ● Supervising Engineer. 	20,000

	Reduction Rules, 2007. OSHA, 2007	<ul style="list-style-type: none"> ● Mark and sign-post all emergency exits; ● Ensure safety warnings are prominently displayed on site, such as “No smoking”, “No naked flames”; ● Provide and enforce the use of personal protective equipment (PPE); ● Install a temporary fire alarm and ensure that fire procedures are known to all the site staff; ● Ensure that an adequately stocked First Aid box is on site at all times; ● Maintain an incident/accident register, in accordance with the OSHA, 2007. 			
Increased waste generation	Waste management regulation	<ul style="list-style-type: none"> ● Ensure segregation of waste at source ● Provide bins and skips for waste management ● Waste to be disposed of at designated areas by NEMA licensed waste handlers 	●	●	
Marine Traffic During Installation of Floating storage		<ul style="list-style-type: none"> ● The Floating storage and its infrastructure installation to be incorporated into the KPA marine master plan 	● Daily post checks	● QHSE/KPA	50,000
Gas leakage and oil spills		<p style="text-align: center;">Ensure regular monitoring/inspection of LPG tanks</p> <p style="text-align: center;">Install smoke/leakage detectors,</p> <p style="text-align: center;">Source services of oil waste handlers</p>	● Daily post checks	● Supervising engineer	
Energy utilization	Energy Act, 2012	<ul style="list-style-type: none"> ● Develop an energy management plan. ● Installation machinery and vehicles should be maintained and used in accordance with manufacturer’s specifications, to maximize efficiency and lower use of energy. ● Workers should be sensitized on the importance of energy management. 	<ul style="list-style-type: none"> ● Determine energy consumption as per set targets. ● Documenting consumption 	<ul style="list-style-type: none"> ● Contractor. ● Supervising Engineer. 	25,000

			levels and reporting on any irregularities.		
Work place Accidents and injuries	Public Health Act, Building Code, EMCA, Cap 387.	<ul style="list-style-type: none"> ● Provision of appropriate PPE'S and ensuring their continuous use ● Adhere to safety regulations outlined in the local government Adoptive by-laws, Building Order 1968 (Building Code) and the Building Operations and Works of Engineering Construction (The Factories and Other Places of Work Act Cap 514). ● The project manager should ensure strict safety management through close attention to design, work procedures, materials and equipment. ● Limit renovations to hours with minimal office activity. ● Conduct safety audits annually 	<ul style="list-style-type: none"> ● Daily spot checks. ● Conduct regular spot checks. 	<ul style="list-style-type: none"> ● Supervising Engineer. 	30,000
Waste Water/water management		<p>All grey waste water to be channelled into the sewer line</p> <p>Routine check-ups and monitoring of the drainage system to avoid leakages and blockages.</p> <p>Construction of separate storm water and waste water drain.</p> <p>Implement water saving devices for domestic water use e.g. dual flush toilets, automatic shut-off taps, etc.;</p> <p>Practice rain water harvesting;</p> <p>Conducting of regular audits of water systems to identify and rectify any possible water leakages</p>	<ul style="list-style-type: none"> ● Daily spot checks. ● Conduct regular spot checks. 	<ul style="list-style-type: none"> ● Management 	50,000

CHAPTER NINE

9.0 PROJECT DECOMMISSIONING

9.1 Overview

Decommissioning is the final disposal of the project and associated materials at the expiry of the project. It mainly involves the proponent removing all materials resulting from demolition from the site and restoring the site to the near original state.

9.2 Removal of liquefied petroleum gas storage tanks

Decommissioning phase of the LPG storage terminal plant will include the following;

- i. Preparation of a decommissioning plan
- ii. Contaminated metal must be steam-cleaned prior to disposal.
- iii. Routing of effluent dependant on contaminants.
- iv. If any metal, including piping, have future value it may be moved, after cleaning, to a storage area for redundant materials.
- v. The area to be excavated must be cordoned off with red/yellow danger tape and no smoking signs displayed around the site.
- vi. All other electrical, storm water or water pipelines must be located prior to excavation to ensure they are not damaged in the excavation process. All pipes, vents and hose reels connected to the liquefied petroleum gas and water tanks respectively, must be disconnected and sealed before the tanks are removed.
- vii. The removed tanks will be loaded onto a flat-bed truck and taken to the contractor's storage yard or to a storage area designated by the proponent. The tanks will be flushed to remove any remaining residues with the flushed water either stored for future flushing or processed to remove the liquefied petroleum gas remains.

9.3 Description of the project's decommissioning activities

i. Demolition works

Upon decommissioning, the project components including structures, paved areas, drainage systems, and hoarding structure, a good amount of solid waste will be generated. The wastes should be reused or if not reusable, disposed of appropriately by a licensed waste disposal company.

ii. Dismantling of equipment and fixtures

All equipment including electrical installations, finishing fixtures partitions, among others will be dismantled and removed from the site on decommissioning of the project. Priority will be to reuse of this equipment in other projects. This will be achieved through auctioning of the equipment to other contractors or reused in another site.

iii. **Site restoration**

Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the topsoil and re-vegetation using indigenous plant species.

Table 9: Decommissioning Plan

Decommissioning Activity	Recommended Mitigation Measures	Responsibility	Time Frame	Estimated Cost (Kshs.)
Decommissioning Process				
i. Acquisition of the requisite demolition and noise/excessive vibration emission permits from the Mombasa County Council and NEMA before the start of the demolition process.	Strict adherence to the respective legislations and regulations like the EMCA (Noise and Excessive Vibrations Pollution (Control), Regulations of 2009.	<ul style="list-style-type: none"> ● Project contractor ● Project proponent ● EHS officer. 	Decommissioning Phase	10,000
ii. Removal of all fixed water pumps, water pipes (domestic/fire fighting), site generator (if any).	Provision of personal protective equipment like the ear muffs, goggles, inspiratory, mouth and nose muffs, gloves, safety boots, aprons.	<ul style="list-style-type: none"> ● Project Engineer ● Project Contractor 	Decommissioning Phase	5,000
iii. Removal of permanent structures like the site office, washrooms, staff residential houses, parking slots, LPG storage tanks, and water tanks (if any), unless required for an agreed future use.	Contracting of a NEMA licensed solid waste handler and hazardous waste handler to collect, transport, dispose and generally manage all the demolition waste materials produced at the site on behalf of the project management.	<ul style="list-style-type: none"> ● Project Engineer ● Project Contractor 	Decommissioning Phase	10,000

iv.	Demolition of the main site office, residential houses, store, and the washrooms.	Employing the 3R's of waste management (Recycling, Reusing and Renewing).	<ul style="list-style-type: none"> ● Project Engineer ● Contractor 	Decommissioning Phase	15,000
v.	Disconnection of electrical connections and wiring within the site.	Contracting of fire safety and qualified electricians/experts to carry out the wiring disconnection exercise professionally.	<ul style="list-style-type: none"> ● Project Engineer ● Contractor 	Decommissioning Phase	5,000
vi.	Reusing, selling, renewing or recycling the non-functional equipment and machineries, vehicles, trucks, tractors, engines, LPG storage tanks, and pump, and used grease and oil lubricants containers in the store (if any).	Provision of adequate colour coded waste bins for demolition waste segregation and sorting at the source for easier disposal.	<ul style="list-style-type: none"> ● Project Engineer ● Project Contractor 	Decommissioning Phase	50,000
vii.	Selling, reusing or recycling the unused refilled gas cylinders, water dispensers, the unused grease and oil lubricants, the water storage tanks, firefighting pipes, extinguishers, fire hose reels (if any).	Identification of NEMA licensed waste oil/grease/fuel dealers (hazardous waste handlers) to manage on behalf of the proponent hazardous waste materials.	<ul style="list-style-type: none"> ● Project Engineer ● Project Contractor 	Decommissioning Phase	20,000

Demolition Waste Management Plan

<p>viii. All building materials, machinery, vehicles, and equipment not being used for other purposes must be removed to the contractor's yard, recycled, reused, or renewed as much as possible.</p>	<p>Employing proper signage during the demolition process.</p>	<ul style="list-style-type: none"> Contractor/ proponent. 	<p>Decommissioning phase.</p>	<p>50,000</p>
<p>ix. Disposal of demolition wastes should be to an approved dumping site and methods applicable.</p>	<p>Awareness creation on workers safety and why it matters the most (prioritised).</p>	<ul style="list-style-type: none"> Project Contractor / proponent / EHS officer. 	<p>Immediately.</p>	<p>40,000</p>

x.	Provision of solid waste collection bins of different colours to ensure for solid waste sorting and segregation at the source before disposal.	Conduction of trainings and drills on fire and general safety to all the site occupants to ensure that their safety is taken care of at all times.	<ul style="list-style-type: none"> Project Contractor / proponent / EHS officer 	Decommissioning phase.	25,000
xi.	Contracting a NEMA licensed/registered solid waste and hazardous waste handler to collect, transport and dispose solid wastes/hazardous wastes on a regular timely basis.	Drafting a waste management plan and design for a sustainable and long-term waste management within the project area.	<ul style="list-style-type: none"> Project contractor. Project EHS officer. 	Decommissioning phase.	60,000
xii.	Testing of hazardous waste materials like grease and oil from the site to ensure that they don't pollute the environment as a result of spillage, infiltration or leakage.	Display of the various ways and methods of managing hazardous waste materials to prevent pollution from occurrence.	<ul style="list-style-type: none"> Project Contractor. Project EHS officer. 	Decommissioning phase.	100,000
Project Site Rehabilitation					

xiii.	Initiate a landscape maintenance program that will revitalize the site vegetation better than was before.	Inclusion of all the site occupants for team work building and wise decision making.	<ul style="list-style-type: none"> ● Contractor ● proponent 	Continuous	70,000
xiv.	Levelling and grading the resultant project site landscape in conformity with the surrounding natural environment landscape.	As the EMCA Act CAP 387, general requirements.	<ul style="list-style-type: none"> ● Project contractor. ● Project EHS officer. 	Continuous.	50,000
xv.	Returning the removed overburden soil from the resultant project site from where it was taken.	Strict adherence to the stipulations of the Occupational Health and Safety Act of 2007, and its subsidiary legislations.	<ul style="list-style-type: none"> ● Project contractor. ● EHS officer. 	Decommission phase.	25,000

<p>xvi. Vegetating the resultant levelled and graded project site with indigenous and exotic plants (trees, grass, aesthetic flowers), of various species to ensure that the site returns back to the initial status before construction works.</p>	<p>Handling with care all highly flammable substances through proper labelling, signage, and display of recommended handling measures amongst other precautionary measures, to ensure that fire outbreaks/hazards are avoided at all costs.</p>	<ul style="list-style-type: none"> ● Contractor. ● Proponent. ● EHS officer. ● Landscaping officer. 	<p>Decommissioning phase.</p>	<p>10,000</p>
<p>xvii. Conduction of routine inspections, patrols and / or monitoring of the decommissioning process to ensure for environmental safety.</p>	<p>Strict adherence to OSHA regulations and the EMCA Act, CAP 387, stipulations.</p>	<ul style="list-style-type: none"> ● Project EHS Officer. 	<p>Decommissioning Phase</p>	<p>20,000</p>

CHAPTER TEN

10.0 CONCLUSION AND RECOMMENDATIONS

10.1 Conclusion

It is evident that the proposed project will generate minimal negative environmental impacts during construction as well as during operation. However, most of the identified impacts when compared to the project benefits are negligible. The study established that the identified negative impacts can be adequately mitigated through the implementation of the provided mitigation measures in the proposed Environmental and Social Management and Monitoring Plan.

10.2 Recommendations

It is recommended that all suggested mitigation measures in the Environmental and Social Management and Monitoring Plan be implemented during the entire project cycle. Additionally;

Construction work to commence only when the NEMA license has been obtained.

- i. The proponent to acquire a license to transport, store and sell bulk liquid petroleum gas from the Energy Regulatory Commission (ERC).
- ii. The project should utilize local manpower during construction and give equal opportunities to women to enhance project ownership and acceptance by the local community.
- iii. Conduct statutory Environmental audits, Fire risk assessments and Occupational Safety and Health audits annually through licensed advisors for the facility during operations phase, as per the NEMA requirements to monitor the environmental compliance standards during the project implementation and operation phases.
- iv. Safety within the living and working environment is of great importance, it is recommended that all provisions of OSHA Act, 2007 be adhered to. An annual Occupational Safety and Health Audit, and Fire Safety Audit should be conducted.
- v. Warning/ informative signs should be conspicuously displayed at the construction site to remind all employees and site visitors of the rules and regulations that they are required to observe.
- vi. Waste materials like debris from installation activities to be disposed in required dumpsites.
- vii. Adhere to the formulated Environmental and Social Management and Monitoring Plan (ESMMP) to mitigate the predicted negative environmental and social impacts during installation, operation, and decommissioning phases.

- viii. The project proponent to acquire all legal permits and licenses like noise and excessive vibration permit from NEMA before engaging in such activities that will result in such negative impacts.

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APPENDICES

A: Public participation questionnaires

B: List of key stakeholders

C: Estimated total project cost

D: Land Title Deed

E: Architectural Plans

F: Certificate of Incorporation

G: Kenya Revenue Authority Certificate