Environmental Social Impact Assessment (ESIA) Study Report.
For
The Proposed Construction and Operation of LPG Bulk Import and Storage Facility On Plot L.R. No. 4791 & 4792/VI/Mainland North, Kipevu area, Mombasa County.

GPS CO-ORDINATES

4°01′29.3″S, 39°38′01.8″E (-4.024818, 39.633821)

PROPONENT

ELEVEN ENERGY LIMITED
P.O. BOX 4006 - 00596
NAIROBI, KENYA

November 2022

EIA PROJECT IMPLEMENTATION TEAM

Name	Qualification	Affiliate	Signature
Edgar Ambaza (1916)	**Lead Auditor/Trainer ISO, Lead Expert Natural Resource Management**	**Global EHS Consulting**	
Edgar Eredi Muyesu (1921)	**Lead Auditor/Trainer ISO, Lead Expert (Natural Resource Management)**	**Mikaye Systems Limited**	
Evans Totona Kiboi	**Health and Safety Advisor. Lead Expert (8049)**	**CEMEA Limited**	
Ezekiel Olukohe (8379)	**Lead Expert (8379), Bsc Environmental Health, Msc Occupational Health and Safety**	**Global EHS Consulting**	
Kenneddy Fortune	**Bsc Environmental Health**	**Zebah Company Limited**	
Victor Kirima	**QSHE Expert Lead Expert (11890)**	**Sustainable QHSE Consulting Ltd**	

Certification by Proponent

Signed on Behalf of: *Eleven Energy Limited*

Name: _____

Position: _____ **Signature:** _____

Date: _____

NON-TECHNICAL SUMMARY

Introduction

This Environmental and Social Impact Assessment (ESIA) Study Report has been prepared for Eleven Energy Ltd (hereinafter referred to as proponent) for the proposed construction of Liquefied petroleum Gas depot (Bulk Import and storage of LPG) on Plot No. L.R. No. 4791 and 4792/VI/Mainland North, Kipevu area. Eleven Energy Ltd is a legally registered Kenyan company which was incorporated on 14th June 2019. The company is specialized in the transportation of petrochemical gas products in liquefied form. The company intends to increase its capacity of bulk delivery of LPG by constructing an LPG terminal at Mombasa with access to common user manifold (CUM). Liquefied Petroleum Gas (LPG) means commercial propane, commercial butane, commercial pentane and a mixture thereof as specified in the relevant Kenya Standards. LPG is an excellent, environment-friendly fuel not known to have any adverse effects on human health except it being highly flammable. Like all forms of energy, LPG is potentially hazardous if mishandled or misused hence promotion of safety is key in any LPG project.

Global EHS Consulting has been contracted by Eleven Energy Limited to conduct an Environmental Impact Assessment Study for the proposed development on Plot L.R. No. MN/VI/4791 & 4792, Kipevu Industrial area, Off Makupa Causeway road in Mombasa County. The firm is constituted of a team of registered EIA experts and DOSHS Accredited Occupational Health and Safety advisors.

There has been considerable increase in the demand and use of LPG for various purposes whereby one of the most important uses in Africa is cooking. Following the rise in demand of LPG within the country, the project Proponent ***Eleven Energy Limited***, a company that specializes in sales of LPG in Kenya proposes to construct and operate a bulk LPG Import and Storage facility to be located off newly developed and finished Makupa causeway in Kipevu area, Changamwe Sub –County within Mombasa County.

Since the inception of the Environmental Management and Coordination Act (EMCA) 1999, it has now become a legal requirement for all projects leading to the activities listed in the second schedule to undertake Environmental Impact Assessment (EIA) prior to commencement. Environmental concerns now need to be part of the planning and development process and not an

afterthought to promote sustainable development. The scale and detail of EIA varies with project complexity as well as the ecological, cultural and socio-economic sensitivity of specific sites. This is consistent with the Constitution of 2010, Vision 2030, and the Sustainable Development Goals, especially SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable – one target being to enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in call countries by 2030. In order to make these provisions operational, the National Environment Management Authority (NEMA) has developed a set of EIA related legislations – Environmental Management and Coordination (Environmental Impact Assessment and Environmental Audit) (amendment) regulations, 2019 that include General EIA guidelines and Regulations; and sector-specific EIA Guidelines.

In accordance to the amended second schedule of the environmental Management and Coordination Act (No. 8 of 1999), the proposed development is a high risk project: 11(a) Hydrocarbon projects including depots and refinery facilities for hydrocarbons. Regulation 11 of the revised EIA/EA Regulations require that all projects scheduled in the Second Schedule of 2019 revised EMCA 1999 as being a high risk project shall submit to the National Environment Management Authority (NEMA) an Environmental Impact Assessment study conducted in accordance with terms of reference developed during the scoping exercise and approved by the Authority (*see attached TOR approval*).

Project Description

The project land is situated in an ideal location the land is owned by EPZA which was specifically zoned for such like projects. The site is close to port of Mombasa and will have an easy access to Common User Manifold thus reducing cost and risk involved in reticulation of the gas to depot facility. In addition, the site is located in the center of industrial area of Mombasa with direct access to main road. The proposed project activities will entail: construction, earthmoving and mechanical works.

The proposed construction and Operation of a bulk LPG Import and Storage facility will feature the following;

- Construction of Entry and Exist Gate and Sentry house
- Truck parking and parking for loaded lorries

- Weighbridge
- Loading and Offloading Gantry
- 2 in numbers 2000 C.M Cold water storage tanks
- Tanker loading and Unloading shed
- Office Block ground and first floor
- Fire water pump house
- Pump House
- Mounding of six storage bullet tanks 5252 propane
- 4 Meter wide loop road
- Perimeter wall

ESIA Process

A detailed field-based environmental and social impact assessment preceded by extensive desk study was undertaken from 22nd to 30th November, 2022. The ESIA process is used to assess the potential environmental and social impacts (both positive and negative) of the proposed construction of the LPG import Terminal; facilitate management and control of the potential environmental and social impacts associated with the construction works; assess compliance with relevant statutory and regulatory requirements and raise awareness of and commitment to environmental and social policies by project staff, the host community and other concerned parties through public meetings. The environmental parameters assessed during this ESIA study include:

- ❖ Physiography
- ❖ Geology
- ❖ Soils
- ❖ Oceanography
- ❖ Surface and ground water resources
- ❖ Climate and air quality
- ❖ Flora, fauna and avi-fauna
- ❖ Land resources
- ❖ Noise and vibrations
- ❖ Visual aesthetics

- Liquid and Solid wastes
- Social, economic & cultural setting and health and safety issues

Global EHS Consulting conducted public awareness through extensive public consultation meetings. This included both formal and informal interviews with the residents of Chaani, Kipevu, Kibarani and Changamwe areas and other key stakeholders. Household questionnaires were administered in households and key informant interviews conducted. The information gathered provides details of the current environmental and socio-economic baseline situation and is critical for development of the Environmental and Social Management and Monitoring Plan (ESMP).

Regulations, guidelines and standards

The policy and legislative framework upon which this ESIA survey for the proposed project was based on and includes Kenyan and international legislation and Eleven Energy Limited Policies but was not limited to the National Energy Policy (2012); Environment and Development Policy; Land Policy; Kenya Health policy; Environmental Management & Coordination Act (EMCA) Cap 387; The Petroleum (Liquefied Petroleum Gas) Regulations, 2019; Occupational Health and Safety Act, 2007; Devolved Government Legislation, International Standards and procedures including: World Bank Group Environmental, Health and Safety (EHS) Guidelines (2007) and International Finance Corporation (IFC) Sustainability Performance Standards (2012) and Guidelines (2007) Policies and Procedures.

Impacts assessment

Aspects of the proposed and unplanned activities that are likely to affect the baseline conditions in the project area include:

- The project footprint;
- The area within which dust may settle;
- The area in which air quality may be degraded as a result of gas leakages and other foul smells;
- The area within which noise may be audible;
- Communities close to the project site;
- Soils which may be degraded due to compaction and uncontained spillage; and
- The road network where construction traffic may result in a noticeable increase in traffic

levels.

Project operations will affect air quality on micro-scale, and in a transient manner, through exhaust emissions from trucks as well as fugitive emissions (leakages).

Conclusion and recommendation

The proposed social impacts and review of Eleven Energy Limited policies and management plans has found that Eleven Energy Limited has committed to implement mitigation measures that are effective in reducing the anticipated negative impacts while maximizing on the positive ones. The ESMP developed in this report should be adhered to in order to ensure that the project remains environmentally and technically friendly throughout its course.

The proposed project, including the construction and operation of the LPG bullet tanks station is anticipated to provide sufficient stock of LPG for the prevailing market use around Mombasa at the Country at large. The impacts before implementation of mitigation measures are assessed as very low to medium low and the ratings are expected to improve further with the implementation of the proposed mitigation measures. In particular, the LPG Bulk Import and Storage facility will be designed, constructed and operated according to the latest industry norms and standards. Programs and plans developed and implemented through the EMP will be monitored and audited to ensure compliance. The mitigation measures proposed in this report should be included in the tender contract and tender documents so that the contractor who will be selected for the project be bound to implement them fully thus ensuring Environmental Sustainability.

DEFINITION OF TERMS

The definitions used in the impact assessment are given below:

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

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

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

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

Resources include components of the biophysical environment.

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

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

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

Spatial scope refers to the geographical scale of the impact.

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

ACRONYMS

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

Table of Contents

1.0. INTRODUCTION

This ESIA has been prepared by Global EHS Consultancy for Eleven Energy Limited herein referred to as the proponent. The report identifies the anticipated environmental and socio-economic impacts (both beneficial and adverse) of the proposed construction and operation of a Liquefied Petroleum Gas (LPG) import and storage terminal in Mombasa, Kenya and proposes practical preventive and mitigation measures during project planning, construction and implementation phases to ensure a clean and healthy environment as enshrined in Kenya's legislation. LPG (either Butane or Propane) is a mixture of flammable hydrocarbon gases that are used as fuel in cooking equipment and heating appliances. Physically, LPG is defined as a colourless, odourless liquid that readily evaporates into a gas and because of its flammable nature and rapid evaporation, an odourant has been added to it to help detect leakages.

Liquefied Petroleum Gas production, use and disposal are central to any economy, as it drives industrial and commercial operations. Petroleum products consumption in Kenya is growing at an average annual rate of 4.37%. Kenya is a net importer of petroleum products and its petroleum sector is dominated by foreign-owned companies. The sector is characterized by a large number of players that import, export, distribute and transport petroleum products.

With the expansion of economic and social development activities that are energy-dependents, petroleum consumption has been on the upward trend. The volatile nature of petroleum products, sensitivity of the ecosystems and under-developed infrastructure of Kenya’s petroleum operations, raise concerns for the environmental impacts thus the need to assess, analyze and incorporate appropriate mitigation measures in the investments activities.

Eleven Energy Limited is a Kenyan company incorporated under Companies Act, 2015 its major interest being LPG distribution in Kenya. It intends to construct and operate an above ground LPG depot on Plot No. MN/VI/4791 & 4792 Kipevu area, off Makupa Causeway road in Mombasa County.

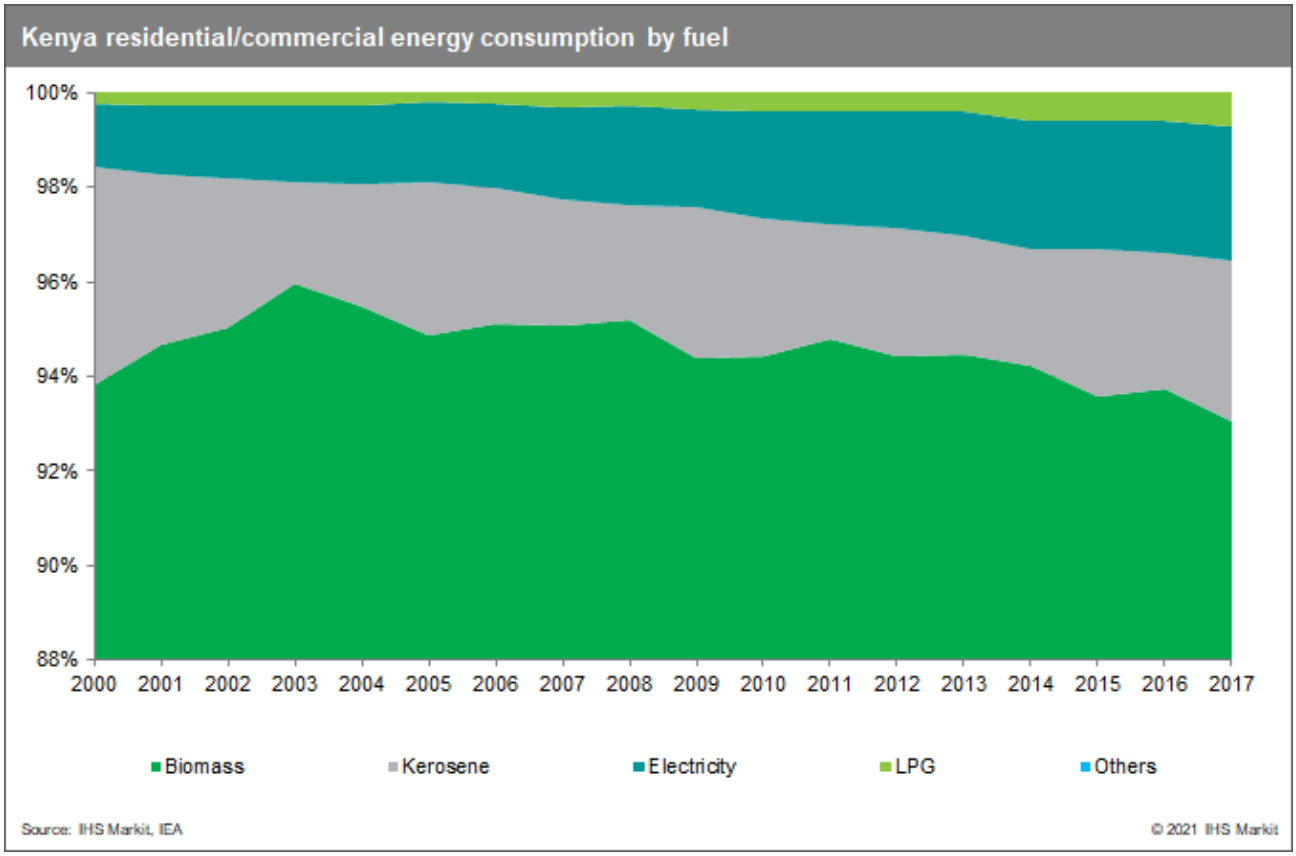
Kenya's energy sector remains underdeveloped despite its relatively large population and fast-growing economy. The vast majority of households rely on biomass sources (charcoal and firewood) and kerosene for cooking. The Kenyan government has sought to encourage displacement of biomass

and kerosene in households with Liquefied Petroleum Gas (LPG), and in recent years has had some initial success. LPG consumption began growing rapidly from a very small base in 2014, and by 2017 consumption in the residential/commercial sector had tripled from 2013 levels to about 124,000 metric tons. Still, this translated to only about a 0.7% share of the overall fuel mix. Rapid demand growth continued in 2018-19, with demand nearly doubling again. The domestic consumption of LPG in Kenya increased to roughly 326 thousand metric tons in 2020, up from 312 thousand metric tons in the previous year. The COVID-19 pandemic interrupted this trend in 2020, though it is expected that growth will rebound in the coming years. *(Keefer Douglas, Director, Midstream Oil and NGLs Research and Consulting, IHS Markit).*

Overall, Kenya has been registering a growing demand for LPG due to improved import and distribution infrastructure and an improved economy. However, market penetration has remained very low due to access to supply and affordability. It is for this reason that the proponent proposes to establish an LPG storage facility/depot as it will ensure continuous supply of LPG to LPG Bottling plants throughout the country and will control costs as it will contribute to elimination of product hoarding.

Beyond 2030, as GDP grows and household income improves, it is anticipated that the per capita LPG consumption growth to accelerate to reach 8-9 kg per person by 2050.

The proponent aims to be among the big players in the LPG industry as it will contribute to the country's LPG import capacity to outpace domestic consumption growth, allowing Kenya to become an import hub for the region, exporting some LPG over land to neighboring countries with limited alternatives for supply.



The proposed construction and Operation of a bulk Import and Storage facility will feature the following;

- Construction of Entry and Exist Gate and Sentry house
- Truck parking and parking for loaded lorries
- Weighbridge
- Loading and Offloading Gantry
- 2 in numbers 2000 C.M Cold water storage tanks
- Tanker loading and Unloading shed
- Office Block ground and first floor
- Fire water pump house
- Pump House
- Mounding of six storage bullet tanks 5252 propane
- 4 Meter wide loop road
- Perimeter wall

Liquefied Petroleum Products Type

Propane gas will be stored, handled and distributed within this proposed facility. There will be two fire water tanks 2000 cubic metres and the proponent is putting up six mounded bullet tanks storage 5,252 metric tons each.

The proposed project site is situated in an ideal location in regards to safety and land use zonation as the neighbourhood entails the Port of Mombasa, dry cargo (clinker) handling facility namely Multiple Hauliers, energy producing companies such as Kengen Kipevu power station and Tsavo power plant-Kipevu. The proposed site is located in the centre of industrial area of Mombasa and has direct access to main road and other significant infrastructure suitable for LPG terminal operation. The facility is located few kilometers from Kenya Pipeline Corporation petroleum products pipeline.

1.1. Project Location

The proposed construction and Operation of the Bulk Import and Storage of LPG facility will be located on Plot No.MN/VI/4791 & 4792 Kipevu in Changamwe Sub-County in Mombasa County geo-referenced as Latitude 4°01'57.1" S Longitude 39°38'10.7" E (-4.032522 39.636307). It's located off newly constructed and commissioned Makupa Causeway (Mombasa Road). The proposed site is currently undeveloped parcel of land. The proposed site is suitable for Port related infrastructure as the area is mainly characterized by industrial developments neighbours such as Multiple Hauliers ICD; power production facilities i.e. Kengen Kipevu power station and Tsavo Power; China Road networks Yard; Port of Mombasa; Makupa Trnsit Shade Container Freight Station; Uganda Properties etc.

Figure 1: Google map extract showing proposed project site for LPG terminal

1.2. Developer Identification

Eleven Energy Ltd is a firm trading in activities across the Oil and Gas spectrum, including upstream, midstream and downstream fuel operations and infrastructure. Eleven Energy Ltd is specialized in the bulk importation, storage and transportation of petrochemical gas products in liquefied form. The company's unrivalled reputation is based on consistently delivering large volumes safely, securely and on time, as well as managing and operating LPG storage facilities often in the most logistically challenging and complex environments in the world. Eleven Energy Ltd intends to build long-term relationships with clients, suppliers, governments, partners and local communities to deliver long lasting and shared values hence the need to construct an LPG import terminal in the port of Mombasa which will supply the region through the period of growth in the LPG market.

1.3. Project Objectives and Justification

Eleven Energy Limited plans to construct and operate an LPG storage terminal in Mombasa with the aim of supplying the Country–Kenya and expand its capacity to supply the entire East African region in the near future. LPG is growing business in Kenya whose current consumption is approximately 400,000 tonnes and its demand is expected to 800,000 metric tonnes by 2030. The current demand is for a small population as approximately 55% of the population use biomass (charcoal and firewood) and kerosene fuel. The government of Kenya is encouraging displacement of biomass fuels in households and commercial entities with LPG hence the projected demand increase. A similar growth trend is predicted across the entire East Africa region hence the company‘s decision to establish an LPG storage facility in Mombasa. This move will help remove infrastructural constraints and LPG will become a more affordable fuel to a wider and more aware population in the region. The project proponent will make use of an existing five acre site, with immediate access to major highway and railway for national and regional distribution.

This project, if successful will play a major role in enabling the country to reduce the problems associated with stock-out costs as well as benefit from oil and gas exportation to neighbouring countries; Rwanda, Uganda; thus increasing the per capita income and the Gross Domestic Product (GDP) from foreign exchange. It will also help to match the rising demand for LPG products locally and regionally.

The proposed LPG storage terminal will address the capacity constraints, and optimize the use of the existing facilities. The same will also address issues of supply and infrastructure into the Port of Mombasa in order to support the LPG Master plan for Kenya. Other possible spin-offs would include job creation and increased economic activity in the area.

The project is also in line with National Energy Policy (improving access to affordable energy services, enhancing security of supply, promoting development of indigenous energy resources; promoting energy efficiency and conservation; and promoting prudent environmental, health and safety practices), the Economic Recovery for Wealth and Employment Creation Strategy (expanding and improving infrastructures, and safeguarding environment and natural resources), and Kenya Vision, 2030 (enhanced equity and wealth creation for the poor).

1.4. Purpose of the ESIA

This study was carried out to evaluate the potential and foreseeable impacts on the environment resulting from the proposed development. The scope was limited to the proposed project site and the immediate environment and community that may be affected by or may affect the proposed project. The report addresses the requirement for preparation of ESIA Study Report in accordance with EIA/EA Regulations (amendment), 2019 and Environmental Management and Coordination Act Cap 387.

The report presents an overview of the proposed project and the environmental regulatory framework from which it operates. It identifies and assesses the significance of the impacts of the project as well as mitigation measures necessary to reduce or prevent impacts from occurring. The ESIA aims to provide information that will help the authority make an informed decision when awarding the license to Eleven Energy Limited.

1.5. Regulatory Framework

The implementation of major projects in Kenya is preceded by an Environmental and Social Impact Assessment (ESIA) report. The National Environment Management Authority (NEMA) requires the proponent to undertake an Environmental and Social Impact Assessment (ESIA) and thereafter annual Environmental Audit Assessment studies as stated in the Environmental Management and Coordination Act (EMCA) of 1999, and the Amendment 2015 and as stipulated in the Environmental (Impact Assessment and Audit) Regulations 2003, Legal Notice No. 101. The current proposed project for the construction of an LPG import terminal facility in Mombasa is regarded as a high risk project and thus subjected to a rigorous ESIA process. This led Global EHS Consultants in undertaking a preliminary data gathering exercise though scoping the ESIA study was conducted.

A project/Scoping report is defined, in the preliminary section of the EMCA (1999) and the interpretation section of the Environmental (Impact Assessment and Audit) Regulations (2003), as a summarized statement of the likely environmental effects of a proposed development referred to in section 58 of the EMCA, Cap 387. Section 58 requires that a proponent intending to carry out any undertaking listed in the Second Schedule to the Act must submit a study report to the National Environment Management Authority (¶the Authority‘) in the prescribed form. Section 18 of the regulation gives information to be captured in the Environmental Impact Assessment report.

Cap 515, Local Government Act, Cap 265, Local Government Act, Cap 265, Penal Code, Cap 63, Regulation No.7 of the Environmental (Impact Assessment and Audit) Regulations, 2003 lays down the specific issues that the study report must address, which in summary are: the nature, location, activities, and design of the project; the materials that are to be used; the potential environmental, economic and socio-cultural impacts and mitigation measures; plans for the prevention and management of accidents and for ensuring the health and safety of workers and neighbouring communities; and the project budget. These issues are to further address, as outlined in the Second Schedule of the Environmental (Impact Assessment and Audit) Regulations (2003): ecological considerations; sustainable use; ecosystem maintenance; social considerations; landscape and land uses; and water. Within this framework, the collection of relevant baseline data, and consultations with stakeholders and the public are important, and ought also to be included in the report.

Other Acts do have a bearing on the rules and regulations that touch on energy exploitation and use include but not limited to: Public Health Act, Cap 242; Water Act 2016; Factories Act; Energy Act, 2019; Petroleum Act, 2019; The Petroleum (Liquefied Petroleum Gas) Regulations, 2019; Climate Change Act 2016; Occupational Health and Safety Act 2007 and Electric Power Act, 1997 etc.

1.6. The Mandate of NEMA

National Environment Management Authority (NEMA)-Kenya is the institution in the country that was established under the principal Environmental Management and Coordination Act (EMCA) of 1999 in order to deal with matters pertaining to the environment, with the objective and purpose of exercising general supervision and coordination over all matters relating to the environment, and to act as the principal instrument of government in the implementation of all policies relating to the environment.

Some of its mandates that are relevant to ESIAs are to:

Coordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programmes and projects with a view to ensuring the proper management and rational utilization of

environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya;

- Carry out surveys which should aid in the proper management and conservation of the environment;
- Undertake and coordinate research, investigation and surveys in the field of environment and collect, collate and disseminate information about the findings of such research investigation or survey;
- Identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under the Act;
- Monitor and assess activities, including activities being carried out by relevant lead agencies in order to ensure that the environment is not degraded by such activities, environmental management objectives are adhered to and adequate early warning on impending environmental emergencies is given;
- Undertake, in co-operation with relevant lead agencies, programmes intended to enhance environmental education and public awareness about the need for sound environmental management as well as for enlisting public support and encouraging the effort made by other entities in that regard;
- Publish and disseminate manuals, codes or guidelines
- Render advice and technical support, where possible,

1.7. ESIA Scope and preparation

Eleven Energy Limited commissioned Global EHS Consultancy to carry out an ESIA for the proposed construction of the LPG import and storage terminal in Mombasa, Kenya in accordance with all applicable Kenyan legislation, IFC and World Bank Group Environmental and Social Management Policies and other international policies and best practices that are relevant to Oil and Gas Industry. This is what informed this ESIA study as the second phase of the process after a scoping exercise had earlier on been undertaken.

The scope of this ESIA Study report can be summarized as:

- Review of relevant data and ground-truthing;
- Utilizing existing baseline data (biophysical, social and health) for the description of the

project area;

- ❖ Stakeholder engagement and public participation;
- ❖ Prediction and evaluation of potential impacts;
- ❖ Determination of appropriate mitigation measures that can eliminate, reduce/minimize the impacts;
- ❖ Development of an Environmental and Social Management Plan (ESMP); and
- ❖ ESIA Report preparation

1.7.1. Structure of the ESIA Report

The structure of the report is based on that proposed in the NEMA EIA Guidelines (2019), and is indicated in Table 1.2 below.

Table 1.2: Structure of the ESIA Report

Chap	Title	Contents
1	Introduction	Introduction to the project area; identification and activities of the project proponent in other regions; project background, objectives and justification; purpose of the ESIA and objectives of the report; the ESIA team; TOR for the report.
2	Project Description	The technology and processes to be used in the implementation of the project; workforce requirements; the materials to be used in the construction and implementation of the project; the products, by-products and waste generated by the project.
3	Methodology	Methods used in carrying out the assessment; identification of gaps in knowledge and uncertainties, which were encountered in Compiling the information.
4	Legal and Regulatory Framework	A concise description of the national environmental, legislative and regulatory framework, and international best practices.
5	Baseline Environmental Parameters of the project Area	Description of the potentially affected environment within the framework of the proposed ESIA; assessment of existing (pre-Project) impacts and potential (project and residual) impacts.
6	Stakeholder consultation and Public Participation	Information obtained during consultations with stakeholders and interested parties.

7	Alternatives	Alternative technologies, processes available, and reasons for preferring the chosen technology and processes.
8	Identification of Impacts and mitigation measures	Environmental effects of the project including the social, economic and cultural effects and the direct, indirect, cumulative irreversible, Short-term and long-term effects anticipated. Identification of mitigation measures for all identified impacts and determination of Impact significance.
9	Cumulative Impacts	Assessment of past and on-going projects in the project area that may have cumulative impacts on the project
10	Environmental Management Plan	Environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the time frame and responsibility to implement the measures; provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the course of carrying out activities or major industrial and other development projects; measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies.
11	Conclusions and Recommendations	Summary of the conclusions and key recommendations from the ESIA.
12	References	List of references and websites referred to in the text.
13	Appendices 1. Minutes of meetings	Minutes of meetings held with communities, community leaders and other stakeholders in the project area.
	2. Copies of laboratory Results	Laboratory results for samples collected in the field (soil & baseline air quality).
	3. Certificates	NEMA Firm‘s and Consultants Licenses.
	4. KRA PIN Number and PIN Certificate	KRA PIN certificate of the proponent.
	5. Land documents	Proponents land documentation for the proposed site
	6. Other relevant Documents	Certificates of registration.

2.0. PROJECT DESCRIPTION, DESIGN AND CONSTRUCTION

2.1. Project Background

Eleven Energy Limited hereinafter referred to as the proponent is a trading firm with supporting activities across the Oil and Gas spectrum including upstream, midstream and downstream fuel operation and infrastructure. Eleven Energy Limited is proposing to construct and operate a 22,000 Metric ton mounded storage LPG terminal in the Port of Mombasa and to commence an associated wholesale and distribution business in Kenya and the wider East Africa Community. The aim of the Project is to address issues of LPG supply and infrastructure to ensure operationalization of a bulk storage delivery system which will contribute to a large, reliable, and uninterrupted supply of LPG in a manner that is environmentally friendly. This will contribute towards the government's policy of increasing uptake of usage of LPG to minimize use of biomass fuel and kerosene hence conserving the environment.

The Proponent has acquired a five acre site in a prime location neighbouring the Port of Mombasa giving the Project significant competitive advantage. The Project is now looking to commence construction of the terminal and begin operation of the terminal and associated wholesale business.

Eleven Energy Limited expects the construction of the terminal to be complete and to commence the wholesale business within 24 months.

2.2. Justification of the Proposed Project

Kenya's energy sector remains underdeveloped despite its relatively large population and fast-growing economy. The vast majority of households rely on biomass sources (charcoal and firewood) and kerosene for cooking. The Kenyan government has sought to encourage displacement of biomass and kerosene in households with Liquefied Petroleum Gas (LPG), and in recent years has had some initial success. Overall, Kenya has been registering a growing demand for LPG due to improved import and distribution infrastructure and an improved economy. However, market penetration has remained very low due to access to supply and affordability. It is for this reason that the proponent proposes to establish an LPG storage facility/depot as it will ensure continuous supply of LPG to LPG Bottling plants throughout the country and will control costs as it will contribute to elimination of product hoarding.

Beyond 2030, as GDP grows and household income improves, it is anticipated that the per capita LPG consumption growth to accelerate to reach 8-9 kg per person by 2050. The proponent aims to be among the big players in the LPG industry as it will contribute to the country's LPG import capacity to outpace domestic consumption growth, allowing Kenya to become an import hub for the region, exporting some LPG over land to neighboring countries with limited alternatives for supply.

The project is also meant to stimulate economic and social development of our country through meeting the high demand of LPG products in the country and also to meet proponent's economic desires. The project area is located near the Port of Mombasa therefore suitable for such project hence there will be no land-use conflict. It is therefore hoped that once the project is implemented, The Eleven energy limited goal to stimulate economic and social development of our country and its own economic goals through meeting the high demand of gas products will be achieved.

2.3. Ownership and Location of the Project

Eleven Energy Limited has acquired a 9-acre piece of prime land on Plot L.R. No. MN/VI/4791 & 4792 Kipevu, Changamwe area Mombasa County. The parcel is a leasehold from Export Processing Zone Authority for a term of 30 years renewable. All the project facilities and related infrastructure will be located within the site. The site is marked by **Latitude 4° 01'57.1"S** and longitude **39°38'10.7"E** and is located in the open with adequate ventilation and is easily accessible for operation, maintenance and fire-fighting.

2.4. Project Scope & Description

Eleven energy limited herein referred to as the proponent proposes to construct and Operate an import and Bulk Storage LPG Depot consisting of six bullet storage tanks with capacity of twenty tones, administration office, fire pump house, firefighting water storage tanks with capacity of twenty tones, administration office, fire pump house, firefighting water storage tanks with capacity of 4,000 C .U. M, 4 m wide loop road around the entire facility, waste management system, internal parking, loading/offloading gantry, weighbridge on plot L.R. No. MN/VI/4791 & 4792 Kipevu in Changamwe area Mombasa County. The proposed project will contribute towards employment creation and income generation both during construction and operation

phases thereby improving the living standards of construction staff, project consultants and the project proponent.

2.5. Project Cost

Total cost for the project is anticipated to be Kenyan Shillings Four Hundrend and sixty seven million as per annexed bill of quantities:

2.6. Project Objectives

- To provide a consistent, affordable and quality supply of LPG into the wholesale market in Kenya through the construction of the Eleven Energy Limited. This in turn well help to address the significant issues of illegal refilling and infrastructure inefficiencies that are the principal current barriers to LPG consumption growth in the country. The government has initiated support for the transition to greater LPG consumption through the removal of the taxes currently imposed on LPG, increased taxes on Kerosene (the main alternative to LPG) and by agreeing to aggressively prosecute purveyors of illegally filled LPG containers.
- To contribute to an increase in consumption of LPG in Kenya within five years.
- To revolutionize the current wholesale distribution network in Kenya by utilizing the existing rail networks as the principal means of LPG transport instead of roads. This will not only address the issue of road congestion, but also help to further reduce prices. The Project will use a dedicated fleet of LPG ISO-containers to move bulk volumes by rail to Nairobi and other population centres in the country. Currently, Nairobi accounts for about 65% of total LPG consumption, but an improved transport and delivery network will make LPG accessible in other population centres in the country.

2.7. Project Impacts

- Creates consistent, quality supply of LPG into Kenya removing current bottlenecks in the supply chain.
- Reduces price of bulk supply of LPG into Kenya.
- Affordable and accessible supply of LPG helps to address current health crisis caused by indoor pollution, and environmental degradation through use of biomass fuels and kerosene.
- Employment creation

2.8. Project Description and Designs

The Project land is situated in an ideal location for the construction of the LPG terminal and is supported by the following infrastructure:

- Close to the port of Mombasa thereby avoiding congestion around new container terminal;
- Close proximity for easy access to Common User Manifold;
- Positioned away from residentials;
- Significant infrastructure already available;
- Direct access to main road;
- The Project land has industrial user titles.
- The total size of the proposed Project site in Kipevu is five acres. The plot is leased in the name of RAMAS EPZ from Export Processing Zone Authority.

2.9. Installation and Construction

The Project comprises design, installation and operation of an LPG terminal facility located in Kipevu, Changamwe area Mombasa County, Kenya and an associated wholesale and distribution network throughout the country. The proposed construction and Operation of a bulk Import and Storage facility will feature the following;

- Construction of Entry and Exist Gate and Sentry house
- Truck parking and parking for loaded lorries
- Weighbridge
- Loading and Offloading Gantry
- 2 in numbers 2000 C.M Cold water storage tanks
- Tanker loading and Unloading shed
- Office Block ground and first floor
- Fire water pump house
- Pump House
- Mounding of six storage bullet tanks 5252 propane
- 4 Meter wide loop road
- Perimeter wall

The relatively straightforward design and construction of the Project facilities should take 18-24 months. The project concept design and required capital expenditure has been verified and confirmed by Derick Kimathi Consultants (an engineering firm Construction). has signed a consultancy agreement to carry out project planning, front end and detailed design, procurement support, project management and supervision.

2.10. Construction Methodology

The construction and installation shall therefore involve the following activities;

- Excavation and constructing of reinforced concrete foundation for the LPG tanks court;
- Installation of LPG piping network;
- Tanker loading and offloading station;
- Excavation and construction of reinforce concrete foundation for the emergency water tanks;
- Construction of office;
- Construction of perimeter concrete blast wall and
- Construction of bulk facilities (water and electricity), and associated sewer infrastructure

Construction techniques will involve;

- Driving of piles into the ground extending to the basalt formation. Methods may include driven, percussive or auger installed piling techniques.

2.11. Auger Installed Piling Techniques

Auger cast piles are a type of drilled foundation in which the pile is drilled to the final depth in one continuous process using a continuous flight auger. This technique shall be used to drill mound base foundation for the LPG storage facilities. It is assumed that all potable / fresh water requirements during the construction stage will be met through bowsers provided by Mombasa Water Supply and Sanitation Company (MOWASSCO).

2.12. Accessibility of the Project Site

2.12.1. Road Link

The proposed project site is well linked by tarmac road which the proponent intend to use to transport bulk LPG using ISO certified containers for wider circulation in the entire country.

2.12.2. Other Subsidiary Infrastructure

2.12.2.1. Offices

Support services will include general office space, firefighting facilities, and back-up power supply (generator), waste management facilities, potable water supply, waiting and loading bays among others.

2.12.2.2. Waste Management Facilities

Waste generated will be transported, handled and treated by qualified waste management contractor. The contractor will ensure that the necessary waste management facilities required to properly treat and dispose of project related waste are complaint with relevant county by-laws, national laws and international legislation.

2.12.2.3. Power Generator

A set of diesel generators will be used to provide power to the project site during the construction phase and for back-up during operation phase of the project. A set up transformer will also be constructed and electricity distributed across the site to the various operations by KPLC.

2.13. Operation

The operation of the LPG is guided by the World LPG Association (WLPGA) which is an authoritative voice of the global LPG industry representing the full LPG value chain.

According to the association, amongst its primary goal is the promotion if compliance to good business and safety practices. The proponent shall apply for all relevant permits from Energy and Petroleum Regulatory Authority and shall abide by all the conditions in the permit.

3.0. APPROACH AND METHODOLOGY

3.1. Introduction

This Chapter sets out the ESIA process adopted for the Eleven Energy Limited LPG bulk storage facility and the methodology used to assess impact significance.

3.2. ESIA Process

The ESIA process constitutes a systematic approach to the evaluation of a project and its associated activities throughout the project lifecycle.

The aim of this ESIA Report is to examine both the positive and negative effects that the proposed LPG storage facility is likely to have on both the physical and the socioeconomic environment. Early identification of possible impacts promotes environmental sustainability in that; anthropogenic factors do not interfere with natural environment but fusions with it creating harmony.

The ESIA study covered the following Aspects:

- Establishing the existing environment (Environmental, socio-economic and health baseline) where the project falls;
- Defining the legal, institutional and policy framework of the proposed project;
- Analyzing the potential impacts of the proposed project;
- Analyzing the alternatives to the proposed project;
- Developing accurate and practical mitigation measures for the significant negative impacts;
- Developing an Environmental and Social Management Plan (ESMP) for the significant negative impact; and
- Identifying, consulting and involving all stakeholders to facilitate all study objectives.

To achieve these objectives, the study collected baseline data firstly through desktop studies on a national level; regional, and then finally scoping down to the study area and its immediate environs. This is done using detailed study, information from previous similar studies, developed checklist, and professional knowledge. The checklist focused on information gained from the scoping process and other cross-sectorial issues such as: health and safety, biodiversity, air pollution, noise among others.

Scoping is a high level assessment of anticipated interactions between project activities and environmental and socio-economic receptors. Its purpose was to focus the assessment on key issues and to eliminate certain activities from the full impact assessment process based on their limited potential to result in discernible impacts.

A field trip to the Project site and area of influence was undertaken from 14th to 18th November, 2022 in order to:

- Conduct an inventory of the potential stakeholders‘ Carry out a preliminary environmental baseline survey and potential impacts Identify the project alternatives; Discuss with opinion leaders in the proposed project area and get an overview of some of the key issues of interest or concern about the construction of an import terminal for an LPG plant;
- Liaise with the local administration to facilitate the holding of public *barazas* (meetings with the communities) and key informant interviews during the upcoming detailed ESIA study;
- Determine the logistics for the detailed Environmental Impact Assessment study, including, for example, security, availability and conditions of infrastructure

3.3. Public Consultation

As required by regulations, stakeholders were identified and engaged as part of this ESIA Study. The groups are those generally considered to be most likely to be impacted by the proposed Project. Public consultation and participation ensures that the views of the affected and interested parties are incorporated as early as possible in the project development: at planning, implementation and operation phase and thereby minimizing the potential for unexpected opposition of the proposed development and potential for adverse effects to the environment. It is also very beneficial in incorporating the views of the public into the design process for the adoption of the best workable models and systems.

Stakeholders identified were grouped into two categories:

I. **Primary Stakeholders -** Those directly affected by the project such as members of the public and various surrounding institutions

II. **Secondary Stakeholders –** Those indirectly affected by the project but who influence development as part of its project implementation. These include the responsible agencies of both the County and National Government and civil organizations.

3.4. Household Survey

For this line of the study, a face-to-face quantitative survey was conducted using randomly selected respondents at the household level. Inquiry centered on issues of water, sanitation, solid

waste, health, livelihoods, land-use, energy use, and community participation. The sample was stratified by geographical location

3.5. Desktop Reviews

An important component of the Scoping Stage is the definition of existing baseline conditions (i.e. the prevailing environmental and social characteristics against which the potential impacts of the Project can be assessed). Baseline conditions were defined during the Scoping Stage through a review of existing environmental and social information. In addition to Project-specific information, scientific journals and reports by government agencies and by other groups were reviewed for relevant baseline information.

Desktop reviews of the literature were undertaken in relation to the following topics:

- Baseline information of the project area and the entire Mombasa County;
- Environmental Management and Coordination Act, Cap 387 and associated proclamations;
- Petroleum Act, 2019 and associated proclamations
- KS EAS 924-3:2020 – Handling, storage and distribution of Liquefied Petroleum Gas (LPG) in domestic, commercial and industrial installations
- ISO 10239:2014
- Pertinent Government constitutional conventions and protocols; and
- Study area detail including climate, geology and soils, vegetation, land use, infrastructure, communication, socio-economic and cultural setting, etc.

Based on the findings of the review and data gathering, the ESIA Team identified potential project related environmental and socioeconomic impacts based on likely interactions between LPG storage activities and environmental/socio-economic receptors.

3.6. Observations

Observations were made through site visits and transect walks. Site visits were more structured in that it was planned to include visits to project site locations and its environs. The transect walks were accomplished through walks in various locations to make unstructured evaluation of the projects and other activities.

3.7. Receptors Identification

Receptors are environmental components, people and cultural heritage assets that may be affected, adversely or beneficially, by the Project. Potential receptors were identified through both desk- and field-based studies, taking into consideration likely Project impacts. Based on the review of existing information, four high-level categories of Project receptors were identified:

- Physical (i.e. non-living environmental components, including air quality, water bodies, landscapes, terrestrial soils, marine sediments and geology);
- Marine ecology (i.e. marine habitat, flora and fauna);
- Terrestrial ecology (i.e. terrestrial habitat, flora and fauna); and
- Human (i.e. landowners and residents of local communities, local economy, marine users, cultural heritage)

3.8. Impact Significance Assessment Methodology

An impact, as defined by the international standard ISO14001:2015 is: *"Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an Organisation's environmental aspects".* Whereas environmental aspect is defined as:

"Element of an organization's activities or products or services that can interact with the environment" supported by clause 6 of IFC Standards.

An impact is defined where an interaction occurs between a project activity and an environmental receptor. The ESIA process ranks impacts according to their significance determined by considering project activity event magnitude and receptor sensitivity. Determining event magnitude requires the identification and quantification (as far as practical) of the sources of potential environmental and socio-economic effects from routine and non-routine project activities. Determining receptor sensitivity requires an understanding of the biophysical and human environment.

Impact magnitude and receptor sensitivity were used to assess impact significance according to the impact assessment matrix. The matrix and significance definitions below have been used to assess adverse impacts of the Project. Although beneficial impacts of the Project are identified within this ESIA, beneficial impacts have not been assessed in terms of receptor sensitivity or impact magnitude. Rather, beneficial impacts have been described in qualitative terms.

Method for Determining Event Magnitude

Event magnitude is determined based on the following parameters, which are equally weighted and are each assigned a rating of µ1 µ, ᴶ2ᴶ, or ᴶ3ᴶ:

Extent / Scale: Events range from those affecting an area:

1 – Up to 500m from the source or an area less than 50 hectares; to

2 – Greater than 500m and up to 1 km from the source or an area between 50-100 hectares; to

3 – Greater than 1km from the source or an area greater than 100 hectares.

Frequency: Events range from those occurring:

1 - Once; to

2 - Up to 50 times; to

3 - More than 50 times or continuously.

Duration: Events range from those occurring for:

1 – Up to one week; to

2 - More than one week and up to one month; to

3 - Periods longer than one month to permanent.

Intensity: Concentration of an emission or discharge with respect to standards of acceptability that include applicable legislation and international guidance, its toxicity or potential for bioaccumulation, and its likely persistence in the environment. Degree/permanence of disturbance or physical impact (e.g. disturbance to species, loss of habitat or damage to cultural heritage). Ranges from:

1 - A low intensity event; to

2 - A moderate intensity event; to

3 - A high intensity event.

Method for Determining Receptor Sensitivity

Receptor sensitivity is determined based on the following parameters, which are equally

weighted and are each assigned a rating of**"1","2", or"3":**

Biological/Ecological Receptors:

Presence: Ranges from:

3 - Routine, regular or reliably predictable presence of any species which is, in Reverse order, a unique, threatened or protected species; to

2 - Regionally rare or largely confined to the Project area or sensitive to Industry emissions /disturbances; to

1 - A species which is none of the above and is therefore assessed at the community level only.

Resilience (to the identified stressor): Ranges from:

1 - Species or community unaffected or marginally affected; to

2 - Species undergoing moderate but sustainable change which stabilizes under constant presence of impact source, with ecological functionality maintained; to

3 - Substantial loss of ecological functionality (e.g. loss of species in key groups, substantially lower abundance and diversity).

Human Receptor:

Presence: Ranges from:

3 - People being permanently present (e.g. residential property) in the geographical area of anticipated impact; to

2 - People being present some of the time (e.g. commercial property); to

1 - People being uncommon in the geographical area of anticipated impact.

Resilience (to the identified stressor): Ranges from:

1 - People being least vulnerable to change or disturbance (i.e. ambient conditions (air quality, noise) are well below applicable legislation and international guidance); to

2 - People being vulnerable to change or disturbance (i.e. ambient conditions (air quality, noise) are below adopted standards); to

3 - Most vulnerable groups (i.e. ambient conditions (air quality, noise) are at or above adopted standards).

Physical Receptor/Feature:

Presence (to the identified stressor): Ranges from:

3 - Presence of feature any species which has, in reverse order, national or international value (e.g. state protected monument); to

2 – Feature with local or regional value and is sensitive to disturbance; to

1 - Feature which is none of the above.

Resilience (to the identified stressor): Ranges from:

1 – Feature/receptor is unaffected or marginally affected i.e. resilient to change;

2 – Undergoes moderate but sustainable change which stabilises under constant presence of impact source, with physical integrity maintained; and

3– Highly vulnerable i.e. potential for substantial damage or loss of physical integrity. **Soil, Ground Water and Surface Water**

Presence: Ranges from:

3 – Receptor is highly valued e.g. used extensively for agriculture, used as a public water supply; to

2 – Receptor has moderate value e.g. moderate/occasional use for agriculture purposes; to

1 – Receptor has limited or no value. **Resilience (to**

the identified stressor): Ranges from:

1 – No or low levels of existing contamination (well below accepted standards) and receptor is unaffected or marginally affected i.e. resilient to change; to

2 – Moderate levels of mobile contamination present which are vulnerable to physical disturbance; to

3 – High levels of mobile contamination present which are highly sensitive to physical disturbance.

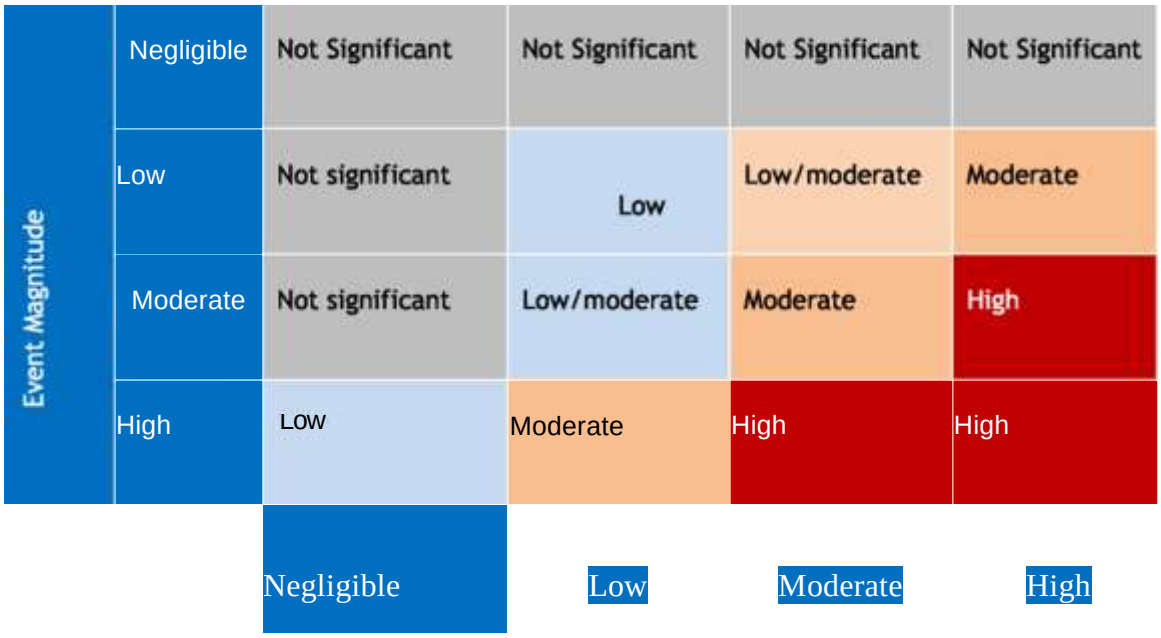
Receptor Sensitivity Rankings

Overall receptor sensitivity is then scored on a spectrum from low (1) to high (6) by adding the individual parameter scores:

Receptor Sensitivity	Score (Summed Parameter Rankings)
Not Significant	0
Low	2
Medium	3-4
High	5-6

Event Magnitude Ranking

Overall event magnitude is scored from low (1) to high (12) by adding the individual parameter scores:



Impact Significance Definitions

Significant. Impacts with ´high' significance are likely to disrupt the function and value of the resource/receptor, and may have broader systemic consequences (e.g. ecosystem or social well-being). These impacts are a priority for mitigation in order to avoid or reduce the significance of the impact.

Significant. Impacts with ´moderate' significance are likely to be noticeable and result in lasting changes to baseline conditions, which may cause hardship to or degradation of the resource/receptor, although the overall function and value of the resource/receptor is not disrupted. These impacts are a priority for mitigation in order to avoid or reduce the significance of the impact.

Detectable but not significant. Impacts with ´low' significance are expected to be noticeable changes to baseline conditions, beyond natural variation, but are not expected to cause hardship, degradation, or impair the function and value of the resource/receptor. However, these impacts warrant the attention of decision-makers, and should be avoided or mitigated where practicable.

Not Significant. Any impacts are expected to be indistinguishable from the baseline or within the natural level of variation. These impacts do not require mitigation and are not a concern of the decision-making process.

3.9. Socioeconomic Impacts

The socioeconomic impact assessment was done using a semi-qualitative assessment approach to describe and evaluate impacts. Factors taken into account to establish impact significance included probability, spatial extent, duration and magnitude of the impacts in addition to the sensitivity of receptors (e.g. the groups of people or populations most likely to be affected and, in particular, whether impacts are likely to be disproportionately experienced by vulnerable groups). An indirect socio-economic impact (i.e. induced effects) was also assessed using the same approach.

3.10. Mitigation and Monitoring

The interactive and integrated nature of the ESIA and project planning processes means that the majority of proposed additional mitigation measures and strategies have been incorporated into the project design. Those additional mitigation and monitoring initiatives detailed in this document will be incorporated into the management plans that will be used during the construction and operational phases.

4.0. POLICY AND LEGISLATIVE FRAMEWORK

4.1. The Constitution of Kenya, 2010

The Constitution provides that every person has the right to a clean and healthy environment (Article 42). The State is obliged to ensure that the environment and natural resources are conserved and genetic resources and biological diversity are protected. In that regard it must eliminate any processes or activities that would be likely to endanger the environment. Everyone is expected to cooperate with the State organs and other people to protect and conserve the environment and ensure that the use and development of the natural resources are ecologically sustainable (Article 69). 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.

4.2. The Policy Framework

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, such as:

- The need to harmonize sectoral policy instruments with the Environmental Management and Coordination Act and the Constitution.
- Implementation of the Land Policy
- Valuation of environmental and natural resources
- Rehabilitation and restoration of 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
- Fragmentation

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

The management of water resources in Kenya is guided by four specific policy objectives, namely to:

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

4.2.3. The Draft National Energy and Petroleum Policy 2015

The energy sector plays a vital role in the socio-economic development of a nation. In Kenya, petroleum and electricity as sources of energy are the main drivers of the economy, while biomass is mainly used in the rural areas. The sector currently relies solely on the import of all petroleum products. However, with the discovery of oil and gas deposits in the northern parts of Kenya, this will change. Policy direction in the energy sector was previously governed by Sessional Paper No. 4 of 2004. 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.

In view of the recent oil discovery in northern Kenya, it is necessary to develop petroleum production capacity and infrastructure to meet the increasing market needs at home and in the region. These developments might include building a new refinery, thereby making products more competitive, creating wealth and ensuring security of supply and stabilizing prices. 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. Petroleum Industry - Midstream Activities

The government recognizes that its infrastructure development has been slow and therefore unable to keep up with the market demand for petroleum products. It therefore considers that it is vital to develop adequate and efficient infrastructural systems in order to ensure sufficient, reliable and cost-effective supply of these products. The government intends to facilitate and support off-loading, storage, transportation and evacuation infrastructure with a view to achieving adequate supply and distribution of petroleum products in all parts of the country at the least cost possible.

4.2.5. Land, Environment, Health and Safety

Environmental management in the energy sector is crucial in ensuring sustainability. Energy production, transportation and use cause various dangers to human life and the environment. It is necessary to provide affordable, reliable and sustainable energy while also upholding people's rights to land, environment, health and safety. Upstream and midstream activities should therefore be conducted in a manner that protects the environment. Fire outbreaks and oil spills are major environment, health and safety concerns in the oil and gas industry. These can be addressed by adopting international best practices, and compliance and enforcement of the law and regulations.

4.2.6. Climate Change Strategy

The government intends to ensure that the energy sector is represented in international climate change negotiations to improve the investment climate for development projects and that research is undertaken in the clean energy technology areas. It will also invest in renewable technologies. Kenya has developed a National Strategy on Climate Change.

4.2.7. 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 equitable 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.

Inadequate environmental management and conflicts over land and land-based resources is one of the major issues the policy aims to resolve.

The need for land reforms in Kenya arose from the inadequacy of the old constitution to establish an efficient, accountable institutional framework for land ownership, administration and management. This resulted in:

- Centralisation of state responsibility over land matters, irresponsive to the citizens' needs;
- Lack of accountability by governments in land governance, leading to irregular allocations of public land;
- Constitutional protection of private property rights even when acquired illegitimately; x Mass disinheritance of communities and individuals of their land;
- Inequitable access to land, particularly for women, children, minority groups and persons with disabilities; and
- Ineffective regulation of private property rights, as a result of which unplanned settlements and environ mental degradation were commonplace.

With the passing of the Kenya Constitution 2010, these issues have been addressed. 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. Read together with the Constitution (Land and Environment, Chapter 5) these statutes now govern all land issues including security of communal tenure, benefit-sharing from land-based resources, restoration and conservation of land quality, land use regulation and development, conservation and sustainable management of land-based resources, ecosystem

protection and management principles, land rights delivery, settlement land allocation and land adjudication, among others.

4.2.8. The Kenya Health Policy 2012 – 2030

The policy is based on the Constitution of Kenya 2010, Vision 2030 and global health commitments. It was developed through an inclusive and participatory process involving the health sector and other related sectors. Its broad aim is to ensure equity, people centeredness and participation, efficiency, multi-sectoral approach and social accountability in delivery of healthcare services. It sets out the goal, objectives, guiding principles and policy directions aimed at achieving Kenya's health agenda and a comprehensive implementation framework. Also included is the institutional management plan under the devolved system of government taking into account the varied roles of the national and county levels of government. The policy also sets out a monitoring and evaluation framework to track progress in achieving the policy objectives.

4.2.9. The National Environmental Sanitation and Hygiene Policy 2007

The Environmental Sanitation and Hygiene (ESH) Policy is intended to improve people's health and quality of life. Strategic interventions have been developed to determine the success of the policy implementation.

One of the key purposes of this policy is to clarify the various roles in order to enhance the existing legal and constitutional framework and to encourage the private sector, civil society and community participation in the planning, implementation and ownership of ESH services.

Sanitation and the Environment: One of the key objectives of the policy is to protect the environment from pollution and its negative effect on human health. The government will seek to minimize negative impacts arising from various types of sanitation systems, and maximize positive effects. In situations where inappropriate hygiene and sanitation systems have negative environmental impacts, the particular choice of technology will be weighed against the unimproved or less elaborate sanitation practices. The Health Ministry, through its Division of Environmental Health in conjunction with relevant agencies, will provide guidelines for the delivery and management of environmental infrastructure, particularly household sanitation, and solid waste disposal including healthcare waste and other wastes. Well-functioning sanitation and hygiene systems are a means of protecting the environment. Monitoring will be increased

and undertaken systematically to help prevent environmental pollution from liquid and solid wastes. The policy is designed in a manner that will create job opportunities, e.g. labour intensive construction, sustainable livelihoods and long-term entrepreneurial activities.

Poor access to adequate sanitation and hygiene is a major hindrance to poverty alleviation. The health risks associated with poor ESH increase poverty. The government envisages that this policy is an important step towards poverty reduction.

4.3. Devolution and Access to Energy Services

There is the concern that the two levels of government may clash on account of lack of clearly-defined roles in the Constitution. Further, no framework exists for devolution of functions within the energy sector to ensure service continuity or standards to guide county governments on devolved responsibility. To deal with these problems, a framework on the functional devolution of roles between the two levels of government will be developed; a royalty of 15% due to the national government from specific county resources developed by the energy sector players will be paid to the specific county government and 5% to the specific local community; minimum standards will be developed to guide county governments on devolved responsibilities in the energy sector; and some of the licensing services will be devolved to the county governments.

4.4. Kenya Vision 2030

Kenya Vision 2030 was launched on October 30, 2006, and is the country‘s new development plan for the period 2008 to 2030. It seeks to transform Kenya into an industrialized ´middle-income country providing a high quality of life to its citizens by the year 2030.

Vision 2030 is based on three ¶pillars‘: the economic, the social and the political. The adoption of the Vision follows the successful implementation of the Economic Recovery Strategy for Wealth and Employment Creation (ERS) launched in 2002.

The economic, social and political pillars of Kenya Vision 2030 are anchored on macroeconomic stability, continuity in government reforms, enhanced equity and wealth-creation opportunities for the poor, infrastructure, energy, science, technology and innovation, land reform, human resources development, security, as well as public sector reforms.

The foundations for the Vision 2030 are:

Macroeconomic Stability for Long-term Development: The Vision places the highest premium on Kenya's current stable macroeconomic environment which works in favour of the poor, and expects it to continue in the future as a matter of policy. The projects proposed under Vision 2030 will be subjected to the parameters set under the macroeconomic stability framework.

Continuity in Governance Reforms: These will be accelerated in order to create a more conducive environment for doing business, and also to enable Kenyans to fully enjoy their individual rights under the Constitution. Towards this end, the government will intensify the anti-corruption programme through more efficient investigation and prosecution; eliminating bribery in the public service and increasing public education and judicial and legal reform. The government will also fully support the people of Kenya, parliament, civil society and the press, recognizing that they are the ultimate defence against abuse of office.

Infrastructure: The Vision aspires for a country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities and telecommunications. This is a high priority issue.

Enhanced Equity and Wealth-Creation Opportunities for the Poor: The Vision includes equity as a recurrent principle in economic, social and political programmes. Special attention has been given to arid and semi-arid districts, communities with high incidence of poverty, the unemployed youth, women, and all vulnerable groups.

Science, Technology and Innovation (STI): The government will intensify the application of STI to increase productivity and efficiency levels across all three pillars. It recognizes the critical role played by research and development in accelerating development in the emerging nations. The government will create and implement an STI policy framework to support Vision 2030.

Land Reform: Land is a vital resource for the socio-economic and political developments set out in the Vision. It is recognized that respect for property rights to land, whether owned by individuals, communities or companies, is key to rapid economic growth (A national land use policy has now been created to enable this growth. *See section 2.2.4 above).*

Human Resources Development: Kenya will create a globally competitive and adaptive human resource base to meet the needs of a rapidly industrializing economy through training and education, raising labour productivity to international levels, creating a human resource database to facilitate better planning, and establish more training institutions.

Security: The government will increase security in order to lower the cost of doing business and provide Kenyans with a more secure environment to live and work in. The strategies will include improving community policing, reducing the police-to population ratio, and adopting information and communication technology in crime detection and prevention. These measures will be supported by judicial reforms.

Energy: Since development projects recommended under Vision 2030 will increase demand on Kenya‘s energy supply, she must generate more energy at a lower cost and increase efficiency in energy consumption. The government is committed to continued institutional reforms in the energy sector, including a strong, regulatory framework, and will encourage more power generation by the private sector. New sources of energy will be found through the exploitation of geothermal power, coal, and renewable energy sources.

The Public Sector: An efficient, motivated and well-trained public service is expected to be one of the major foundations of the Vision. Kenya intends to build a public service that is more citizen-focused and results-oriented. The government will intensify efforts to bring about an attitudinal change in public service that values transparency and accountability to the citizens of Kenya.

4.5. Legal and Regulatory Framework

This will be reviewed to align with the energy sector‘s legal and regulatory framework and the Constitution, and the various relevant statutes will be consolidated into one. Demarcation of roles between the two levels of government will be carried out. Provisions in the law will ensure that investments benefit local communities and their economies in terms of the Constitution. Sharing of royalties equitably from the exploitation of natural resources between the national and county governments will be provided for; the general rules of international law and the treaties and international conventions ratified will be recognized; additional safeguards will be created

on use of land, environment and natural resources critical for energy infrastructure development and service provision. Penalties for energy-related offences will be enhanced.

4.5.1. The Environmental Management and Coordination Act, Cap 387

The Environmental Management and Co-ordination Act, 1999, provides for the establishment of an appropriate legal and institutional framework for the purpose of managing the environment and matters connected with it has been amended to EMCA, 2015 in order to reflect the requirements of the Constitution with regard to devolution of government. The National Environment Management Authority (´the Authority") was established under section 7 of the Act. Its mandate is to monitor the operations of industries, projects or activities to determine their immediate and long-term effects on the environment. The Eleven Energy limited., being a proponent whose project activities fall within the ambit of the Act, is therefore subject to its provisions.

The Act (Part VIII) lays down provisions pertaining to environmental quality standards. It establishes a Standards and Enforcement Review Committee whose broad functions are to (a) advise the Authority on how to establish criteria and procedures to measure water and air quality and (b) issue standards and guidelines for the safe and proper disposal of waste (Sections 70, 71, 78, 86). Where Kenya is a party to an international convention, treaty or agreement on the management of the environment, the Authority must initiate legislative proposals to give effect to them (Section 124). The Authority may prescribe measures to ensure that the biological resources in place are preserved, issue guidelines to promote the conservation of the various terrestrial and aquatic systems, and protect species, ecosystems and habitats threatened with extinction.

The EIA Guidelines and Administrative Procedures

The Environment Impact Assessment and Administrative Procedures arose from the policy framework and the legislative and regulatory (the Environmental Management and Co-ordination Act, 1999, and its regulations) procedures in order to assist in the integration of environmental concerns in economic development so as to foster sustainable development. The document sets out guidelines for carrying out Environmental Impact Assessment, Environmental Audit and Monitoring, Strategic Environmental Assessment and dealing with

issues of trans boundary, regional and international conventions, treaties and agreements. It sets out the procedure in Environmental Impact Assessment studies and Environmental Audits as well as the contents and format of the reports required to be submitted to the National Environment Management Authority for consideration. The Environmental Impact Assessment study review process and decision-making are also explained. The guidelines are mainly intended to assist project proponents, EIA practitioners, lead agencies and members of the public to understand the process and the basis on which decisions are made.

4.5.2. 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 of 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 for connected purposes

Surveys, inspections and monitoring

The Director-General or a person authorised by him for the purpose, may board, inspect and survey any ship to which this Act applies, enter port facilities in Kenya, demand the production of documents, records and other evidence; and take testimony of witnesses under oath, for the purposes of conducting inspection and survey and for undertaking other activities authorised or required under this Act.

Part III – Restriction on Trading

Restriction on trading in Kenyan

waters

(1) A ship shall not trade in or from the waters of Kenya unless the ship—
   (a) Is a Kenyan ship; or
   (b) Has a certificate of foreign registry.

(2) Subject to the provisions of any regulation or any treaty or agreement with any foreign

Government, only Kenyan ships may be engaged in any local trade in Kenyan waters.

Part 15 of this act requires that, every foreign ship anchoring in or trading in or from Kenyan waters or entering a port in Kenya shall carry insurance cover against risks of loss or damage to third parties.

Where a ship is in contravention of this section, the owner shall be deemed to have committed an offence and shall be liable, upon conviction, to a fine not exceeding one million shillings, or to imprisonment for a term not exceeding five years, or to both such fine and imprisonment.

Part 16 of the Act, requires that, No owner of a ship or person providing the service of a shipping line shall, either directly or indirectly, provide in the maritime industry the service of crewing agencies, pilotage, clearing and forwarding agent, port facility operator, shipping agent, terminal operator, container freight station, quay side service provider, general ship contractor, haulage, empty container depots, ship chandler or such other service as the Minister may appoint under section 2.

Any person who contravenes the provisions of subsection (1) commits an offence and shall be liable to a fine not exceeding one million shillings or to imprisonment for a term not exceeding three years, or to both such fine and imprisonment.

Part XI – Carriage of Bulk Cargoes and Dangerous Cargoes

The provisions of this Part and any regulations made under section 297 respecting dangerous goods shall apply to all Kenyan ships and to all foreign ships while loading or discharging cargo or fuel, or embarking or disembarking passengers at any place in Kenya as they apply to Kenyan ships.

Regulations (1) The Minister may, by regulations, prescribe which goods, articles or materials to be carried in a ship are dangerous goods in accordance with the Safety Convention in relation to the carriage of dangerous goods, and such regulations shall incorporate by reference, the International Maritime Dangerous Goods (IMDG) Code of the Organization.

No person shall send by or carry in a Kenyan ship any dangerous goods without first distinctly marking their nature on the outside of the outermost package containing the same, in accordance with such regulations as the Minister may make, and without first giving written notice of the nature of such goods and of the name and address of the sender thereof to the master or owner of the ship.

Any person who contravenes any of the provisions of this Part with respect to dangerous goods, including regulations made under section 297, commits an offence and shall be liable, upon conviction, to a fine not exceeding five hundred thousand shillings, or to imprisonment for a term not exceeding three years, or to both such fine and imprisonment.

Where a contravention involves the marking, packing, stowing or quantity of dangerous goods within a ship, that ship shall be deemed, for the purposes of Part XII, to be unsafe by reason of improper loading.

4.5.3. Kenya Standards

4.5.3.1. KS 1938-3:2006

The standard is concerned with the code of practice for handling, storage and distribution of liquefied petroleum gas in domestic, commercial and industrial installations. Part 1 of the standard; Liquefied petroleum gas installations involves gas storage containers of individual capacity not exceeding 500L and a combined water capacity not exceeding 3000L per installation, Part 2 of the standard: Transportation of LPG in bulk by road, Part 3 of the Standard: Liquefied petroleum gas installations involving storage vessels of individual water capacity exceeding 500L and Part 4 of the Standard concerns the storage and filling sites for re-fillable liquefied petroleum gas (LPG) containers not exceeding 15 kg.

4.5.3.2. KS EAS 924-3:2020 – Handling, storage and distribution of Liquefied Petroleum Gas (LPG) in domestic, commercial and industrial installations

The standards cover recommendations for the layout, design and installation of LPG equipment and above-ground, buried and mounded storage vessels of individual water capacity exceeding 9000L

4.6. The County Governments Act, 2012

The purpose of this Act is to give effect to Chapter 11 of the Constitution (Devolved Government), to provide for county governments' powers, functions and responsibilities to deliver services. Other aims are to: a) give effect to the objects and principles of devolution as set out in Articles 174 and 175 of the Constitution; give effect to Article 176 (2) of the Constitution in respect of further decentralization; b) provide for public participation in the

conduct of the activities of the County Assembly as required under Article 196 of the Constitution; c) prescribe mechanisms to protect minorities within counties pursuant to Article 197 of the Constitution; and d) prescribe additional requirements in respect of county legislation as contemplated in Article 199 of the Constitution.

The functions and service provision of each county government must be decentralized to: a)the urban areas and cities within the county as required in the Urban Areas and Cities Act (No. 13/2011); b) the sub-counties equivalent to the constituencies within the county established under Article 89 of the Constitution) the wards within the county established under Article 89; d) such number of village units in each county as the respective county assembly may determine; and e) such other or further units as the county government may determine (section 48).

The sub-county administrator is responsible for the coordination, management and supervision of the general administrative functions in the sub-county unit, including the development of policies and plans; service delivery; developmental activities to empower the community; the provision and maintenance of infrastructure and facilities of public services; the facilitation and coordination of citizen participation in the development of policies and plans and delivery of services; and for the exercise of any functions and powers delegated by the County Public Service Board (section 50). The ward administrator is mandated to coordinate, manage and supervise the general administrative functions in the ward and other functions as for the sub-county administrator (section 51). A village administrator has the responsibility to coordinate, manage and supervise administrative functions in the village, including ensuring and coordinating the participation of the village unit in governance; and assisting the village unit to develop administrative capacity for the effective exercise of the functions, powers and participation in governance at the local level and other functions and powers as the Public Service Board may delegate under section 86 (section 52). At the lowest level is the village council for each village unit. The village council comprises the village administrator as the chairperson, and not less than three and not more than five village elders appointed by the village administrator with the approval of the county assembly, taking into account gender balance. All of the administrators are appointed by the Public Service Board.

4.7. The National Government Coordination Act, 2013

This Act is intended to establish an administrative and institutional framework for co-ordination of national government functions at the national and county levels of government. Articles 131 and 132 of the Constitution are cited in support. The Public Service Commission is mandated, in consultation with the Cabinet Secretary, to recruit and appoint national government administrative officers to co-ordinate government functions countrywide. County commissioners are appointed in respect of every county, including a deputy and other junior officers (section 15). A mediation team will be constituted to deal with disputes arising as to the mandate or powers of any of the officers, or their roles in the county and national governments (section 19).

4.8. Transition to Devolved Government Act, 2012

This statute was enacted to provide a framework for the transition to devolved government pursuant to section 15 of the Sixth Schedule to the Constitution. The section provides that Parliament must enact legislation for the phased transfer from the national to the county government of the functions assigned to counties within a period of three years after the date of the first election of county assemblies. Section 23(1) of the Act provides that the Transition Authority is required to identify functions listed in the Fourth Schedule of the Constitution that may be transferred to county governments immediately after the first elections under the 2010 Constitution. This was done through Legal Notice No. 16 of 2013. The said functions are in addition to the executive, legislative and financial functions provided through the establishment of the County Executive and the County Assembly.

The functions devolved include: agriculture; county health services; cultural activities, public entertainment and public amenities; control of air pollution, noise pollution, other public nuisances and outdoor advertising; county transport; animal control and welfare; trade development and regulation; county planning and development; pre-primary education, village polytechnics, home-craft centres and child-care facilities; implementation of specific government policies on natural resources and environmental conservation; fire-fighting services and disaster management; control of drugs and pornography; and ensuring and coordinating the participation of communities and locations in governance at the local level and assisting them to develop the

administrative capacity for the effective exercise of the functions and powers and participation in governance at the local level.

Section 24 of the Act provides that the county government must meet the following criteria so as to have the functions in the Fourth Schedule transferred to it:

- Existing legislation relating to the function applied for exists.
- A framework for service delivery already is in place to implement the function.
- Where applicable, the county government should identify or establish administrative units to the function.
- The county government has undertaken a capacity assessment in relation to the function.
- Arrangements for, and the extent of, further decentralization of the function and provision of related services have been made by the county government.
- The required infrastructure and systems to deliver the function are in place.
- The county government has the necessary financial management systems in place.
- The county government has an approved plan in relation to the function.
- Any other variable as may be prescribed after consultations between the Authority, The County Government, the Committee for the Implementation the Constitution and the Commission on Revenue Allocation.

The devolved government statutes act as the framework for the transfer of certain functions from the national government to the 47 county governments. The functions commence once the executive, the legislative and the financial systems are in place. Eleven Energy Ltd. will need to familiarize itself with the county's legislative and regulatory provisions as soon as the same are passed and gazette, and ensure compliance with them.

4.9. The 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 and in particular, several functions which include: advising the national and county governments on

legislative and other measures necessary for mitigating and adapting to the effects of climate change;

a) coordinating the activities of various governmental and non-governmental stakeholders on climate change matters;
b) advising the national and county governments on regional and international conventions, treaties and agreements on climate change to which Kenya is a party and following up on their implementation;
c) preparing reports on Kenya's adherence to its international obligations on climate change issues;
d) coordinating local, regional and international negotiations on climate change; and
e) Conducting research on climate change and disseminating information to the national and county governments, the public and stakeholders.

4.10. International Practices, Standards and Conventions

4.10.1. 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 Organisation 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 and its key elements are as follows:

- Leadership and Commitment

- Policy and Strategic Objectives
- Organization, Resources and Documentation
- Evaluation and Risk Management
- Environmental planning and compliance programmes
- Implementation and Monitoring
- Audit and Review

Renowned national and international standards for best practice, particularly the ISO 9000 and 14000 series, also offer management systems models that can be used by companies to enhance their environmental performance.

Some regional and national Standards Development Organizations and industry organizations have developed standards found to be acceptable for use internationally. Examples are the American Petroleum Institute (API), the British Standards Institution (BSI) and the Australian Petroleum Production and Exploration Association Limited (APPEA).

From the environmental principles emerging from the codes of conduct and environmental guidelines developed by the above-mentioned oil industry organizations and other bodies, and recognized as being best practices, Alexandra S. Wawryk (2006) identified five that when adequately implemented, should help to minimize the harmful environmental and cultural impacts of oil and gas exploration and production, namely:

a) Environmental Impact Assessment (EIA)
b) Social Impact Assessment (SIA)
c) Environmental Management Systems (EMS)
d) Environmental Performance Evaluation (EPE)
e) Environmental Monitoring, Auditing and Reporting

4.11. 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: Labour & Working Conditions
- ✓ PS 3: Pollution Prevention & Abatement
- ✓ PS 4: Community Health, Safety and Security
- ✓ PS6: Biodiversity Conservation & Sustainable Natural Resource Management

PS5 (Land Acquisition and Involuntary Resettlement) does not apply as no land acquisition is needed. PS7 (Indigenous Peoples) does not apply as there are no indigenous communities potentially affected by this project. There are no cultural relic preservation sites, scenic spots, revolutionary and historical relics hence inapplicability of PS 8. There is no environmentally sensitive area in close proximity to the project site. The proposed project site will comply with the development plan for the Kenya Ports Authority (KPA) and EPZA (the landlord) as a regulated area and thus will not cause any significant impacts on the surrounding environments.

4.12. PS1: Assessment and Management of Environmental and Social Risks and Impacts

The standard requires the project proponent to have an in-house Environmental and Social Management System that will be used in managing and mitigating environmental impacts and social risks. The standard also requires the proponent to compensate workers and affected communities or offset for risks and negative impacts generated by the project. Grievances from stakeholders and affected communities must be addressed appropriately. Key social and environmental issues that might emanate from the project activities are: workers' rights, occupational health and safety; waste water treatment; solid waste management; noise and dust. The project itself will not cause significant increase to air and water pollution as it consists of the utilization of the AMOG site that is operational, and the Eleven Energy Limited is committed to implementing the necessary mitigation measures consistent with PS 1 as well as national regulations. In ensuring compliance to the said standards the proponent commissioned the undertaking of this ESIA study that will has led to the Environmental and Social Management Plan (ESMP) which will aid in development of or refinements in the Environmental and Social Management Framework (ESMF).

The ESMF will be developed and put in place for the construction. Operations and decommissioning phases of the project presenting (i) detailed mitigation measures to address the project impacts (including management of solid, liquid and gas wastes, marine pollution and management of traffic within and outside the project area), (ii) emergency response measures; (iii) occupational health and safety, and workers relations; (iii) a monitoring system, (iv) timeline for ESMP with specific responsibilities assigned; and (v) defined follow-up actions and reviews. To this end, Eleven Energy Ltd. MUST sufficiently and continuously throughout the course of the project engage the community members on issues that are likely to affect them and undertake environmental due diligence.

4.13. PS2: Labour and Working Conditions

Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental1 rights of workers. For any business, the workforce is a valuable asset, and a sound worker-management relationship is a key ingredient in the sustainability of a company. Failure to establish and foster a sound worker-management relationship can undermine worker commitment and retention, and can jeopardize a project. Conversely, through a constructive worker-management relationship, and by treating the workers fairly and providing them with safe and healthy working conditions, Eleven Energy Limited will create tangible benefits, such as enhancement of the efficiency and productivity of their operations.

Eleven Energy Limited is required to conform to these standard and national laws regarding occupational health and safety, working conditions, management of worker relationship (including terms of employment, workers organizations, non-discrimination and grievance mechanism for workers to express themselves in relation to terms of employment and working conditions). PS 2 thus requires Eleven Energy Limited to give equal treatment to men and women in the workplace, and give them equal opportunities in the economic sphere. There must not be any discrimination of employees on any ground. Labour practices must be fair. Forced labour is prohibited. Child labour or exploitative labour is prohibited. All workers are entitled to fair remuneration and reasonable working conditions. They also have the right to participate in a trade union and to go on strike. There must be a grievance mechanism for workers to raise workplace concerns. Eleven Energy Limited would be able to foster this

through but not limited to the following approaches; workers unions formations, development of grievance mechanism, health and safety training programs for all employees, assessment of health and safety awareness, ensuring all workers are fit for work through a pre-employment medical examination and annual medical re-evaluations with counselling and ensuring access to adequate health care facilities for all employees.

4.14. PS3: Pollution Prevention and Abatement

This standard recognizes that project and other economic activities often generate increased levels of pollution to air, water and land and endeavours to direct proponents toward avoiding or minimizing adverse impacts on human health and the environment. This may be achieved by avoiding or minimizing pollution from project activities, reducing project related greenhouse gas emissions (GHG) which threaten the public health and welfare of current and future generations, and by promoting sustainable use of resources, including water and energy.

There are a number of key areas requiring management in relation to pollution prevention for both the construction and operational phases. The construction phase involves the construction of site facilities such as mounted storage yard, access roads on site, office buildings, as well as facilities for water supply and drainage, fire-fighting facilities. The main pollution sources here would consist of mechanical noise, engineering dust, wastewater and solid waste. Pollution on ambient air by the construction activities include dust from surface levelling at the construction site, movements of trucks and other vehicles, (un)loading of construction materials, earthwork and temporary piling of spoils. Engineering dust may increase Particular Matter (PM) content in the air at certain parts within the area, and may also be transported to neighbouring areas by wind, thus affecting livelihood and working of employees of adjacent entities such as those at MICD, Ken Gen, Tsavo Power plant, Gapco Depot etc.

Eleven Energy Limited is committed to take proper measures to minimize such adverse impacts on ambient air. Measures to be taken during the construction period include, enclosure walls with a height of 2 meters or above around the construction site; using enclosed spaces for storing and mixing construction material such as cement and sand; covering such materials during loading and unloading, use of enclosed vehicles to transport materials, routes of transportation vehicles shall avoid residential quarters and other environmentally sensitive areas, and vehicle speed shall also be limited. In addition, exhaust gas from machinery and vehicles may increase concentration

of carbon monoxide and other pollutants in the air of certain parts of the area but this is envisaged to be of low effect on the workers as most of it will be absorb appropriately by the local environment. Air emissions during operation include dust, NOx, carbon monoxide and hydrocarbons from vehicles. Mitigation measures include, ensuring a steady speed of vehicles within the project area and regular maintenance of vehicles.

Wastewater from the proposed project during construction period mainly includes wash water for engineering equipment and water from concrete maintenance. However their quantity is insignificant, and not considered as significant pollutants. A simplified sedimentation tank shall be built on the construction site, through which, the engineering wastewater will be collected and settled, and then be used for site sprinkling to reduce fugitive dust. Domestic wastewater (by about 100 construction workers), of which the main part is washing waste will be discharged into the existing wastewater system.

Noise sources come from engineering machinery and vehicles. Mitigation measures include, using advanced engineering equipment and technologies of low noise. This will be a principal criterion for selecting contractors. Also percussion by piling machine or pneumatic hammer will not be allowed, and working hours will be limited between 08:00 and 18:00 hours.

Solid wastes will consist of construction refuse and domestic refuse. Solid waste from the engineering process will be collected by cleaning and hygiene teams of the municipality or by a licensed waste collector and transported to a licensed solid waste disposal site.

Eleven Energy Limited is required to consider ambient conditions and apply technically and financially feasible principles of resource efficiency and pollution prevention, as well as techniques that will avoid or minimize adverse impacts on health and the environment during the life of the project.

4.15. PS4: Community Health, Safety and Security

This standard requires the proponent to avoid or minimize risks and adverse impacts to the health, safety and security of the local community arising from the project activities. Eleven Energy Limited must conform to the standard through adopting effective design layout, construction and operation of its equipment and decommissioning of the infrastructure so that

they do not increase community and third party exposure to incidents and injuries. The measures that can be employed include transportation and disposal of hazardous materials safely and appropriately, reduction in air and water quality pollution.

The nearest inhabited areas of Changamwe and Kipevu are less than a kilometre from the proposed project site. The transportation trucks the proponent is proposing to use will make use of the existing roads currently being used by the area residents. For this case, a traffic management plan both within and outside the project area is required as part of the Environment and Social Management Plan to mitigate traffic risks to communities close to public roads used by vehicles/trucks serving the project, and workers within the project area.

In addition to the emergency preparedness and response requirements described in Performance Standard 1, Eleven Energy Limited is also required to collaborate with the Affected Communities, local government agencies, and other relevant parties, in their preparations to respond effectively to emergency situations, especially when their participation and collaboration are necessary to respond to such emergency situations at the project site.

4.16. PS5: Land Acquisition and Involuntary Resettlement

The objective of this standard is to avoid or minimize adverse social and economic impacts from land acquisition or restrictions on land use. This means avoiding or minimizing displacement of persons, using alternative project designs and avoiding forced evictions. Other objectives are to improve or restore livelihoods and standards of living and to improve living conditions for displaced persons through providing adequate housing and security of tenure. The Standard is not applicable in the context of this project, as the land allocated to the Eleven Energy Ltd. will not necessitate displacement of populations.

4.17. PS6: Biodiversity Conservation and Sustainable Natural Resource Management

This standard seeks to protect and conserve biodiversity, maintain the benefits from ecosystem services, and promote the sustainable management of living natural resources Eleven Energy Ltd should avoid adverse impacts to priority system services that are of relevance to the affected community where it has direct management control or significant influence over them. Conservation needs must, as far as is possible, be integrated with development priorities.

The project site is in an industrial/commercial area along the Indian Ocean, and therefore PS 5 might not be much relevant but due to the presence of marine ecosystem the standard to some extend will be partially be applicable. The project intends to use a private berth at the Indian Ocean and this might affect the marine life at this particular site. However, the project site is located in an industrial area with restricted activities being permitted by KPA.

Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. For the LPG storage facility, Eleven Energy Limited is required to sustainably manage and mitigate impacts on marine life and ecosystem services throughout the project‘s lifecycle through the following measures:

- The protection and conservation of marine life.
- Maintenance of the benefits from ecosystem services and
- The promotion of sustainable management of marine living and non-living natural resources through the adoption of practices that integrate conservation needs and development priorities.

4.18. PS7: Indigenous Peoples

Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. As a consequence, Indigenous Peoples may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities. This vulnerability may include loss of identity, culture, and natural resource-based livelihoods, as well as exposure to impoverishment and diseases. The project site area of influence has no identifiable Indigenous Peoples hence the PS is not applicable.

4.19. PS8: Cultural Heritage.

Performance Standard 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity. However, for the LPG storage facility, the PS is not applicable as the ESIA team did not identify any known sites of archaeological or cultural heritage value within the project site boundaries and even during construction activities there is no chance of making any chance findings.

4.20. WB Equator Principles;

The Equator Principles (EPs) is a credit risk management framework applied to determining, assessing and managing environmental and social risk in Project Finance transactions. Its main objective is to provide a minimum standard for due diligence in order to inform and support risk during decision-making.

To date, it has been adopted in 35 countries and by 79 financial institutions. These principles are applying to all industry sector projects as well as in project finance advisory services, project financing, project and bridge loans. The EPs bore the Equator Principles Financial Institutions (EPFIs), which implement the principles to ensure internal Environmental and social adherence. Without conformance to internal Environmental and social policies, standards and procedures, the EPFIs are unable to provide project financing. There are ten principles under the EP applied to all projects in a chronological manner namely; i) Review and categorisation, ii) Social and environmental assessment; iii) Applicable Social and Environmental Standards; iv) Action Plan and Management System; v) Consultation and disclosure; vi) Grievance mechanism; vii) Independent review; viii) Covenants, ix) Independent monitoring and reporting; and EPFI reporting.

4.21. WB guidelines on pollution prevention, natural habitats, environmental assessment;

These guidelines focus on promoting sustainable development by shedding light on the

importance of environmental pollution prevention and raising economic benefits through the use of cleaner production and good management techniques. The guidelines are to ensure reduction of pollution emissions from the production processes, mainly through a combination of cleaner production and end of pipe treatment. The guidelines are provided to protect human health and reduce environmental pollution

4.22. 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. Eleven Energy Limited will thus adopt the World Bank Group's Environmental, Health and Safety (EHS) Guidelines and other best environmental practices.

4.23. 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 objectives of this Code are:

1. 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;
2. To 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;

3. To ensure the early and efficient collection and exchange of security-related information;
4. To provide a methodology for security assessments so as to have in place plans and procedures to react to changing security levels; and
5. To ensure confidence that adequate and proportionate maritime security measures are in place.

Application

This Code applies to:

The following types of ships engaged on international voyages:

1. passenger ships, including high-speed passenger craft;
2. cargo ships, including high-speed craft, of 500 gross tonnage and upwards; and
3. mobile offshore drilling units;

Port facilities serving such ships engaged on international voyages.

Notwithstanding the provisions of section 3.1.2, Contracting Governments shall decide the extent of application of this Part of the Code to those port facilities within their territory which, although used primarily by ships not engaged on international voyages, are required, occasionally, to serve ships arriving or departing on an international voyage.

The Company shall ensure that the ship security plan contains a clear statement emphasizing the master‘s authority. The Company shall establish in the ship security plan that the master has the overriding authority and responsibility to make decisions with respect to the safety and security of the ship and to request the assistance of the Company or of any Contracting Government as may be necessary.

The Company shall ensure that the company security officer, the master and the ship security officer are given the necessary support to fulfil their duties and responsibilities in accordance with chapter XI-2 and this Part of the Code.

4.24. Kenya Legislation, Regulations, Standards and International Conventions

The Kenyan legislation, regulations, standards and international conventions relevant to this study is presented in tables 4:1 and 4:2 below:

Table 4:1: Kenyan Legislation, Regulations, Standards and International Conventions Relevant to the Project

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
EIA REQUIREMENTS				
Physiography and Geology	The Environmental (Impact Assessment and Audit) Regulations, 2003, Regulations 18 and 45(2)(b)	The National Environment Management Authority	The ESIA Study report must include the potential environmental impacts of the project on the physiography and geology of the area, and propose mitigation measures to be taken during and after the implementation of the project. Failure to prepare an ESIA report in accordance with the Act and regulations is an offence.	The offender is liable on conviction to imprisonment for a term not exceeding two years or to a fine of not more than two million shillings, or to both. Section 138, EMCA
	The Environmental Management and Co-ordination Act, Cap 387 Section 42 The Environmental (Impact Assessment and Audit) Regulations, 2003 Regulations 18 and45(2)(b)	The National Environment Management Authority	After ESIA study, the prior written approval of the Authority must be obtained in relation to a river, lake or wetland to: erect, reconstruct, place, alter, remove or demolish any structure or part of any structure in, or under it; excavate, drill, tunnel or disturb it; introduce into it any animal, whether indigenous or alien; deposit in, on or under its bed any substance that would have adverse environmental effects on it; direct or block it from its natural and normal course; or drain it	The offender is liable on conviction to imprisonment for a term not exceeding two years or to a fine of not more than two million Shillings, or to both. Section 138, EMCA

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	**Offences and Penalties**
			. The Environmental and Social Impact Assessment Study report must include the potential environmental impacts of the project on the physiography and geology of the area, and propose mitigation measures to be taken during and after the implementation of the project.	
	The Forests Act, 2005 Section 34 (2)	The Kenya Forest Service Board	Eleven Energy Ltd Must not fell, cut, damage or remove protected trees or species or family of trees or their regeneration or aid anyone in committing such acts.	
	The Forests Act, 2005 Sections 52, 55, 63	The Kenya Forest Service Board	A license is required in order to fell, cut, take, burn, injure or remove any forest produce, or to set fire to grass or undergrowth of forest produce. The Environmental Impact Assessment process applies with regard to such a license.	Not less than Shs. 50,000, or imprisonment of not less than one year, or both. In addition, the court may order compensation equal to the determined value, or Shs. 10,000 for each offence. Sections 52, 55

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Forests Act, 2005 Section 63	The Kenya Forest Service Board	Any disputes arising will be resolved by the National Environment Tribunal, established under the EMCA 1999.	
	The Forests Act, 2005 Section 43	The Kenya Forest Service Board	A license for a forest-based activity that is likely to result in the depletion of forest cover will include a compulsory requirement to re-vegetate on completion of the activity. Failure to so act is an offence.	Imprisonment for not less than 6 months, or a fine of not less than Shs. 100,000 or both. Section 44
Soils	The Environmental (Impact Assessment and Audit) Regulations, 2003 Regulations 17,18 and 45(2)(b)	The National Environment Management Authority	The Environmental and Social Impact Assessment Study report must include the potential environmental impacts of the project on the soils, including the vegetation cover, and indicate the mitigation measures to be taken during and after the implementation of the project. The views of the people who may be affected by the project must be sought. Failure to prepare an environmental impact assessment in accordance with the Act and regulations is an offence.	The offender is liable on conviction to imprisonment for a term not exceeding two years or to a fine of not more than two million shillings, or to both. Section 138, EMCA

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Environmental Management and Co-ordination (Wetland, Riverbank, Lakeshore and Seashore Management) Regulations, 2009Regulation 4(h)	The National Environment Management Authority	Activities that may cause pollution and siltation in wetland areas or in other ways degrade the environment, must be prevented or controlled.	Environmental Restoration orders may be given to allow a wetland, riverbank or lakeshore that has been degraded to regenerate. Section 108, EMCA
Water Resources	The Public Health Act, Cap. 242 (Revised Edition 2012) Sections 63, 130	The Health Ministry	Eleven Energy Ltd. Must guard against pollution of the camp's water supply source, underlying aquifers and surface water from liquid effluent discharges or solid waste emanating from sanitation systems at the campsite, oil, or chemical leaks from vehicles and equipment. The disposal of waste from such sanitation systems and kitchens must be by a satisfactory system of surface irrigation or sub-irrigation in a manner that does not pollute water supplies or cause other forms of nuisance. There must be compliance with any rules the Cabinet Secretary may make as to the safe discharge of liquid or other material prone to pollute streams or that are likely in any way to be a nuisance or dangerous to health.	The relevant local authority may take legal action against any person causing water pollution. Section 129

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Environmental Management and Coordination Act, 2015 Section 72	The National Environment Management Authority	Eleven energy Ltd. Must comply with the water pollution control standards against discharge of noxious matter, waste or other pollutants into the aquatic environment.	Imprisonment for a term not exceeding two years, or a fine of up to one million shillings, or both. The offender must in addition, pay the cost of removing the poison, radioactive waste, etc., including restoration of the environment, as well as payment of the cost to third parties in the form of reparation, restitution, restoration or compensation. Section 72
	The Environmental Management and Coordination Act, Cap. 387 (Revised Edition2012) Section 75(1), (2)	The National Environment Management Authority	A license must be obtained from the Authority if it is intended to discharge waste into the environment. The application must be made within twelve months of Commencement of the project.	Cancellation of license for contravening any provision of the Act or failing to comply with any specified Conditions in the license. Section 76

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Water Act, Cap. 372 (Revised Edition 2012) Sections 25(c) and 94(1)	The Environment, Water and Natural Resources Ministry	Eleven energy Ltd may not willfully obstruct, interfere with, divert or obstruct water from any watercourse or water resource, or negligently allow such acts, or throw any dirt, effluent, or waste (e.g. oils or chemicals) or other offensive or unwholesome matter into or near any water resource in such a way as to cause or be likely to cause pollution of the water resource.	Any person who contravenes the Water Quality Regulations commits an offence and is liable to a fine not exceeding five hundred thousand shillings. Regulation 27
	The Environmental Management and Co-ordination (Water Quality) Regulations, 2006 Regulations 6(b) and 24	The National Environment Management Authority	Eleven Energy Ltd Must obtain an environmental and social impact assessment license in order to carry out any activity near lakes, streams, springs and wells that is likely to have an adverse impact on the quality of the water.	Deliberately polluting water meant for public use is a misdemeanour under the Penal Code, Cap. 63 and the offender is liable to imprisonment for up to one year.

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Water Resources Management Rules, 2007 Rules 81, 82, 88	Water Resources Authority (WRA)	Eleven energy Ltd. has a duty to ensure that no toxic or obstructing matter, waste or other pollutants are discharged into anywater resource unless the discharge has been treated to permissible levels. Discharge of effluent into a water resource requires a valid discharge permit issued by the National Environment Management Authority. The wilful and deliberate spilling into any water source or onto land where such spillage may contaminate any surface or groundwater is not permitted. Any threat of contamination must swiftly be dealt with	The offender is liable on conviction to imprisonment for a term not exceeding two years or to a fine of not more than two million shillings, or to both
	The Environmental (Impact Assessment and Audit) Regulations, 2003 Schedule 2, Issue No. 1 (under Regulation 11)	The National Environment Management Authority	The Environmental Impact Assessment study report must include the potential environmental impacts of the project on the water sources (quantity and quality) and the drainage patterns, and indicate the mitigation measures to be taken during and after the implementation of the project. The views of the people who may be affected by the project must be sought. Failure to prepare an environmental impact assessment report in accordance with the Act and Regulations is an offence.	Imprisonment for a term not exceeding two years or a fine of not more than two million shillings, or both. Section 138, EMCA

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, 1991		Eleven energy Ltd. Must endeavour to reduce waste generation to a 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.	
	The Ramsar Convention on Wetlands of International Importance, Especially as Waterfowl Habitat, 1971	NEMA WRA	Eleven energy Ltd Must make every effort to conserve the wetlands and their flora and fauna.	

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
Ecosystems	The Wildlife (Conservation and Management) Act, No. 47 of 2013 Sections 30, 31, 89	The East African Affairs, Commerce and Tourism Ministry	The Cabinet Secretary may declare a marine or wetland area to be a protected area and restrict or prohibit activities there in order to secure the safety of the flora and fauna or to preserve the habitat and ecology within a national park, reserve or sanctuary. Anyone who acts in contravention of a notice issued in respect of a protected area commits an offence Eleven energy limited should, as a matter of course, minimise carrying out its activities close to these areas so as to avoid disturbance of wildlife as a result of noise generated by its vehicles, machinery and equipment during the course of the project, and the Introduction of weeds and pests among the flora. In addition, it must not discharge of hazardous substances, waste or oil into a designated wildlife area, or pollute wildlife habitats and ecosystems, or discharge into a designated wildlife conservation area any pollutant detrimental to wild life.	A fine of not less than two million shillings or to imprisonment for a term of not less than five years or to both. The offender may also be required to clean up and pay the full cost of cleaning up the polluted wildlife habitat(s) and ecosystem(s). Section 89

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit-Sharing) Regulations, 2006 Regulation 4	NEMA	Eleven Energy Ltd Must not engage in any activity that may have an adverse impact on any ecosystem; lead to the introduction of any exotic species; or lead to unsustainable use of natural resources.	Any person convicted of an offence under the Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit-Sharing Regulations is liable to imprisonment for up to eighteen months, or to a fine not exceeding three hundred and fifty thousand shillings, or both. Regulation 24
	The Environmental (Impact Assessment and Audit) Regulations, 2003 Schedule 2, Issue No. 1 (under Regulation 11)	NEMA	The Environmental Impact Assessment study report must include the potential environmental impacts of the project on the area's ecology, incorporating the biological diversity including the effect of the project on the number, diversity, breeding habits, etc., of wild animals and vegetation, and the gene pool of domesticated plants and animals, and indicate the mitigation measures to be taken during and after the implementation of the project. The views of the people who may be affected by the project must be sought.	The offender is liable on conviction to imprisonment for a term not exceeding two years or to a fine of not more than two million Shillings, or to both. Section 138, EMCA

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
Public Safety and Security	The Environmental (Impact Assessment and Audit) Regulations, 2003 Regulation 7(h)	NEMA	The Environmental Impact Assessment study report must include a plan to ensure the health and safety of the neighbouring communities. Failure to prepare an environmental impact assessment in accordance with the Act and Regulations is an offence.	The offender is liable on conviction to imprisonment for a term not exceeding two years or to a fine of not more than two million shillings, or to both. Section 138 , EMCA
Occupational Health and Safety	The Explosives Act, Cap. 115 (Revised Edition 2012) Sections 6, 7, 11, 13 The Explosives (Blasting Explosives) Rules 78 - 80	The Labour, Social Security and Services Ministry	Eleven Energy Ltd Must obtain a license if it intends to purchase and use blasting materials or convey explosives. The use or transport of explosives, in the working of the project is forbidden, unless an explosives manager has been appointed and the inspector notified in writing. The explosives manager is responsible for the safety and security of all explosives used, transported or stored, until they are handed to the blaster for use. The explosives manager is also responsible for the safety of every person who is working with explosives or in the vicinity of where explosives are being used, whether under his direct supervision or not.	A fine not exceeding three thousand shillings, and in default of payment, imprisonment for a term not exceeding one year. Section 12

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Energy Act, No. 12 of 2006 (Revised Edition 2012) Sections 95(1), 98 and 117	The Energy Petroleum Regulatory Authority	Eleven Energy Ltd. Must comply with the Kenyan or other approved standards on environment, health and safety, and in conformity with the relevant laws. It must notify the Energy Commission of any accident or incident causing loss of life or personal injury, explosion, oil spill, fire or any other accident or incident causing significant harm or damage to property or to the environment.	None specified. A general penalty applies - a fine not exceeding one million shillings. Section 122
	The Occupational Safety and Health Act, No. 15 of 2007 (Revised Edition2012) Sections 6, 55, 77- 83, 89, 101	The Labour, Social Security and Services DOSHS	Eleven energy Ltd. has a duty to ensure the safety, health and welfare of all its workers at work at the site, including work procedures that are safe. Visitors to the work site should be similarly Protected. The likely emission of poisonous, harmful, or offensive substances such as chemicals or vehicle fumes into the atmosphere should be prevented, and where they occur, they must be rendered harmless and inoffensive	A fine not exceeding three hundred thousand shillings or imprisonment for a term not exceeding three months, or both. If contravention continues after conviction, the offender will be liable to a fine not exceeding ten thousand shillings for each day on which the contravention is continued. The court may in addition or instead of a penalty order remedy of the contravention. Sections 109, 110

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
			Machinery, protective gear, and tools used at the project site have to comply with the prescribed safety and health standards. Dust, fumes or impurities may cause respiratory problems and must not be allowed to enter the atmosphere without appropriate treatment to prevent air pollution or harm of any kind to life and property. Highly inflammable substances must be kept in a safe place outside any occupied building. Where dangerous fumes are liable to be present, Eleven Energy Ltd. must provide a means of exit and suitable breathing apparatus. Means for extinguishing fire must be available and easily accessible, and evacuation procedures must be tested regularly.	

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Environmental (Impact Assessment and Audit) Regulations, 2003 Regulations 7(h) and 18(1)(m)	NEMA	The Environmental Impact Assessment study report must include a plan to ensure the health and safety of the workers. Failure to prepare an environmental impact assessment in accordance with the Act and Regulations is an offence.	The offender is liable on conviction to imprisonment for a term not exceeding two years or to a fine of not more than two million shillings, or to both. Section 138, EMCA
Land Resources	The Land Act, 2012 Section 11(1), (2) The Convention on Biological Diversity, Rio de Janeiro, 1992	The National Land Commission	The National Land Commission is mandated to take appropriate action to maintain land that has endangered or endemic species of flora and fauna, critical habitats or protected areas. The Commission is required to identify ecologically sensitive areas that are within public lands, and demarcate or take any action on those areas to prevent environmental degradation and climate change. Eleven Energy Ltd. must minimise activities that would degrade the environment and cause climate change.	

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit-Sharing) Regulations, 2006 Regulation 9(1)	The National Environment Management Authority	Anyone who intends to access genetic resources must apply to the Authority for an access license, and thereafter comply with the conditions imposed on the license or those implied under the Regulations, or of the agreements made in relation to its grant. Contravention or failure to comply with any of the matters provided in the Regulations will constitute an offence	Suspension, cancellation or revocation of the license. Imprisonment for a term not exceeding eighteen months, or to a fine not exceeding three hundred and fifty thousand shillings, or both. Regulation 24
Visual Aesthetics	The Environmental (Impact Assessment and Audit) Regulations, 2003 Schedule 2, Issue No. 3 (under Regulation 11); Regulation 17	The National Environment Management Authority	The Environmental Impact Assessment study report must include the potential environmental impacts of the project on the landscape, including the views opened up or closed, visual impacts (features, removal of vegetation, etc.), compatibility with the surroundings, and amenities opened up or closed (e.g., recreation possibilities) and indicate the mitigation measures to be taken during and after the implementation of the project. The views of the people who may be affected by the project must be sought. Failure to prepare an environmental impact assessment in accordance with the Act and Regulations is an offence	The offender is liable on conviction to imprisonment for a term not exceeding two years or to a fine of not more than two million shillings, or to both. Section 138, EMCA

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
Noise and Vibrations	The Environmental Management and Coordination Act 2015, Sections 101-103	The National Environment Management Authority	Emitting noise in excess of the noise emissions standards is an offence. However, the Authority may on request grant a temporary license allowing emission of noise in excess of the established standards for activities such as demolitions and specific heavy industry on specified terms and conditions. Where exemption is granted, workers exposed to the excessive noise levels must be adequately protected as directed by the Authority.	Imprisonment for a term of not more than eighteen months, or a fine of not more than three hundred and fifty thousand shillings, or both. Section 144
	The Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations,2009 Regulations 3-6, 11, 12		Eleven Energy Limited must not exceed the laid-down permissible noise levels unless the noise is reasonably necessary to preserve life, health, safety or property. The use of machinery, generators and vehicles, and activities and operations which are likely to emit noise or excessive vibrations must be carried out within the prescribed levels as set out in Schedules 1 – 3 of the Regulations, unless the noise is reasonably necessary to preserve life, health, safety or property.	Making loud noises so as to annoy a considerable number of people amounts to a common nuisance under the Penal Code, Cap. 63, and the offender is liable to imprisonment for up to one year.

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	**Offences and Penalties**
	The Explosives Act, Cap. 115 (Revised Edition 2012) Sections 6, 7, 11, 13	The Ministry of Mining	Addressed under Occupational Health and Safety above, but also applicable to Noise and Vibrations	A fine not exceeding three thousand shillings, and in default of payment, imprisonment for a term not exceeding one year. Section 12
Offensive Odours	The Environmental Management and Coordination Act, 2015 Sections 78, 80, 82	The National Environment Management Authority	Eleven Energy Ltd. Must comply with the emission standards in the Act so as to ensure that substances which cause pollution are not emitted during the course of the project. Its motor vehicles should be operated in a manner that will not cause air pollution, and it must ensure that its machinery, equipment and appliances do not cause emissions in contravention of the prescribed standards.	An imprisonment term not exceeding two years, or a fine not exceeding five hundred thousand shillings, or both. The offender must in addition, pay the cost of removing the pollution and the cost to third parties in the form of reparation, restitution, restoration or compensation. Section 78(2)

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	**Offences and Penalties**
	The Environmental Management and Coordination Act, 2015. Sections 78, 80, 82	The National Environment Management Authority	Eleven EnergyLtd. Must apply to the Authority for a license in respect of activities that will emit substances or energy causing or likely to cause air pollution. Any conditions specified in the license must be complied with.	Cancellation of license.
	EMCA, 1999 Sections 78, 80, 82	Mombasa County Government	Eleven Energy Ltd. Must comply with any rules or regulations that the relevant County Executive Member(s) may make as to the safe discharge of any liquid or other material prone to cause offensive smells. The proponent must also abide by any conditions the County Executive Member(s) may lay down, under which an activity producing smoke, fumes, chemicals, gases or dust (e.g. from the use of motor vehicles, machinery, equipment or other devices) that may cause a danger to people in the vicinity, may be carried out. A license may be cancelled or denied if the method adopted or proposed to prevent noxious or offensive vapours, gases or smells arising from the activity are not effective.	Deliberately fouling the air is a misdemeanour under the Penal Code, Cap. 63 and the offender is liable to imprisonment for up to one year.

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	**Offences and Penalties**
	The Environmental Management Co-ordination (Fossil Fuel Emission Control) Regulations, 2006 Regulation 4	The National Environment Management Authority	Internal combustion engines are subject to inspection and must pass tests to show that they comply with the standards and requirements for the control of air pollution or contamination. It is an offence to operate an internal combustion engine which emits smoke or other pollutant in excess of the emission standards. Eleven Enegry Ltd. Must ensure that power generators and associated machinery and vehicles do not emit toxic carbon gases and particulate matter. The polluter must bear the cost of clearing the pollution generated through fuel emission.	It is an offence to contravene these Regulations, and the offender, if convicted, is liable to a maximum fine of three hundred and fifty thousand shillings or to imprisonment for a term not exceeding eighteen months, or to both. Section 144, EMCA
	The Environmental (Impact Assessment and Audit) Regulations, 2003 Sections 17, 18	NEMA	The Environmental Impact Assessment study report must include the potential environmental impacts of the project on the ambient quality of the air, and the mitigation measures to be taken during and after the implementation of the project. The views of the people who may be affected by the project must be sought. Failure to prepare an environmental impact assessment in accordance with the Act and Regulations is an offence.	The offender is liable on conviction to imprisonment for a term not exceeding two years or to a fine of not more than two million shillings, or to both. Section 138, EMCA

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	**Offences and Penalties**
	The Kyoto Protocol to the United Nations Framework Convention on Climate Change, Kyoto, 1997		Eleven Energy Ltd. Must show that they are consistently taking steps to control/reduce greenhouse gas emissions.	
Solid and Liquid Wastes	The Public Health Act, Cap. 242 (Revised Edition 2012) Section 126(e)	The Health Ministry	Eleven Energy Ltd. Must comply with any rules the Cabinet Secretary may make as to the standard(s) of purity of any liquid which may be discharged as effluent after treatment.	A fine not exceeding fifty thousand shillings, or imprisonment for a term not exceeding six months, or both; and if the offence is of a continuing nature, to a further fine not exceeding one thousand shillings for each day it continues. Section 164
	The Physical Planning Act, Cap. 286 (Revised Edition 2009) Section 36	The Land, Housing and Urban Development Ministry CGM	If a local authority is of the opinion that the proposed project, any dump site, sewerage treatment plant or other development activity that Eleven energy Limited intends to carry on will impact on the environment adversely, the proponent will be required to submit an environmental impact assessment report for consideration by the Physical Planning Liaison Committee which determines development applications.	A fine not exceeding one hundred thousand shillings or imprisonment for a term not exceeding five years or both. Section 30(2)

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Environmental Management and Coordination Act, 2015	The National Environment Management Authority	Eleven Energy Ltd. Must ensure that it discharges or disposes of waste in a manner that will not cause pollution to the environment or ill health to any person. A license must be obtained from the Authority in order to: transport waste; dispose of the waste to a waste disposal site (set up in accordance with the license issued); or operate a wastes disposal site. The proponent must employ measures essential to minimize wastes by treating, reclaiming or recycling such waste.	Imprisonment for not more than two years or a fine not exceeding one million shillings, or both. Section 87(5)
	EMCA, 1999 Section 91(3), (4) and (5)		Hazardous wastes may not be transported, imported or exported without a valid license issued by the Authority.	Imprisonment for not less than two years or a fine of not less than one million shillings or both. Offender responsible for the removal of the waste from Kenya and for its safe disposal. Section 91(6), (7)

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Environmental Management and Coordination Act, 2015 Section 93(1), (2)	The National Environment Management Authority	Eleven Energy Ltd. Must not discharge any hazardous substance, chemical, oil or mixture containing oil into any segment of the environment.	In addition to any other sentence imposed by the court, payment of the cost of removing the hazardous substance, chemical, oil or mixture containing oil, including restoration of the environment, as well as payment of the cost to third parties in the form of reparation, restitution, restoration or compensation. Section 93(3)

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	**Offences and Penalties**
	The Environmental Management and Coordination Act, 2015 Section 93(4)	The National Environment Management Authority	Eleven Energy Ltd. Is required to mitigate any discharge from its storage facility/ies, motor vehicle(s) or vessel(s) by: giving immediate notice to the Authority and other relevant Government officers of the occurrence of such discharge contrary to the Act; immediately beginning clean-up operations using the best available clean-up methods; and by complying with any directions that the Authority may prescribe.	Seizure of the storage facility/ies, motor vehicle(s) or vessel(s). Where the operator fails to take the mitigation measures within a reasonable time (not more than six months), the Authority may, upon a court order, dispose of the storage facility/ies, motor vehicle(s) or vessel(s) to meet the costs of taking the necessary remedial and restoration measures. Section 93(5), (6)
	The Environmental Management and Co-ordination (Waste Management) Regulations, 2006 - Parts II and III; Schedule 3	The National Environment Management Authority	Eleven Energy Ltd Must obtain an Environmental Impact Assessment license if it intends to engage in any activity likely to generate hazardous waste. Toxic or hazardous waste generated must be treated and disposed of according to the laid-down guidelines (Schedule 3 of the Regulations). Waste generated must be minimized by adopting cleaner production methods. The waste product can also be reused and recycled. The proponent is required to mitigate pollution by installing at its premises anti-pollution equipment for treating the waste it generates.	Imprisonment not exceeding two years, or a fine not exceeding one million shillings, or both. Section 141, EMCA

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	**Offences and Penalties**
	Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, Bamako, 1991,		Eleven Energy Ltd. Must endeavour to reduce waste generation to a minimum in terms of quantity and/or hazard potential. Whenever it does generate such wastes, . 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.	

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	**Offences and Penalties**
	The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Basel, 1989		Appropriate legal, administrative and other measures must be taken within the area under the project's jurisdiction to prohibit the import of all hazardous wastes. A licence is required for trans-boundary movement of waste, and to export or transit waste. It is an offence to violate the provisions of the Regulations.	
	The Environmental (Impact Assessment and Audit) Regulations, 2003 Regulations 7(1)(e) and (f); and 17	The National Environment Management Authority	The Environmental Impact Assessment study report must include the potential environmental impacts of the project's methods of waste discharge and disposal into then environment, and indicate the mitigation measures to be taken during and after the implementation of the project. The views of the people who may be affected by the project must be sought. Failure to prepare an environmental impact assessment in accordance with the Act and Regulations is an offence	The offender is liable on conviction to imprisonment for a term not exceeding two years or to a fine of not more than two million shillings, or to both. Section 138, EMCA

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
Archaeological and Natural Heritage Sites	The National Museums and Heritage Act, No. 6 of 2006 Section 34	The Ministry of Sports, Culture and the Arts	The Cabinet Secretary may prohibit or restrict access or any development on an open space or on a specified site on which a buried monument or object of archaeological or paleontological interest exists, if, in his/her opinion, it is liable to damage that monument or object. The restriction may include the adjacent area, or a geo-park. A breach of a prohibition or restriction order or a breach of any law made by the Cabinet Secretary in respect of protected areas amounts to an offence. Eleven Energy should avoid the use of heavy vehicles and machinery in or close to these areas as they may damage the archaeological, historical or cultural sites.	A fine not exceeding one million shillings or imprisonment for a term not exceeding twelve months, or to both. Section 36
	The Convention Concerning the Protection of the World Cultural and Natural Heritage, Paris, 1972		Eleven Energy Ltd. Must endeavour to protect cultural and natural heritage from the adverse effects that its activities may Engender.	

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	**Offences and Penalties**
Natural Resource Management and Land Use	The Constitution of Kenya, 2010 Article 69(2)	The State	Eleven energy Ltd Is expected to co-operate with the State organs and other people to protect and conserve the environment and ensure that the use and development of the natural resources are ecologically sustainable.	Environmental rights are enforceable in the Land and Environment Court. Regulation 70
	The Land Act, 2012 Section 19(1), (2)	The National Land Commission	Eleven Energy Ltd. Must comply with any rules or regulations the Commission may make for sustainably conserving land-based natural resources. Regulations made may include: measures to protect critical ecosystems and habitats; incentives for communities and individuals to invest in natural resource conservation programmes that generate income; measures to facilitate the access, use and co- management of forests, water and other resources by communities who hold customary rights to them; procedures on involving stakeholders in managing and utilizing land-based natural resources; and measures to ensure benefit-sharing for the affected communities.	Disputes arising from matters provided for under this law may be referred to the Land and Environment Court which has exclusive jurisdiction to handle them. Section 150

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	**Offences and Penalties**
	The Environmental (Impact Assessment and Audit) Regulations, 2003 Regulations 17, 18	The National Environment Management Authority	The Environmental Impact Assessment study report must include the potential environmental impacts of the project on the current and surrounding land use and land use potentials, and indicate the mitigation measures to be taken during and after the implementation of the project. The views and participation of stakeholders and the local community who may be affected by the project must be sought. Failure to prepare an environmental impact assessment in accordance with the Act and regulations is an offence.	Imprisonment for a term not exceeding two years or a fine of not more than two million shillings, to both.
	The Water Act, 2016	WRA	Water is vested in the State subject to rights of user that may be granted under the law. Eleven Energy Limited. Must strictly abide by any state scheme that may be formulated for the use for any public purpose (e.g. the distribution, apportionment or measurement of water) of the whole or part of a water resource. This would include community water projects.	

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	African Convention on the Conservation of Natural Resources (Revised Version) Maputo, 2003 IFC Performance Standard 6		The proponent must endeavour to meet developmental and environmental needs in a sustainable, fair and equitable manner.	
Community Health, Safety and Security	The Constitution of Kenya, 2010 Article 43(1)(a)	The State	Everyone has the right to a high standard of health and health care services. Eleven energy Ltd. must seek to avoid adverse impacts on the health and safety of the affected community (including workers, contractors and visitors to the site) that may arise as a result of noise during excavation, and use of machinery, vehicles, generators and other equipment, or air pollution arising from substances such as dust, fumes and fumes during the life of the project in work and non-work related situations.	

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	IFC Performance Standard 3		Eleven energy Ltd. Must seek to avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities, reduce project related GHG emissions and promote sustainable use of resources, including water and energy.	
	The Environmental Management and Coordination Act, 2015. Sections 102, 103	The National Environment Management Authority	Emitting noise in excess of the noise emissions standards (subject to the Civil Aviation Act) is an offence. However, the Authority may on request grant a temporary license allowing emission of noise in excess of the established standards for activities such as demolitions and specific heavy industry on specified terms and conditions. Where exemption is granted, workers exposed to the excessive noise levels must be adequately protected as directed by the Authority.	Imprisonment for a term of not more than twenty-four months, or a fine of not more than three five hundred thousand shillings, or both. Section 140

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 Regulations 3, 4, 5, 6(1), 11 and 12(1), (2)	The National Environment Management Authority	Eleven Energy Ltd must not exceed the laid-down permissible noise levels unless the noise is reasonably necessary to preserve life, health, safety or property. The use of generators and vehicles, and activities which are likely to emit noise or excessive vibrations must be carried out within the prescribed levels as set out in Schedules 1 – 3 of the Regulations, unless the noise is reasonably necessary to preserve life, health, safety or property.	Making loud noises so as to annoy a considerable number of people amounts to a common nuisance under the Penal Code, Cap. 63, and the offender is liable to imprisonment for up to one year.
	The Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 Regulation 15	The National Environment Management Authority	During the environmental impact assessment studies, eleven Energy Ltd. must identify natural resources, land uses or activities that may be affected by noise or excessive vibrations from the project activities; determine the measures which are needed in the plans and specifications to minimize or eliminate adverse noise or vibration impacts; and incorporate the needed abatement measures in the plans and specifications.	A fine not exceeding three hundred and fifty thousand shillings or imprisonment for a term not exceeding eighteen months, or both. Regulation 28

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	IFC Performance Standard 4		It is the Eleven Energy Ltd Ltd. responsibility to avoid or minimize risks and adverse impacts to the health and safety of the local community arising from the project activities.	
Economic and Social Rights	The Constitution of Kenya, 2010 Article 43	The State	Everyone has the right to: a high standard of health and health care services; accessible and adequate housing and reasonable standards of sanitation; adequate food of acceptable quality; clean and safe water in sufficient quantities; social security and education. Eleven Energy Ltd. Can support the government‘s efforts in enforcing these rights by incorporating some of them in its local CSR plans.	
	The International Covenant on Economic, Social and Cultural Rights (ICESCR)		The proponent should support Kenya‘s programmes toward the granting of economic, social, and cultural rights to individuals, including labour rights and the right to health, the right to education, and the right to an adequate standard of living.	

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	IFC Performance Standard 1		Eleven Energy Ltd. Must compensate workers and affected communities or offset for risks and negative impacts generated by the project. Grievances from stakeholders and affected communities must be addressed appropriately. Eleven Energy Ltd. must sufficiently and continuously throughout the course of the project engage the affected community on issues that are likely to affect them.	
Labour/ Employment	The Constitution of Kenya, 2010 Articles 27(1) -(5), 30, 32(3) and 41(1) -(2)(a) The Labour Relations Act, 2007 Sections 5, 76 IFC Performance Standard 2	The State The Labour Ministry	Eleven Energy Ltd. Must ensure that men and women in their employ are treated equally in the workplace, given equal opportunities in the economic sphere. There must not be any discrimination on any ground. Forced labour is prohibited. Labour practices must be fair. Workers must be given fair remuneration; they are entitled to reasonable working conditions and have the right to participate in a trade union and go on strike. There must be a grievance mechanism for workers to raise workplace concerns. Children must not be engaged in hazardous or exploitative labour.	For a trade union, employers' Organisation or federation – a fine not exceeding forty thousand shillings. Section 82

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	**Offences and Penalties**
	The Occupational Safety and Health Act, 2007 Sections 55, 65, 77-80, 82, 83, 89, 101, 102	The Labour Ministry	Eleven Energy Ltd. has a duty to ensure the safety, health and welfare of all its workers at work at the site and in the field environment, including work procedures that are safe. Visitors to the work sites should be similarly protected. The likely emission of poisonous, harmful, or offensive substances such as chemicals or fumes into the atmosphere (e.g. arising from the use or movement of machinery or vehicles) should be prevented, and where they occur, they must be rendered harmless and inoffensive. Machinery, protective gear, and tools used at the project site have to comply with the prescribed safety and health starndards. Dust, fumes or impurities may cause respiratory problems and must not be allowed to enter the atmosphere without appropriate treatment to prevent air pollution or harm of any kind to life and property. Highly inflammable substances must be kept in a safe place outside any occupied building. Where dangerous fumes are liable to be present, Eleven Energy Ltd. must provide a means of exit and suitable breathing apparatus. Means for extinguishing fire must be available and easily accessible, and evacuation procedures must be tested regularly.	

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	**Offences and Penalties**
	The Work Injury Benefits Act, 2007	Directorate of Work Injury Benefits	Employees who sustain work- related injuries and contract diseases in the course of their employment must be compensated.	
	The Explosives Act, Cap. 115 Section 8	The Environment and Natural Resources Ministry	Eleven Energy Ltd. Must obtain a license if it intends to purchase and use blasting materials or convey explosives. The use or transport of explosives, in the working of the project is forbidden, unless an explosives manager has been appointed and the inspector notified in writing. The explosives manager is responsible for the safety and security of all explosives used, transported or stored, until they are handed to the blaster for use. The explosives manager is also responsible for the safety of every person who is working with explosives or in the vicinity of the locality where explosives are being used, whether under his direct supervision or not.	A fine not is exceeding three thousand shillings, and in default of payment, imprisonment for a term not exceeding one year. Section 8

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The Energy Act, No. 12 of 2006 Section 117	The Energy Regulatory Commission	Eleven Energy Ltd must comply with the Kenyan or other approved standards on environment, health and safety, and in conformity with the relevant laws. It must notify the Energy Commission of any accident or incident causing loss of life or personal injury, explosion, oil spill, fire or any other accident or incident causing significant harm or damage to property or to the environment. All Eleven Energy Ltd equipment must conform to the relevant Kenya Standard, and where that does not exist, the relevant international standards approved by the Kenya Bureau of Standards will apply.	A general penalty applies – a fine not exceeding one million shillings. Section 122

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	International Labour Organisation (ILO) Conventions		Freedom of association and the effective recognition of the right to collective bargaining; the elimination of all forms of forced or compulsory labour; the effective abolition of child labour; and the elimination of discrimination in respect of employment and occupation are considered as fundamental principles and rights at work. Eleven energy ltd should abide by these principles.	
Culture and Natural Heritage	The Constitution of Kenya, 2010 Article 44	The State	All people have the right to participate in their cultural life and to enjoy their culture. Eleven Energy Ltd. Should endeavour not to interfere with these rights in any way, but rather respect them.	

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
	The National Museums and Heritage Act, Cap. 216 Section 25	The Ministry for National Heritage and Culture	The Cabinet Secretary may prohibit or restrict access or any development on an open space or on a specified site on which a buried monument or object of archaeological or paleontological interest exists, if, in his/her opinion, it is liable to damage that monument or object. The restriction may include the adjacent area, or a geo-park. A breach of a prohibition or restriction order or a breach of any law made by the Cabinet Secretary in respect of protected areas amounts to an offence. Eleven Energy Ltd. should avoid the use of heavy vehicles and machinery in or close to these areas as they may damage the archaeological, historical or cultural sites.	A fine not exceeding one million shillings or imprisonment for a term notexceeding twelve months, or to both. Section 36
	The Convention Concerning the Protection of the World Cultural and Natural Heritage, Paris, 1972		Eleven Energy Ltd. has the responsibility to protect the host country's cultural and natural heritage of outstanding universal value.	

Environmental or Social Parameter	Legislation/Regulations/ International Conventions	Regulatory Agency	Relevance to Project	Offences and Penalties
Minorities and Marginalized Groups	The Constitution of Kenya, 2010 Article 56	The State	Affirmative action programmes are required to ensure that minorities and marginalized people participate and are represented in all areas of life; are given special opportunities in educational and economic fields, and access to employment; develop their cultural values and practices and have reasonable access to water, health services and infrastructure. These are areas where Eleven Energy Ltd. may be engaged in partnership with the government with regard to its CSR policy.	

4.25. International Conventions

The Kenya Constitution provides that the general rules of international law shall form part of the laws of Kenya, as shall any treaty or convention that she ratifies (Article 2). Kenya has ratified or subscribed to a number of international conventions that relate to the environment within her borders.

Table 4:2: International conventions that Kenya has ratified

	Convention	Entry into force	Date of ratification
1.	African Convention for the Conservation of Nature and Natural Resources, Algiers, 1968 Parties must conserve their natural resources – soil, water, flora and fauna – ensuring that they are used and scientifically developed in a manner that will benefit their people.	16TH June, 1969	12 May, 1969 (accession)
2.	African Convention on the Conservation of Natural Resources (Revised Version) Maputo, 2003 Parties must ensure that developmental and environmental needs are met in a sustainable, fair and equitable manner.	11TH July, 2003	17 December, 2003 (signature)
3.	Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Ramsar, 1971. It provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.	21ST December, 1975	5 October, 1990
4.	Convention Concerning the Protection of the World Cultural and Natural Heritage, Paris, 1972. It establishes a system of collective protection of cultural and natural heritage of outstanding universal value.	17TH December, 1975	1 July, 1983
5.	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington, 1973. It aims at ensuring that international trade in specimens of wild animals and plants does not threaten their survival.	1ST July, 1975	13 March, 1979

6.	Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979. It aims to protect those species of wild animals that migrate across or outside of national boundaries. Parties must protect them, conserve and restore their habitat, mitigate obstacles to migration and control other factors that might endanger them.	1ST November, 1983	1 May, 1999
7.	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Basel, 1989. It aims at protecting human health and the environment against the adverse effects resulting from the generation, management, transboundary movements and disposal of hazardous wastes.	5TH May, 1992	2000 (accession)
8.	Amendments to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Geneva, 1995. The amendment prohibits exports of hazardous wastes destined for final disposal or recycling purposes from Annex VII countries to non-Annex VII countries (Annex VII not yet in force).	5TH May, 1992	9 September, 2009 (acceptance)
9.	United Nations Framework Convention on Climatic Change, New York, 1992. It sets an overall framework for intergovernmental efforts to tackle the challenge posed by climatic change, recognizing that the climate system can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases.	21ST March, 1994	30 August, 1994
10.	Kyoto Protocol to the United Nations Framework Convention on Climate Change, Kyoto, 1997. It sets binding targets for 37 industrialized countries and the European Community as well as for countries undergoing the process of transition to a market economy in order to reduce greenhouse gas emissions.	16TH February, 2005	2005 (accession)
11.	Convention on Biological Diversity, Rio de Janeiro, 1992 It aims at granting the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the use of genetic resources.	29TH December, 1993	27 June, 1994

	Convention	Entry into force	Date of ratification
12.	Stockholm Convention on Persistent Organic Pollutants, Stockholm, 2001. It protects human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically and accumulate in the fatty tissue of humans and wildlife. It requires Parties to take measures to eliminate or reduce the release of persistent organic pollutants into the environment.	17TH May, 2001	24 September, 2004
13.	Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, Bamako, 1991 It binds Parties to take appropriate legal, administrative and other measures within the area under their jurisdiction to prohibit the import of all hazardous wastes, for any reason, into Africa from non-Contracting Parties.	22ND April, 1998	17 December, 2003 (signature)
14.	United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, 1994 It seeks to combat desertification and mitigate the effects of drought through national action programmes and is based on the principles of participation, partnership and decentralization – for good governance and sustainable development.	26TH December, 1996	24 June, 1997
15.	Convention of the African Energy Commission, 2001 It aims to ensure, co-ordinate and harmonise the protection, preservation, development and the national exploitation, marketing and integration of Africa‘s energy resources.	13TH December, 2006	29 December, 2006
16.	Convention for the Protection of the World Cultural and Natural Heritage, 1972 It seeks to have nations co-operate to protect world heritage that is of such outstanding universal value that it is vital to preserve it for future generations.	17TH December, 1975	5 June, 1991

Table 4.3.: Summary of legislations applicable to the proposed project

Legalisation	Institution	Main Purpose	Relevance to the Proposed Project
The EMCA, 1999	NEMA	A framework legislation that addresses major issues concerning the environment. The purpose of the Act is to provide for sustainable management of the environment.	Requires the Proponent to: – Submit EIA Report to NEMA before commencing any new project. – Engage NEMA Licensed expert/firm of experts in conducting EIA studies – The project shall be classified in accordance to second Schedule – Keep accurate records and make annual reports to the Authority describing how far the project conforms in operation with the statements made in the environmental impact assessment study report submitted
Environment Impact Assessment /Environmental Audit Regulations, 2003	NEMA	Provides for the framework for carrying out environmental impact assessment in Kenya	Requires the Proponent to: - prepare EIA Project report in accordance with the format specified in Regulations and pay attention to issues specified in the second schedule of the Regulations - carry out annual environmental audits to check on efficacy of EMP developed in EIA report - carry out corrective measures in the improvement order from NEMA - allow a NEMA inspector to enter the facility for the monitoring the effects of its activities on the environment - mitigate trans-boundary impacts taking into account regional and international treaties.

Legalisation	Institution	Main Purpose	Relevance to the Proposed Project
L.N. 121: Environmental Management and Coordination (Waste Management) Regulations, 2006	NEMA	Formulated for managing various kinds of waste in Kenya	The Regulations requires the Proponent to: - Acquire valid EIA license from NEMA prior to engaging in an activity that can generate hazardous substance - Segregates their waste (hazardous and non-hazardous) by type and then disposes the wastes in an Environmentally acceptable manner. - Contract a NEMA licensed waste handler to collect and disposed-off. - Ensure waste is in a licensed disposal facility. - Label hazardous wastes containers in accordance with the requirements provided in section18 of the Regulation.
L.N. 120: Environmental Management and Coordination (Water Quality) Regulations, 2006	NEMA	Formulated for sustainable management of water used for various purposes in Kenya	The Regulation requires the Proponent to: - Refrain from any activity which might cause water pollution. - Not to discharge any liquid, gaseous or solid into water resource as to cause pollution. - Acquire a valid effluent discharge license to discharge effluent into the environment. - Acquire EIA licence prior to abstracting ground water or any activity that is likely to have any adverse impact on the quantity and quality of the water - follow the monitoring guide set out in the Third Schedule to the regulation when discharging effluent into the environment

Legislation	Institution	Main Purpose	Relevance to the Proposed Project
Legal Notice No.61 of 2009: The Environment Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations	NEMA CGM DOSH	Promulgated for control of Noise and excessive vibration pollution	The regulations: - Prohibits the Proponent from making or causing to be made noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety or safety of others and the environment. - Prohibits the Proponent from making or causing to be made excessive vibration which annoy, disturb, injure or endanger the comfort, response, health or safety of others and the environment - Prohibits the Proponent from causing noise which exceeds any sound level as set out in the First Schedule to the Regulations - Requires the Proponent (if wishing) to operate or repair any machinery, motor vehicle, construction equipment or other equipment, pump, fan air –conditioning apparatus or similar mechanical device or engage in any commercial or industrial activity which is likely to emit noise or excessive vibrations to do so within the relevant levels prescribed in the First Schedule of the Regulations. - Prohibits the Proponent from operating a motor vehicle which produces any loud and unusual sound and exceeds 84 dB (A) when accelerating. - Prohibits the Proponent from operating construction equipment or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to the Regulations. Requires the Proponent during EIA studies to: - Identify natural resources, land uses or activities which may be affected by noise or excessive vibrations from construction or demolition;

Legalisation	Institution	Main Purpose	Relevance to the Proposed Project
			- Determine the measures which are needed in the plans and specifications to minimize or eliminate adverse construction or demolition noise or vibration impacts - Incorporate the needed abatement measures in the plans and specifications. - Prohibits the Proponent from carrying out activities relating to demolitions without a valid permit issued by the Authority
Environmental Management and Coordination (Air Quality Standards) Regulations, 2014	NEMA	Formulated to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air.	The proposed project has potential to impact on air quality. Dust and fugitive emissions from transport vehicles during construction and decommissioning phases and petroleum fumes during operation phase could impact on air quality. In the light of the above, these Regulations prohibit the Proponent from: - Acting in a way that directly or indirectly cause or may cause air pollution to exceed levels set out in the second Schedule to the Regulations - Allowing particulates emissions into the atmosphere from any source not listed in the six schedule of the Regulations - Causing ambient air quality in controlled areas (listed in Schedule Thirteen) to exceed those stipulated under second Schedule. - Allowing emission of particulate matter above the limits stipulated in second Schedule. - Prohibits any person from allowing stockpiling or other storage of material in a manner likely to cause ambient air quality levels set out under the First Schedule to be exceeded.

Legalisation	Institution	Main Purpose	Relevance to the Proposed Project
Building Code	Local Government NCA EPRA	Formulated to provide rules, guidelines and standards to be observed during construction.	The Proponent is required to adhere to the rules, guidelines and standards stipulated in the Code during development of the proposed project
The Public Health Act Cap 242	Ministry of Public Health	The Act regulates activities detrimental to human and environmental health and safety	The Act prohibits the Proponent from engaging in activities that cause environmental nuisance or those that cause danger, discomfort or annoyance to inhabitants or is hazardous to human and environmental health and safety.

Legalisation	Institution	Main Purpose	Relevance to the Proposed Project
The Local Government Act (Cap. 265)	Ministry of Local Government		The Act requires the Proponent to grant the Officers and servants of Local Authority access to their premises to inspect, maintain, alter or repair sewers, drains, pipes, ventilating shafts or other
The Penal Code (Cap. 63)	Judiciary	Formulated to define the penal system in Kenya. It outlines criminal offences and prescribes penalties to them	The Code Prohibits the Proponent from: - Voluntarily corrupting or fouling water for public springs or reservoirs, rendering it less fit for its ordinary use - Making or vitiating the atmosphere in any place to make it noxious to health of persons/institution in dwellings or business premises in the neighbourhood or those passing along public way.
The Occupier Liability Act (Cap 34)	DOSH NEMA		The Act Requires the Proponent to ensure that visitors to his premises will be reasonably safe in using the premises for the purposes for which he is invited or permitted by the Proponent to be there

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

Legalisation	Institution	Main Purpose	Relevance to the Proposed Project
			It is not anticipated that there will be equipment that will generate noise exceeding the threshold levels of noise stipulated under the Rules. However, in case there will, it will be incumbent on the selected contractor to ensure that their equipment complies with the threshold noise values given above. Alternatively the selected contractor will be required to develop, rollout and implement a written hearing conservation program during the project period
Petroleum Act, 2019	EPRA	Enacted to: - provide a framework for the contracting, exploration, development and production of petroleum; - cessation of upstream petroleum operations; - give effect to relevant articles of the constitution in so far as they apply to upstream petroleum operations, regulation of midstream and downstream petroleum operations; and - for connected purposes	This Act and the Energy Act 2019 brings Kenya's legislative framework on energy sector in line with current industry practices. These are meant to give investors, contractors and suppliers the comfort they need to confidently invest in the sector within Kenya. The Act provides that petroleum operations in Kenya will be regulated by the Cabinet Secretary (CS)-Ministry of Petroleum and Mining and EPRA. The Act makes it a requirement to apply for permit before operating any petroleum business

The Petroleum (Liquefied Petroleum Gas) Regulations, 2019	EPRA	Promulgated for Management of LPG Business in Kenya. It covers on import, export, transport, storage, wholesale and retail of LPG	The Regulations requires the Proponent to: - Apply for/obtain licence from EPRA prior to operating bulk LPG storage facility. - Ensure LPG is imported through the import routes prescribed by the East African Community Customs Management Act - Apply for construction permit for construction/installation of bulk LPG storage facility - Ensure that LPG is not loaded to or unloaded from an unlicensed bulk liquefied petroleum gas transport vehicle

Legalisation	Institution	Main Purpose	Relevance to the Proposed Project
KS 1938:2006	KEBS EPRA	Code of practice for handling, storage and distribution of LPG in domestic, commercial and industrial installations Part 3: LPG installation involving storage vessels of individual water storage capacity exceeding 500L	The Standard provides guidelines for: - Design pressure Fire protection - Construction and initial (production) testing of storage vessel - Filling ratio and volumes of storage vessel - Storage vessel location - Installation of LPG storage vessels - Installation of vaporizers - Periodic inspection and retesting; - Electrical equipment and other sources of ignition - Filling point for bulk storage vessel; - Filling of portable containers Container storage areas; - Filling shed for portable containers

5.0. PROJECT SITE BASELINE INFORMATION

5.1. INTRODUCTION

This chapter provides details of the desktop studies and baseline field survey based on the methods outlined in Chapter 3.

5.2. Physical environment

5.2.1. Geology

Generally, the geological setting of the Kenyan coastal zone is characterized by outcrops of Permian-Carboniferous age that about, to the east, the metamorphic rocks of the Mozambique Belt, and to the east, sedimentary rocks of Triassic age. Further east and to the northern border of the coastline, sediments of Tertiary to Quaternary age overlie these older rocks. The project area lies in a passive continental margin that evolved from faulting and subsequent rifting during the breakup of Gondwanaland in the Mesozoic era (Pepper & Everhart 1963).

Jurassic shales and limestones of marine origin known as the Kambe formation are unconformably overlain by the Permo-Triassic sediments. The tectonic history of the Cainozoic in the coastal area is characterized by extensive erosion and faulting removing the older Cretaceous deposits. The rocks present within the project area display the tectonic history and sedimentary origin from the Permo-Triassic age.

5.2.2. Soil

The proposed LPG terminal site falls under Reef coastal plains (Pc8/Pc9) and the area is surrounded by similar soil unit and Coastal Uplands (Uc2). The soils are quite sodic; therefore, the soil structure is usually pulverized during the dry season and susceptible to windborne erosion. Working with heavy machinery during the wet season will require a lot of precaution due to the stickiness and plasticity of the soils. The soils have high to moderate fertility.

The identification of soils is based on the presence of diagnostic horizons and diagnostic properties which are defined by measurable morphological, physical and chemical criteria related to soil characteristics that are the result of soil genesis/formation. The soil units as recognized by FAO-UNESCO legend is presented below (Sombroek et al. 1982). Figure 5.2 presents the soil mapping units of the project area.

5.2.2.1. Soil Sample Analysis

There were six soil samples collected on the project site. This was accomplished by use of a shovel and a scoop. The sampling comprised of surface/ top soil only to a depth of 30cm. The samples were composite and accurate representative samples were collected with this procedure and the same taken for laboratory analysis by Kenya Agricultural and Livestock Research Organization in Nairobi.

From the laboratory analysis the six samples were mainly of medium alkalinity in their Soil PH with the minimum and maximum levels being at 7.92 and 8.40 respectively. The samples had adequate Electrical Conductivity (mS/cm) potential of between 0.20 mS/cm and 0.33 mS/cm and with all the samples exhibiting low Total Nitrogen ranging from 0.05% to 0.15%. The Total Organic Carbon for the samples was low and moderate for four and two samples respectively. For Phosphorus determination under the Phosphorus (Olsen) ppm method testing all the six samples showed low Phosphorus content ranging from 0.1ppm to 1 ppm. Potassium results showed low and moderate levels- four samples showing low and two indicating moderate levels. Magnesium content was either adequate or high with four of the samples indicating adequate levels (1.89-2.83) and two high levels (4.30). As a true reflection of the parent material for the soil formation all the samples showed high Calcium content of between 35.7-38.8. For the rest of the elements analyzed that included Manganese, Copper, Iron, Zinc and Sodium the results were adequate as indicated in the report.

Mapping Unit	**Description**
Uc2	The landform is Coastal Uplands. The soils developed on shales. The soils comprise well drained to imperfectly drained, shallow to moderately deep, yellowish brown to very dark grey, firm to very firm clay. They are classified as eutric Cambisols, vetro-luvic Phaozems and vertic Cambisols.
Pc8	They are developed on raised coral reef limestones with a mixture of lagoonal deposits. They are well drained, deep, dark red to reddish brown, friable, rocky sandy clay loam to sandy clay with a top soil of loamy sand.
	They are classified as rhodic Ferralsols.
Pc9	They are well drained, shallow, dark brown to dark reddish brown, friable, rocky sandy clay loam to sandy clay. They are classified as Lithosols and ferralic Cambisols.

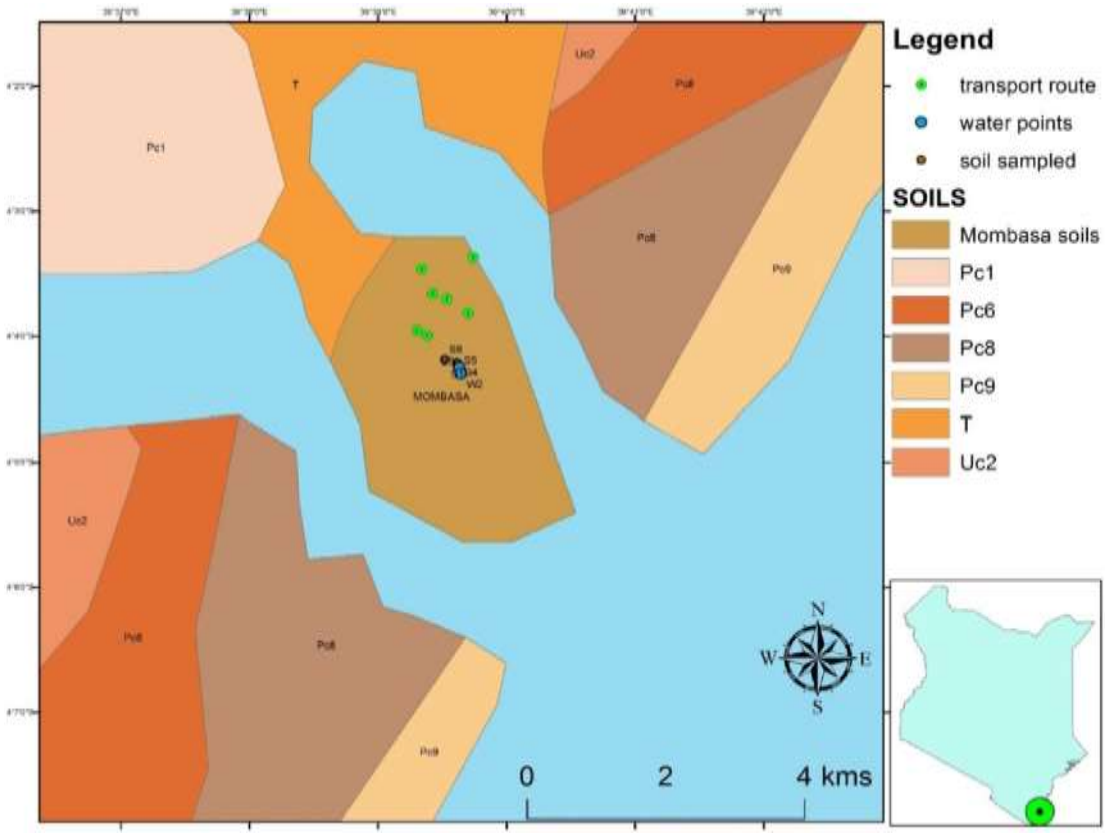


Figure 4: Soil mapping units in the project area

5.2.3. Oceanography

The oceanic currents influencing the Kenyan coast are four. They include the Equatorial Counter Current (ECC), the South Equatorial Current (SEC), the East African Coastal Current (EACC), and the Somali Current (SC). When South Equatorial current reaches the African coast at Cape Delgado, it divides into two currents. The Mozambique Current, which drifts southwards, and the East African Coastal Current, which flows north-eastwards, parallel to the coast.

The Somali currents and the Monsoon winds both influence the distance the East African Coastal Current moves up the East African Coast. During the South-East Monsoon, the EACC joins the Somali Current beyond Malindi and flows northwards to the horn of Africa. Conversely, during the North-East Monsoon the EACC stretches only as far north as Malindi or

Lamu, where it meets the opposing Somali Current, the only current off the coast of Kenya that seasonally reverses its flow. When the two currents meet, they cause outburst, which is believed to be responsible for the high output in the northern Kenyan coast. The highest Sea surface temperatures are recorded during the North-East Monsoon and lowest during the South-East Monsoon, averaging. Seasonal temperature variations decrease with increasing water depth, with temperatures stabilizing at 6–7 °C and 2.5 °C at 1,000 and 2,000m depth respectively.

Salinity variation of the East African Coastal Current waters is low, ranging between 34.5 and 35.4 ppt. This variation is primarily due to heavy rainfall between March and May and the associated terrestrial freshwater runoff, as well as input from rivers. In estuaries and tidal creek systems such as Gazi Bay, Mtwapa, Mwache/Port Reitz and Tudor, there are significant seasonal salinity variations, particularly in the inshore waters. During the dry season, salinity can rise to 38 ppt, while in a rainy season it can be as low as 19 ppt. The Kenya coast experiences mixed semi-diurnal tides, with approximately two tidal cycles every 24 hours. The reference port for tidal observations in Kenya is Kilindini (Port of Mombasa), where the maximum tidal range generally does not exceed 3.8 m.

5.2.4. Water Resources

The main water source for Mombasa County is Mzima springs in Chyulu hills in Taita Taveta County. The others include Baricho, Marere and Tiwi boreholes in the south coast. This supply however is able to meet 65% of the County water demand. The County however has a significant potential in terms of groundwater resources due to its relatively high water table. In the rural areas, there are three springs, water pans and boreholes operated by private investors, NGOs and local CBOs. The exploitation of the ground water resource is however limited due to salinity resulting of seawater intrusion, and is also curtailed by pollution from numerous pit latrines and septic tanks in the town. *(source: baseline survey report on WASH 2015)*

The project site however, lies within the vicinity of the Indian Ocean from which water is generally not abstracted for use on site by the neighbouring industries and facilities. The water from the ocean is used for cleaning of ships docked along the coastline.

5.2.4.1. Ground Water Quality Analysis

The community in the project area utilizes ground water and water from Coast Water Services Board (CWSB) for domestic use and consumption. Two ground water samples were collected from two different locations to assess the quality of water in the project area. The water samples were examined for physio-chemical parameters.

The pH value of the sampled water varies from 7.90 to 7.71 in the two locations, which is within the required standards. Alkalinity level varies between 292 to 320 mgCaCO3/l, which is also within the WHO Standards. Electrical Conductivity levels vary from 4780 to 5200 µS/cm. This is above the permissible WHO Standards of Max 2500. Total dissolved solids ranges from 2963.6 to 3224 mg/l, which is above the WHO and KEBS (KS 459-1:2007) Standards. The hardness values in ground water of the project area ranges between 1140 to 2020 mgCaCO3/l. The hardness values in all location are above the WHO (Max 500) and KEBS (KS 459-1:2007) Standards (Max 300). The levels of Calcium and Chloride in the two samples were also found to be above the WHO and KEBS (KS 459-1:2007) Standards. There was no metallic contamination found in any of the ground water sample of the Project area. Most of the parameters in ground water sample were within the WHO and KEBS (KS 459-1:2007) Standard. In conclusion the two samples were found to be very hard, saline and require treatment before domestic use.

5.2.5. Climate and Air Quality

5.2.5.1. Rainfall

The study area lies in Agro-climatic zones III and IV classified as semi-humid and semi-humid to semi-arid (Sombroek et al, 1982). The average annual rainfall for the zones is 800-1400mm and 600-1100 mm respectively. The climate and weather variations on the Kenyan coast are dominated by the large-scale pressure systems of the western Indian Ocean and the two distinct monsoon periods. This produces a bimodal rainfall pattern with the long rains in March to June with a peak in May and the short rains in October to December/January with a peak in November. Average annual rainfall is presented in the graphs below.

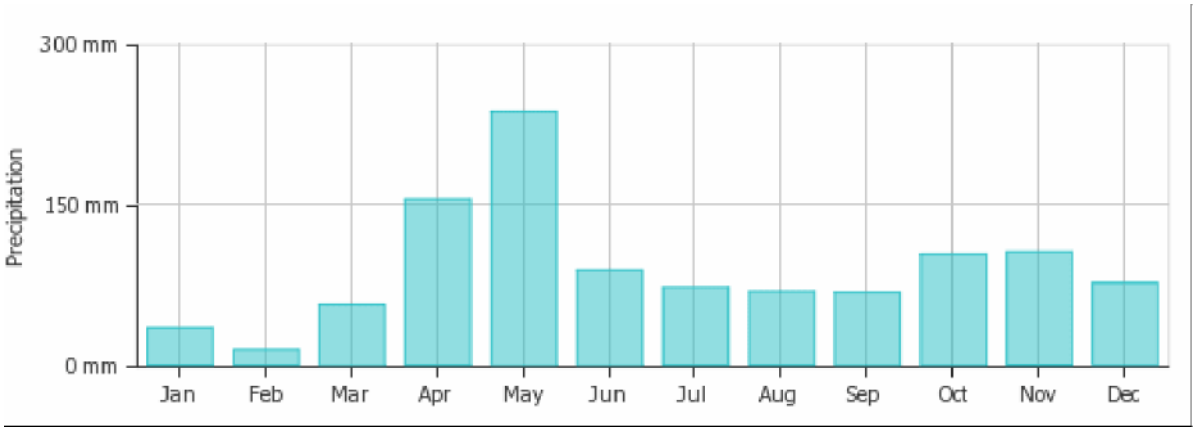


Figure 5.3: Annual Average Rainfall Graph for Mombasa County

5.2.5.2. Temperature

The mean annual temperature for the study area is 28-31 °C making it fairly hot to very hot. The highest temperatures are experienced between March and April and the lowest temperatures between July and August. The graphs below present the annual average temperatures for Mombasa Counties.

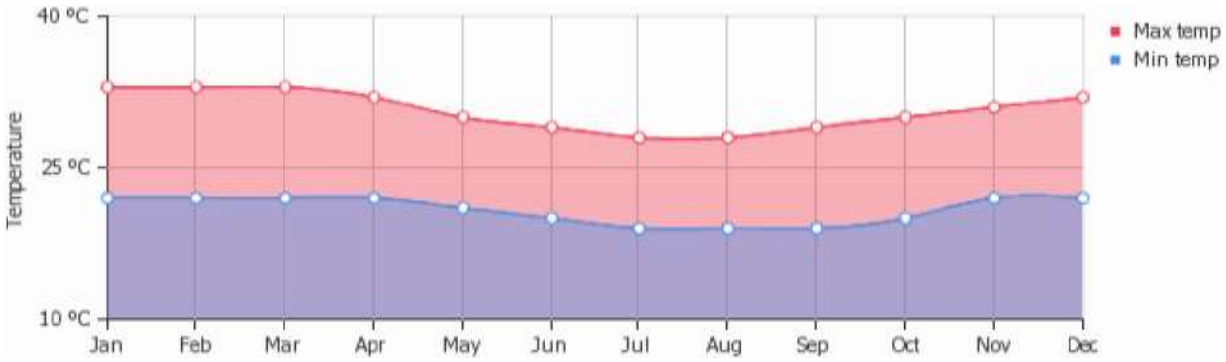


Figure 5.4: Annual Average Temperature for Mombasa

5.2.5.3. Air Quality

The project area is generally densely populated with a number of industries beside the proposed site and residential areas across the ocean, opposite the site. Air pollution is however minimal, caused by vehicles raising dust and emitting exhaust fumes when traversing the area.

5.2.6. Landscape and visual receptors

The study area falls under the Coastal Belt comprising of coastal plains that rise to levels of 140 m and foot plateaus occurring at 140m-600 m above sea level. Since the County is a city, it is characterised by built up areas bordering the Indian Ocean.

5.2.7. Biological Environment

5.2.7.1. Habitat (Flora)

Vegetation characteristic of any area is usually determined by either or a combination of land form, soil, climate, animals and man. Based on the parameters mentioned, the vegetation of the study area is influenced primarily by landform (coastal plain) and associated soil types, climate, man and animals.

There is minimal vegetation on and around the project site since it lies within the industrial zone of Mombasa. On site, there are a number of grass species growing due to long term non-use, and a few trees on site. The species observed include *Azadirachta indica, Casuarina equisetifolia, Cieba pen tandra, Ricinus communis, Plumeria rubra Mangifera indica, Cocos nucifera, thevetia peruviana, Leucaena leucocephala, Terminalia sp,* and *Acacia melifra* and Grass species include *Eragrosti, Cenchru, Cymbopogon spp, Bothriochloa spp. and Heteropogon sp.*

5.2.7.2. Terrestrial Mammals spotted at the Site (Fauna)

The Vervet Monkey is widespread and often abundant. However, it is very patchily distributed over its extensive geographic range, linked to the availability of appropriate sleeping trees and drinking water. During the EIA study few ´*Cercopithecus pygerythrus*[H], or African green monkeys, were seen within the proposed project site. According to IUCN there are no major threats on this specie, although Vervet Monkeys are actively persecuted (shot and hunted) by landowners in areas where they raid crops or interact with humans. In Mombasa Island there are no large scale livestock keeping and none was spotted near the site due to industrial activities however, on the peri-urban places like Likoni few sheep, goats and cattle were spotted.

The Kenyan coast provides a number of habitats for migrating and local birds. In addition to the intertidal areas, especially mudflats, other habitats include creeks, narrow recesses in the coastline subject to tidal movement, estuaries, and salt pans which are small natural depressions flooded only occasionally and filled with salt deposits. The proposed project site had limited

presence of birds due to heavy industrial activities and human settlements. However, few migratory and local bird species such as Black Necked Weaver *´Ploceus nigerimus*" were seen during the study. Others included egrets, crab plovers *´Dromas ardeola*", kingfishers *´Halcyon senegaloides",* and sunbirds *´Anthreptes pallidigaster".* There were also several Indian Crows which are not indigenous to East Africa but lots of them are found in Mombasa especially in dumping sites. The plate below shows Crows in a nearby dumping site in Ganjoni area. These Indian crows were introduced in East Africa intentionally around 1890 in order to control rubbish. Finally the site does not fall in any designated Important Bird Areas of Kenya.

5.2.7.3. Marine and Aquatic Resources

The aquatic flora and fauna are much more diverse at the Kenyan Coast. Some of the identifiable species include prawns *(Penaeus indicus, P. monodon, P. semisulcatus, Metapenaeus monoceros);* crabs (Scylla serrata, Uca spp., Sesarma spp. and Birgus latro); molluscs (oysters such as Brachydontes spp., and *Crassostrea cucullata;* and cockles, *Donax* spp.) The marine faunal species majorly are *Tridacna squamosa, Pinctada margaritifera,* green turtle *(Chelonia midas),* and hawksbill *(Eretmochelys imbricata).* Other fauna include the long-spined sea urchin *(Diadema setosa),* the giant sea anemone, and lobsters among others Seagrasses which are not really grasses but marine flowering plants are also found in predominantly sandy and muddy areas where their roots can penetrate and provide easy anchorage and provide a habitat for a variety of commercially important fish species as well as act as feeding grounds for endangered species such as the green turtle *(Chelonia mydas),* the hawksbill turtle *(Eretmochelys imbricata)* while the Loggerhead *(Caretta caretta)* and the Dugong (Dugong dugon) are classified as Vulnerable. Other endangered species include molluscs such as Tritons Trumpet *(Charonia tritonis*- Rare), Green Snail *(Turbo marmoratus),* Fluted Giant clam *(Tridacna squamosa),* Small Giant clam *(Tridacna maxima),* Pearl Oyster *(Pinctada spp)* and the Spiny Lobster *(Panulirus spp).* Twelve species of seagrass have been recorded from Kenyan waters namely, Cymodocea ciliata, C. *rot unda*ta, C. *serrulata, Halodule uninervis, H. wrightii, Halophila balfourii,* H. minor, H. *ovalis, Syringodium isoetifolium, Zostera capensis, Enhalus acoroides* and *Thalassia hemprichii* with *Cymodocea ciliata* and *Thalassia hemprichii* being the most abundant species in Kenyan waters. The seaweed species occurring along the Kenyan coast can be assigned to one of four groups, conveniently distinguished by their colour - blue-greens, greens, browns and reds. Near the project site on the shores at Mombasa Yacht Club green seaweeds occur in smaller numbers. The green seaweeds are adapted here as they are mainly found in shallow water where they are able to make the best use of sunlight and grow better. They are also highly resistant to changes in salinity and temperature and can cope with the wide range of conditions encountered in the intertidal zone. They include the bright green sea lettuce, with Ulva pertusa growing in continuous sheets while others like Ulva reticulata, are delicately perforated and net-like. The green seaweeds are much sought after by grazing fish and molluscs and are often found at the water‘s edge at low tide.

5.2.7.4. Marine Beaches and Dunes

Marine beaches and dunes occur along the coastal areas and are usually characterized by bare sand dunes. At the project site these features are not available and a small section of the site that borders the Indian Ocean forms part of the project site which was reclaimed. The area is partially grassed with some open areas existing. The project area has no marine beach and dunes activities as it is part of the KPA regulated area and only permitted activities by KPA are allowed in this

area.

Coral reefs exist along most of the Kenya coast as coral flats, lagoons, reef platforms and as fringing reefs. However at the project site there were no coral reefs located nearby.

5.2.7.5. Mangroves

There are 8 species of mangrove trees and shrubs found along the Kenya coast *Rhizophora mucronata, Ceriops tagal, Bruguiera gymnorrhiza, Sonneratia alba, Xylocarpus granatum, Avicennia marina, Lumnitzera racemosa and Heritiera littoralis.* The mangrove swamps along the Kenyan coast cover approximately 53,000 hectares. However, near the proposed project site there were no mangroves trees save for the remnants that were observed on the Likoni shores as in the plate below.

5.2.7.6. Reptiles

On the project site, arthropods, reptiles and other small living organisms including: Odonata (Dragon flies and Damselflies), Isosptera (Termites), Coleoptera (Beetles), Orthoptera (Grasshoppers and Crickets), Diptera (Tsetse flies), Lepidoptera (Butterflies and Moths), Hymenoptera (wasps, ants and bees), and Myriapods (millipedes and centipedes) were spotted. Other species include the lizards and skinks.

5.2.8. Waste Management

5.2.8.1. Solid Waste

The project area is located in an urban setting thus solid waste generation is significant. Owing to this, during the construction phase too, quantities of excavated materials and other wastes such as stones, wood, broken glasses, containers, rods of metal, pieces of iron etc. will be generated which will require disposal in an appropriate and environmentally acceptable manner following strict adherence to NEMA regulations and County Government by-laws. The disposal strategy is based upon the waste management principle of reducing the amount of waste requiring final disposal through the development of outline plans for waste avoidance, material re-use, and recycling. There is also a dumpsite situated along one route to the project site with which the majority of solid wastes include plastic bottles, worn cartons, waste food stuff, and plastic papers amongst others wastes. The dumpsite can be used for disposal after acquiring license/permit from relevant authorities. However, during operation the proponent is advised to put up oil water interceptor tank on one side of the plot which will take care of all runoff from the project site during operation phase before discharge of the same to an approved drainage channel that will be constructed in line with the Physical Planning Act of Mombasa County.

5.3. Ecosystem services

The Ecological Society of America defines ecosystem services as the processes by which the environment produces resources that support human life such as clean water, timber, habitats and pollination. TEEB (The Economics of Ecosystems and Biodiversity 2014), classifies ecosystem services into the following categories:

- **Food:** ecosystems provide the conditions for growing food. The food is derived from managed agro-ecosystems but marine and freshwater systems or forests also provide food for human consumption;
- **Raw materials:** ecosystems provide a great diversity of materials for construction and fuel including wood, bio fuels and plant oils that are directly derived from wild and cultivated plant species;
- **Fresh water:** ecosystems play a vital role in the global hydrological cycle, as they regulate the flow and purification of water. Vegetation and forests influence the quantity of water available locally; and
- **Medicinal resources:** ecosystems and biodiversity provide many plants used as traditional medicines as well as providing the raw materials for the pharmaceutical industry. All ecosystems are a potential source of medicinal resources.

The inhabitants in the peri-urban and rural parts around the project area rely on grass and shrubs as fodder for their livestock. Other raw materials derived from the ecosystem include grass and palm leaves for constructing houses, wood and timber for construction of modern houses and herbs such as Neem tree for medicinal purposes.

5.4. Social, Economic and Cultural Setting

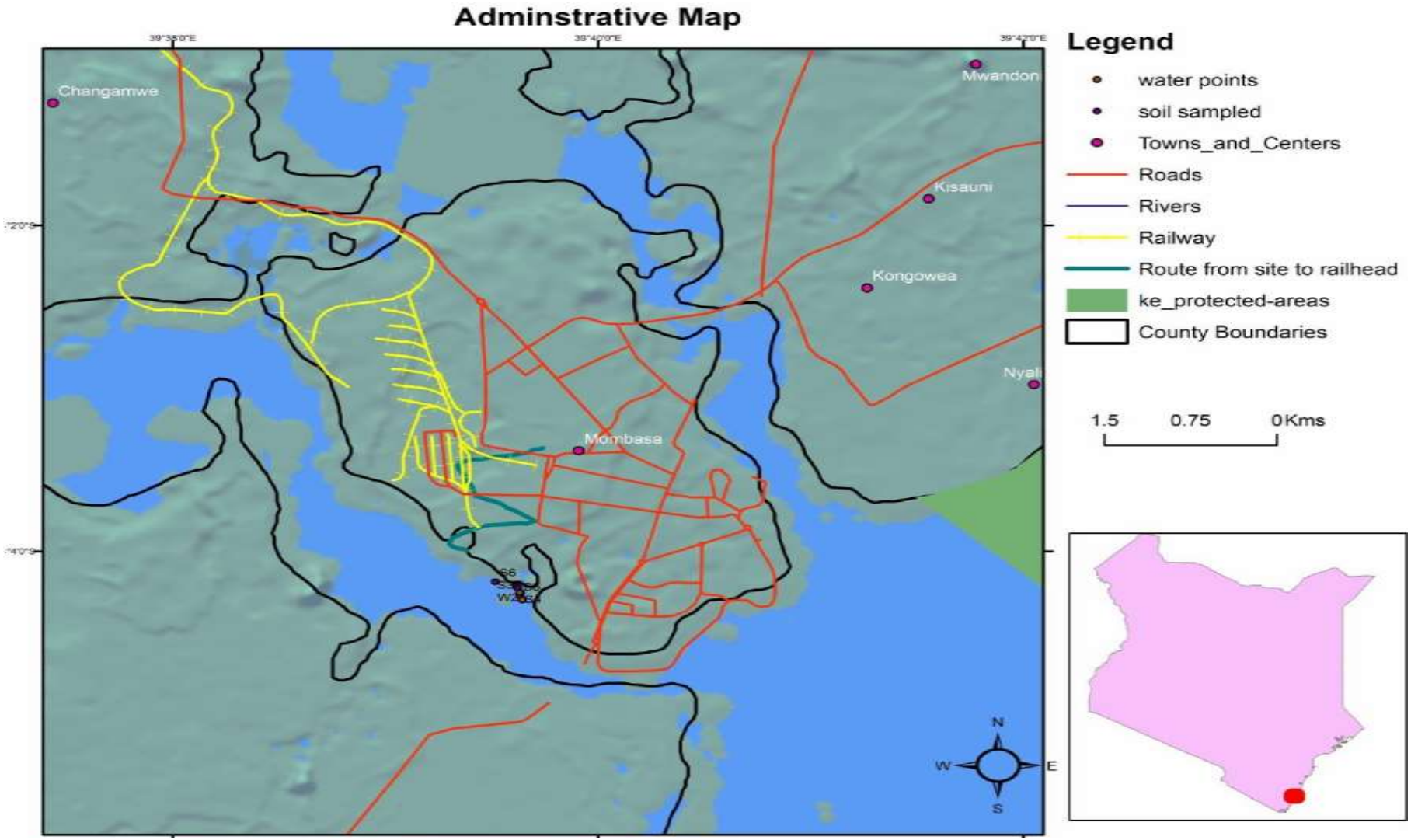
Socioeconomic and cultural assessment is an important component of the Environmental Impact Assessment of any industrial project. It is carried out to help develop the sustainability strategy for the area, where the industrial project would be executed. This section presents the socioeconomic and cultural profile of Mombasa County and analyses the baseline status of the study area. In this report, the socioeconomic aspects discussed include administrative setting, demography, economic structure, education and literacy level and health facilities. Other aspects discussed are transport and communication infrastructure and energy sources in the study area.

5.4.1. Administration

Mombasa County is one of the forty seven (47) counties of Kenya and is located at the heart of the Coastal strip of Kenya. It covers an area of 229.9 sq. km and 65 sq. km of land and water masses respectively (Mombasa County Government: First County Integrated Development Plan, 2013 – 2017). It is situated between Longitudes 39º 34’ and 39º 46’ east and between Latitudes 3o 56‘ and 4o 10‘ south. The county borders Kilifi to the north, the Indian Ocean to the east, Kwale County to the south and Kilifi and Kwale counties to the west. Mombasa town is the second largest in Kenya after Nairobi and is famed for its tourist attractions such as the Fort Jesus, Haller Park and Mamba Village among others. Mombasa is also a transport hub holding the port that serves the East African region.

Administratively, similar to other Kenya counties, Mombasa County has both national and county government administrative structures. It is sub-divided into seven (7) divisions, eighteen (18) locations and thirty (30) sub-locations. In terms of political units, the county has six (6) constituencies namely Changamwe, Jomvu, Kisauni, Nyali, Mvita and Likoni.

Administrative map of Mombasa County



5.4.2. Demographic Information

5.4.2.1. Population Size and Composition

Demography is a very important indicator of environmental wellbeing of an area. It includes population, sex ratio, households, education and literacy levels, population density among others. In this report, demographic features of Mombasa County were assessed based on the population census data of 2009 and the subsequent population projections up to 2017. In Mombasa County, population distribution and settlement patterns are influenced by proximity to key social and physical infrastructure networks such as roads, housing, water and electricity. Other factors that influence settlement patterns include accessibility to employment opportunities and security.

Table 5-4 below shows the county population projection by constituencies. The total population of the county in 2009 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.

5.4.2.2. Population Density and Distribution

According to the 2009 population census, the population density of Mombasa County was 6,131 persons per square kilometre. This was projected to increase to 6,640.5 persons per square kilometre by 2015 owing to high population growth contributed to by the increased numbers of people seeking employment in the manufacturing, service and processing industries, the Port of Mombasa, Kenya Ferry Services, Container Freight Terminals, go downs and hotels.

Densely populated areas of the county are Majengo, Bamburi, Bangladesh, Mikindani, Jomvu, Miritini, Migadini, Port Reitz, Mishomoroni and Bombolulu among others. There also exist a number of settlement schemes in the county namely Mwakirunge, Jomvu-Kuu, Bububu-A, Shika-adabu, Vyemani, Mwembelegeza and Majaoni. In addition, there also exist a number of informal settlement areas inhabited by landless people. They include Mishomoroni, Junda and Kisumu ndogo in Kisauni Sub-county; Shika-Adabu and Ngomeni in Likoni Sub-county and Bangladesh in Changamwe Sub-county.

On the other hand, sparsely populated areas, most of which are found in the outskirts of the county, are Mwakirunge-Maunguja, Mwangala, Mreroni and the Mkupe Jetty area. These areas are least developed in terms of infrastructure such as road network, electricity and water supply. Education and health facilities are also scantly available in these areas making the inhabitants highly prone to poverty and disease incidences. The high population densities in Mvita, Changamwe and Nyali sub-counties is attributed to proximity to key infrastructural developments such as roads, water, electricity and employment opportunities due to the presence of industries and other physical facilities such as the Port of Mombasa and the Moi International Airport, Mombasa.

5.4.2.3. Fertility, Maternal Mortality and Child Mortality rates

According to the Mombasa County Annual Development Plan 2016 – 2017, Mombasa has a fertility rate of 3.3 per cent. This places it among the counties in the country with low fertility rate. Maternal mortality rate stands at 223 while child mortality rate is 115.

5.4.2.4. Birth, Death and Growth Rates

The county's crude birth rate is 37.1 per cent while crude death rate stands at 8.9 per cent with a growth rate of 28.2 per cent.

5.4.3. Infrastructure

5.4.3.1. Transport Network

a. Roads and Railway

There are a total of 257.17 kilometres of bitumen surface roads, 127 kilometres of gravel surface roads and 91.29 kilometres of earth surface roads in the county. Main classified roads include Mombasa - Nairobi Highway (A109), Mombasa - Malindi road (B8) and Likoni – Lunga Lunga Road A(14) connecting Kenya and Tanzania. Others include; Airport road (C110), Mbaraki - Shimanzi road (C114) and Mtongwe road (C109). While the major roads are in a fair condition, access roads within the residential and industrial areas are in deplorable state.

The situation is worsened by the poor storm drainage systems most of which is dilapidated. The roads are maintained by the national government through Kenya Rural Roads Authority (KeRRA), Kenya Urban Roads Authority (KURA), the Kenya National Highways Authority (KeNHA) and the county government. KeNHA is responsible for classified national trunk roads (class A, B and C roads) while KURA, KERRA and Mombasa County government are responsible for roads in the urban areas, access roads to estates and other settlement areas.

The Dongo-Kundu by-pass is expected to ease congestion at the central Business district, as traffic from Nairobi to South coast shall be diverted at Miritini towards Likoni and Diani. The residents of the coastal city largely use matatus (mini-buses) to move around the city and its suburbs. Tuk-tuks (three wheelers) are also widely within the city. The project site has a good accessible road of bitumen standard.

Mombasa has approximately 10 kilometres of railway line and 3 railway stations operated by Rift Valley Railways (RVR) offering cargo services between Mombasa and Nairobi and the new Standard Gauge Railway (SGR) Station located in Miritini operated by the Kenya Railways. The SGR currently offers quick daytime passenger services between Mombasa and Nairobi and vice

versa. The county government of Mombasa envisions having light commuter rail within the city in the long run.

b. Harbour and Airport

The port of Mombasa, the largest in Kenya, 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. In 2012, dredging was undertaken with a view of deepening the Likoni channel to facilitate usage of the port by larger vessels. Currently, the port has 19 deep-water berths with two additional berths nearing completion and two oil terminals.

Rail connects the port to the interior. There is no bridge between Mombasa Island and south coast; instead the distance is served by ferries operated by the Kenya Ferry Service from Kilindini and Mtongwe to Likoni in the south coast of Mombasa.

Moi International Airport serves the city of Mombasa. It is located in Port Reitz area on the mainland metropolitan area. Flights to Nairobi and other Kenyan, European and Middle Eastern destinations depart from the airport.

5.4.3.2. Communication Network

Telecommunication 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.

5.4.4. Energy sources

A number of industries and residential places in Mombasa town are connected to electricity supply by Kenya Power. Apart from electricity 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.

5.4.5. Water for Domestic Use

The reticulated water supply system in the county is owned and managed by Mombasa Water and Sewerage Company. This water supply comes from Mzima Springs in Taita Taveta County, Marere and Sabaki/Baricho in Kilifi County and Tiwi Boreholes in Kwale County. It is estimated that the water supply only meets 65 per cent of the county‘s water demand.

5.4.6. Livelihoods and Economic Activities

The formal sector in Mombasa County provides majority of employment. Major employers include the hotel industry, shipping industry, the government of Kenya, and various private institutions and businesses. In the financial sector, the county boasts of over thirty eight (38) banks and a host of microfinance institutions operating in various parts of the county.

5.4.7. Education

Literacy levels in the county of Mombasa are relatively low at 86.3 per cent. The net enrolment ratio in early childhood development centres, primary and secondary schools is 57.4%, 81.1% and 32.5% respectively. The education sector in Mombasa County currently faces challenges such as inadequate school physical infrastructure, for example, classrooms, desks, laboratories and inadequate staffing. Mombasa has one level five hospital, that is, Coast General Hospital, which also doubles as a referral facility serving the entire coast region and two level four hospitals, that is, Port Reitz and Tudor Hospitals. Additionally, Mombasa County has over thirty five public dispensaries and health centres, eighteen clinics and four special clinics. In the project area health services are obtained mainly from Ganjoni Clinic and Seaside Hospital. Health sector in the county faces such challenges as inadequate health personnel as the doctor to patient ratio stands at 1:11,875 while the nurse to population ratio is 1:18,678 way much lower than the World Health Organization's recommended doctor to patient ratio of 1:600 and nurse to patient ratio of 1:500.

5.4.8. Land Tenure and Settlement Patterns

Land tenure regimes in Mombasa County are public, private and community owned. Within the private ownership, tenancy-at-will regime is found. As a result of the rapidly growing population, the county has witnessed a high rate of urbanization and mushrooming of informal settlements such as Bangladesh, Magongo, Likoni, Longo, Kisauni, and Bamburi among others. The project location site is found within an industrial zone and in close proximity to Liwatoni and Ganjoni residential areas.

5.4.9. Heritage Sites

Mombasa being an ancient town is a centre of coastal tourism in Kenya. It hosts several tourist attractions including world heritage sites such as the Fort Jesus among other tourist destinations such as the Haller Park, Mamba Village etc. Tourism facilities are available in Mombasa in abundance. There are over 201 registered hotels and lodges. The Nyali, Bamburi, Shanzu, Shelly, Tiwi, and Diani beaches provide several luxury hotels for revellers.

6.0. STAKEHOLDER ENGAGEMENT AND PUBLIC PARTICIPATION

6.1. Introduction

Stakeholder engagement can be described as an organization‘s efforts to understand and involve stakeholders and their concerns in its activities and decision-making processes.[2] Stakeholders are defined here as any group or individual who can affect, or can be affected by, an organization or its activities, including employees, community groups, environmental non-profit organizations, customers and others. The overall purpose of stakeholder engagement in this project is to drive strategic direction and operational excellence for the proponent. Done correctly, engaging stakeholders can result in learning, innovation, and enhanced performance that will not only benefit the proponent, but also its stakeholders and society as a whole. In addition to serving as a key tool to support a facility‘s sustainability reporting efforts, stakeholder engagement is a foundation that supports a facility‘s broader sustainability efforts to set strategic goals, implement action plans, and assess its performance over time.

Public participation is essentially concerned with involving, informing and consulting the public in planning, management and other decision-making activities. Public participation tries to ensure that due consideration is given to public values, concerns and preferences when decisions are made. It encompasses the public actively sharing in the decisions that government and other agencies make in their search for solutions to issues of public interest.

The main objectives of the consultation were to:

- Inform the public and key stakeholders about the proposed project and activities that will be undertaken;
- Seek views, concerns and opinions of people in the area concerning the project;
- Incorporate the views, concerns and proposals of community members, and other stakeholders on their expectations from the project activities;
- Establish if the local people foresee any positive or negative environmental effects from the project and if so, how they would wish the perceived impacts to be addressed; and
- Obtain socioeconomic information about the project area.

6.2. Methodology

Public participation was mainly achieved through direct interviews, observations and questionnaire administration. Traditionally the tool used to collect information is the administration of open ended questionnaires where the respondent is free to comment on issues at own thinking. After individuals complete the questionnaires individually and the expert finds some divergent and conflicting responses, usually Focus Group Discussions are held only on the conflicting ideas for the respondents to discuss the contentious issues and come to an agreement by themselves after informing each other.

Stakeholders were identified and Key Informant interviews carried out. Two public consultation meetings were carried out in Chaani areas to gather information on concerns regarding the proposed project. Questionnaires were then administered. For the study reported here interviews were conducted individually on a pre-set open ended questionnaire to collect the views of various stakeholders. Respondents were selected among the communities surrounding the proposed project site on both sides of the ocean. All the stakeholders accepted to respond.

The following is a detailed discussion of public consultation methodology used by the ESIA team:

6.2.1. Key Informant Interviews

Key Informant interviews were used to get responses from key stakeholders in the project area. Their comments were sought through engaging them in discussions about the proposed project and associated activities.

6.2.2. Questionnaire administration

Questionnaires were uniformly distributed to the sampled residents. The neighbours were informed of the proposed project and requested for their views concerning the project. They were used to capture their views in terms of the positive and negative impacts that they anticipate the project and the mitigation measures.

6.2.3. Issues and concerns raised

Tables below summarize the expectations, concerns and the mitigation measures that were discussed during the key informant interviews, stakeholders‘ consultations and public meetings.

Table 6:2 Summary of Issues/Concerns raised by members of the public, Expectations and Mitigation Measures

Expectations (Positive Impacts)	Concerns (Adverse Impacts)	Proposed Mitigation Measures and Recommendations by the Stakeholders
- Increased Employment opportunities to the residents during construction and operation phases. - Increase in cheap and affordable gas supply which will alleviate the overdependence on charcoal use. - Improve both county and national economy and act as a source of revenue collection. - Infrastructure upgrades especially the roads leading to the facility. - Increased Corporate Social Responsibilities within the area.	▪ Production of toxic/pungent gasses that may affect area resident's health. ▪ Air and dust pollution which may cause respiratory ailments to local residents. ▪ Interference with ocean stability thereby affecting marine life and fishing activities ▪ In case of gas leakage, fire incidents and explosions may affect the entire area causing massive property destruction and loss of life. ▪ Traffic snarl-up during construction and operation phases in the area. ▪ Noise pollution during construction and operation. ▪ Ecological system will be disrupted during construction phase hence displacement of flora and fauna in the project site is expected. ▪ Security of the surrounding area will be jeopardized. ▪ Long exposure to petroleum	- Put appropriate mechanisms to prevent environmental hazards - Put leakage detection mechanism in place to help in minimizing fire incidents. - Stabilize the area soil to avoid soil wash into the ocean. - Ensure CSR activities are aimed at improving Hospitals and Roads within the area. - Ensure project site is fenced off to avoid intrusion by non-authorised persons. - Ensure workers to the site are well trained and are always under strict supervision either by private environmental health and safety monitor or out sourced inspectors e.g. from NEMA. - The plant must be fitted with adequate safety and monitoring control devices and operated by competent persons with strict time frame maintenance. - Ensure constant education and public awareness of the project activities and its impacts to the residents. - Ensure registered waste handler is contracted to collect waste from the site for appropriate disposal in the designated dumping sites. - Ensure that exposed excavated soil heaps are covered and dampen to reduce dust emission. Similarly ensure that, the exposed soil surface

	products may cause different types of cancers to nearby residents. - Production of solid waste during the operation and construction phases. - Soils wash as a result of construction. - Water pollution due to oil spills. - Risks of accidents caused by heavy tankers transporting the LPG containers.	is compacted and re-vegetated either by grass or ornamental flowers. - Liaise with Mombasa traffic department to help ease traffic congestion on the access roads. - Install oil traps to prevent accidental oil spills from contaminating the ocean waters. - Build strong fire-walls which can withstand heat for long enough and ensure firefighting equipment‘s are installed. In addition, put up a robust firefighting station near the project site to curb fire accidents In case of any. - Ensure engineering design of the containers is of international standards and are air tight. - Put up Emergency Health Facility near the project site as part of CSR. - Install state of the art air cleaning filters to disperse pungent smell into the atmosphere.

7.0. PROJECT ALTERNATIVES

7.1. Introduction

IFC Performance Standard 1 (Assessment and Management of Environmental and Social Risks and Impacts) (´PS1μ) requires an assessment process that identifies the risk and potential impacts associated with a project. Specifically, ´the process may comprise a full scale environmental and social impact assessment, a limited or focused environmental assessment or straight forward application of environmental siting, pollution standards, design criteria or construction standardsμ

PS1 states that for developments or large expansions with specifically identified physical elements, aspects and facilities that are likely to generate potential environmental or social impacts, the client conducted a comprehensive ESIA, including an examination of alternatives, where appropriate.

This section presents an overview of the alternatives considered as part of the ESIA study. With a view of shedding light of the proposed project‘s impacts on the existing environment and at the same time achieve its objectives; available alternatives were sought in line with the requirements under ESIA regulations and Environmental Management and Coordination (Amendment) Act of 2015 (EMCA). In this analysis, alternatives were considered on the following basis:

- Site
- Technology
- Flora
- Aquatic organisms and Ichthy of fauna (aquatic biota)
- Fauna (especially birds and mammals)
- Integral environmental vulnerability of adjacent marine areas
- Landscape and soil cover
- No project alternatives

In addition, consideration was also given to the following criteria:

- The presence of specially protected environmental zones
- The availability and accessibility of existing infrastructure

7.2. Alternatives to Site

The Proponent has only one proposed site for the construction of the LPG import terminal for the storage and distribution of LPG. The site is located near Kenya Ports Authority not far from

petroleum products pipeline. The setting up of the LPG import terminal on the said plot is welcomed as the proponent plans to deliver the products by ship and employ use of Kipevu Oil Terminal Jetty to discharge LPG to the proposed LPG bulk storage tanks. 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 appropriate development land whose access to Common User Manifold is easy. Close proximity of the proposed site to Mombasa Port reduces the risks and costs of reticulating LPG to depots. The site is currently vacant and is bound by MICD Freight & logistics, Kengen, Multiple hauliers & China road networks yard. 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.

7.3. Alternatives of Technological Options

LPG 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 LPG storage vessel. Eleven energy Limited intends to use ISO Certified tanks sizing is 6.05m (20ft) long, 2.4m wide and 2.55m high in storing and transportation converse to pipeline. Transportation from the terminal will be through large road tankers by road and when the railway line passing near the site will be modernized, the proponent will transport LPG in tanks to rail heads. I.e. Kenya Railways.

The technology involved will enable vapour displacement from the storage tanks of the LPG 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.

7.4. No Project Alternatives

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 Kenyan Public and both the County and the National Government of socio-economic and environmental advantages detailed in positive impacts during operation sections of this report. Key advantages include;

- Constant availability and reliability of fuel for lighting and energy home use
- Reduced expenditure on LPG importation
- Limiting illegal vending of unlicensed natural gas.
- Secure supply of natural gas will provide the country with an environmentally friendly source of energy

Whereas the No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

The economic status of the nation and the local community will deteriorate;

The full regional economic potential will not be exploited;

- Poverty levels will remain high;
- No employment opportunities will be created for local populations;

Despite few risks associated with LPG were identified, these risks are manageable and therefore the ´No Action Alternative is not justified

7.5. Waste Management Alternatives

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

7.6. Proceeding with the Proposed Project with Mitigation Measures

This option is the preferred option and it entails carrying out the proposed construction of LPG storage facility with the detailed mitigation measures in chapter eight (8) to prevent, offset, or avoid any negative impacts thereby maximizing it gains. This option would therefore lead to achieving the sectoral lead agencies policies, goals and objectives of vision 2030.

8.0. IMPACT IDENTIFICATION

8.1. Introduction

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

8.2. CONSTRUCTION PHASE IMPACTS

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

8.2.1. Geology and Physiographic Impacts

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

8.2.1.1. Mitigation measures

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

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

There potential geological and physiographic impacts during construction are generally low

8.2.2. Soil Erosion and Pollution

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

8.2.2.1. Mitigation measures

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

Severity of impacts are localized with low intensity and expected to be **low and short-lived.**

8.2.3. Delivery of LPG Vessels by Sea

The LPG Vessels shall be imported by barge/ship in complete units, received at the Eleven Energy Limited site's private berth, driven to receiving rails by Self Propelled Modular Trailer (SPMT) and skidded into final position. This method of transportation and installation is well tested for fabricated units of this scale.

It is anticipated that the entire delivery and installation process should take 3 to 4 days (for all vessels), with fully supervised shifts working 24 hours. A preliminary check of the structural capacity of the private berth wall has been undertaken and it is anticipated that no traffic should be encountered.

8.2.3.1. Mitigation measures

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

The impacts of delivery of LPG vessels and accessories by sea is assessed as low.

8.2.4. Noise and vibration

- ✓ Construction workers within the site
- ✓ Personnel on adjacent property closest to the noise source; i.e. MICD, Trans trailer Kengen, Tsavo power, Kenya among others.

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

All construction activities will be of a temporary nature. It is anticipated that the piling will be

undertaken over an 8 to 12 week period.

8.2.4.1. Mitigation Measures

It is not possible to avoid the construction techniques above, however the following mitigation measures are proposed to reduce the impacts.

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

The potential noise and vibration impacts during construction are therefore assessed as low.

8.2.5. Air quality

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

- ✓ Dust generated during the earthworks, mud on roads
- ✓ Exhaust gases from the operation of heavy plant can be a potent source of NOx, CO, PM and other pollutants Impact receptors will be:
    - Construction workers within the site
    - Personnel on adjacent properties closest to the noise source.

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

8.2.5.1. Mitigation Measures

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

- ✓ For potentially dusty earth works operations, construction workers to be enclosed within ventilated cabs or provided with facemasks for potentially dusty earth works operations.
- ✓ 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
- ✓ Construction plant will be maintained in good running order; all vehicles should comply with the requirements of Road Traffic Act and its subsequent regulations for emission control.

The potential air quality impacts during construction are therefore assessed as **low.**

8.2.6. Water Usage

It is assumed that all potable/fresh water requirements during the construction stage will be met through bowsers provided by Coast Water Services Board (CWSB), or a temporary CWSB connection to feed the site compound.

Potable and fresh water will be provided for the welfare of construction workers, for wash-down of equipment and for damping down of earthworks to reduce dust. These requirements will be commensurate with efficient construction practices. A considerable volume of water will be required for the hydro-testing of the pressure vessels. It is proposed that this will be pumped directly from the sea into the clean vessels. Following testing, the uncontaminated water will be discharged to the sea. Seawater may also be used for damping down during earthworks operations.

8.2.6.1. Mitigation Measures

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

Therefore potential potable water usage impacts during construction are therefore assessed as **low.**

8.2.7. Energy Usage

It is assumed that all electrical requirements during the construction stage will be met through

on-site generators or a temporary Kenya Power connection to feed a site office. It is in the contractor‘s interests to ensure that fuel consumption is reduced to a minimum and commensurate with efficient construction practices.

8.2.7.1. Mitigation Measures

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

Therefore, potential energy usage impacts during construction are therefore assessed as **low.**

8.2.8. Road Traffic

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

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

Impact receptors will be:

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

It is estimated that a peak of approximately 20 HGV movements (each way, to and from site) per day will be necessary during the earthworks activities. In the context of the adjacent port and industrial operations, it is considered that these additional HGV movements will have a low impact on the intensification of vehicular traffic on the existing road system.

The likely increase in HGV movements during peak construction (8 to 12 weeks) will therefore amount to minimal compared to the existing situation. This impact is therefore assessed as negligible and it is proposed that a full Traffic Impact Assessment is not necessary.

Road users which are likely to be most affected by the construction traffic are MICD, Makupa shed and Transtraillers, however the Site activities themselves will be well confined and it is

proposed that close liaison with these parties will avoid any significant nuisance.

8.2.8.1. Mitigation Measures

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

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

Potential road traffic impacts during construction are therefore assessed as **low.**

8.2.9. Impacts on Terrestrial Biodiversity

Construction activities at the project site will require stripping of top soils and clearance of few trees, shrubs and vegetation where the facilities will be located. Although minimal, few floral species mainly *Azadirachta indica* and *Mangifera indica* as well as *leuceana spp* species will be cut to pave way for new facilities. The project site has no rare or scarce plant species, the vegetation consists mainly grasses and common shrubs. In addition, the Site lies largely on reclaimed land with the surface material comprising 100% fill material with no landscaped features of any kind; it is therefore determined that, there is negligible impact to terrestrial biodiversity.

8.2.9.1. Mitigation Measures

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

8.2.10. Water Quality

During construction poor maintenance and operation of heavy trucks and equipment might lead to oil and fuel spills at the construction site which may contaminate land and surface water resources in the area. Other sources include; Silt load run-off due to surface erosion particularly during earthworks activities and fuel storage and re-fuelling of vehicles, liquid bitumen from asphalt surfacing.

The Site is also located centrally within the main industrial area of Mombasa County. Recently the southern portion of the project site was extended further seawards by the construction of the private berth and the reclamation of more land. Hence the immediate marine ecosystem is not considered to be of a 'sensitive' nature. However, In order to minimise the risk of reduced water quality during construction stage the following measures will be adopted.

8.2.10.1. Mitigation measures

- Earthworks activities shall be halted when rain conditions are such that excessive erosion and silt loaded run-off noticed.
- The construction programme will avoid excessive exposure of bare earth surfaces which may be more prone to erosion.
- If appropriate, settlement lagoons can be used to allow silts to be retained prior to discharge of run-off to the existing drainage channels or direct to sea;
- Care will be taken to avoid excessive mud being transferred by construction plant to the access roads and public highway. Where this is likely to become a nuisance it will be cleared by the Contractor.
- Consideration will be given to undertaking routine maintenance of plant and vehicles off-site in a properly equipped workshop

- All haulage vehicles shall be maintained in good running condition and should comply with the requirements of Road Traffic Act.
- Existing drainage channels to be cleared of silt / debris and trash screens installed if appropriate.
- Used oil interceptors shall be installed to trap any accidental leakages.
- All effluent shall be treated before discharge to any sewer line

8.2.11. Solid Waste

Construction activities will lead to solid waste generation mainly from Non-degradable and non-toxic materials: Such as Plastic and metal packaging materials, excess concrete from ready-mix deliveries, Metal off-cuts from trimming reinforcing bars and pipes to length. Whereas Degradable and non-toxic: shall be generated from food wastes, Papers, cardboard and timber packaging materials and this will lead to an increased load on the municipal/County waste authority.

All options will be considered in avoiding or minimising transporting any unsuitable excavated materials from site, as this is undesirable from both an ecological and economic perspective. The quantity of material for disposal will be determined by further soils investigation and testing. The identification of a suitable reclamation area or dumping ground will be through further discussions with the KPA in consultation with the County Government of Mombasa and will of course be subject to appropriate licensing. A location close to the Site will be preferred.

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

8.2.11.1. Mitigation Measures

- The contractor shall put in place a waste management plan aimed at minimising the production of all wastes.
- Where possible measures will be put in place to recycle materials such as metal off-cuts, some plastics and clean paper/cardboard utilising existing specialist recycling firms in Kenya.
- A suitable location within site for placing excess concrete and washing down equipment will be agreed with no discernable impact.
- Non-recyclable materials will be segregated and stored in plastic bins, collected and

disposed of through the municipal waste system.

- Provide disposal bins at designated areas at the project site to help in waste segregation to encourage recycling.
- Enforce regular collection and disposal of garbage by the project contractor through licensed NEMA waste handler
- Clean storm water drains to minimize clogging

Potential impacts due to the generation of solid wastes during construction are therefore was assessed as being **Low.**

Potential impacts due to the possible spread of unsuitable excavated materials will be assessed when the quantity and location is known. However, it is reasonable to assume that measures can be put in place to ensure that high impacts are avoided, with a resulting impact being either low or moderate.

8.2.12. Foul Smell

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

8.2.12.1. Mitigation measures

- Firm measures will be enforced to ensure that construction workers do not foul areas surrounding the site.
- The sewerage will be collected and treated via an on-site septic tank and leaching field, with arrangements in place for periodic de-sludging and disposal using a licensed carrier by County Government of Mombasa and NEMA.

Potential impacts due to the generation of foul effluent during construction are therefore assessed to be **Low.**

8.2.13. Landscape and Visual Environment

Construction activities such as clearing of top soil and few shrubs, transportation of earth moving materials/equipment to the site and construction of the storage mounds will have insignificant impact on aesthetic values of the area. In addition the size of the LPG mound is considerable (21 m high, approx. 90m x 75m base).

Whilst the proportions of the mound are large, they are not dissimilar to many of the industrial buildings within the port. As the sides of the mound will be concrete clad, this may from a distance appear ‘building like‘. It is considered that existing port structures will continue to dominate the skyline.

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

8.2.13.1. Mitigation measures

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

8.2.14. Occupational Accidents

Construction workers are prone to accidents resulting from construction activities. These accidents may have acute or chronic impacts depending on nature, severity and intensity. In this regard, construction and mobilization activities of the proposed LPG storage facility would result into accidental injuries and hazards which can negatively impact the workforce. Because of the intensive engineering and construction activities including erection and fastening of roofing

materials, metal grinding and cutting, concrete work, steel erection and welding among others, construction workers will be exposed to risks of accidents and injuries. At times, such injuries may be from accidental falls from high elevations, injuries from hand tools and construction equipment cuts from sharp edges of metal sheets and collapse of building sections among others.

8.2.14.1. Mitigation Measures

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

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

8.2.15. Employment opportunities

Construction of the storage terminal will have substantial labour benefits to the county. Labour required from the local workforce is estimated to be 200,000 man hours. It is therefore concluded that the provision of employment opportunities during construction will therefore provide a positive socio-economic impact.

8.2.16. Impacts on Security

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

8.2.17. Income Generation among Suppliers

During construction phase, the proposed project plan to import construction materials from overseas countries and also source locally available materials such as cement, iron sheets, steel bars, pipes, etc. from the local market. This demand therefore, will create market for local people in Mombasa and/or elsewhere in the country engaged in supplying construction materials leading to significant positive economic benefits to suppliers in Mombasa.

8.2.18. Increased STDs and HIV/AIDS Cases

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

8.2.19. Informal Business Growth

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

be buying food from them.

8.2.20. Impact on surrounding social facilities

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

8.3. OPERATIONAL PHASE IMPACTS

The impacts of potential increases to future production of downstream LPG bottling plants is outside the scope of this assessment.

The global impacts of increased local consumption of LPG are also outside the scope of this assessment.

8.3.1. Soil Erosion

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

8.3.1.1. Mitigation

- Minimal earthworks to be undertaken during rehabilitation,
- Restore all the sites that were damaged during rehabilitation,
- Have appropriate soil stabilization measures adopted on the site,
- All storm water should be drained separately and not allowed into the pits

8.3.2. Marine and Aquatic Environment

The impact sources from the project operations will include mobilization of equipment and machinery, construction wastes, oil leakages and storm water. These potential sources might

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

8.3.2.1. Mitigations Measures:

- The project site is in a KPA regulated area with limited activities permitted,
- LPG Vessels/storage tanks utilized for the activity are not allowed to leak or discharge content
- All equipment, vehicles and machinery should be sanitized prior to mobilization to the project site to avoid transfer of invasive/alien species and remove bio fouling
- All project activities should be located away from shores of the Indian Ocean, sea grass beds, coral reef areas, productive shallow water areas and any other environmentally sensitive area;
- All sewage and putrescible wastes should be handled and disposed-off in accordance with EMCA Waste management regulation, 2006
- Garbage Management Plan should be put in place detailing wastes generated and disposal requirements. There should be no discharge of plastics or plastic products of any kind from vessels to the aquatic environment
- All storage facilities and handling equipment will be in good working order and designed in such a way as to prevent and contain any spillage as far as practicable
- All solid, liquid and hazardous wastes (other than sewage, grey water and putrescible wastes) should be compacted and stored in designated areas and sent onshore for recycling, disposal, treatment or appropriate final disposal;
- There should be Correct segregation of solid and hazardous wastes

- Used motor oil and filters from vehicles and generators should be properly disposed-off; and
- A log of any chemicals and motor oil disposed should be maintained. This should include the quantity disposed and the disposal location

8.3.3. Noise

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

The number of LPG ship movements is expected to increase along with the maximum size of vessel up to 25,000DWT. This noise impact generated by these vessels should be considered in the context of the existing port operations at both Port Reitz Container Terminal and Kipevu Oil Terminal. At both locations the average vessel size is considerably larger and the number of ship movements greater by a significant amount. In addition the activities of the offloading cranes and stacking vehicles generate noise. Due to the fact that there is no mechanical handling operation during import, and the pumps will generate little noise, the LPG berthing and offloading activities are significantly quieter than the container terminal or KOT.

Adjacent properties are of an 'industrial' nature and may therefore be considered of limited sensitivity, especially where heavy plant or noisy processes are in operation (i.e. tipping of coal, fabrication etc.).

8.3.3.1. Mitigation Measures

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

Potential noise impacts during operation are therefore assessed as **low.**

8.3.4. Air quality

There are no venting scenarios anticipated during normal operation of the proposed facility, including offloading of LPG carriers. Vapour displaced from the storage tanks of the LPG

carriers is fed back to the mound (and vice-versa) as a closed system to prevent major pressure changes between the LPG in storage at the mound and ship.

There are no venting scenarios anticipated during normal maintenance. The facility utilises LPG compressors to recover liquids and vapours from the LPG Terminal between valve isolations. Vapours are compressed and liquefied and then returned to any remaining active storage or export to a ship if necessary.

'Stenching' (or odorising) of the LPG product does not take place at the proposed facility, therefore the risk of odour nuisance from spills is eliminated.

In the unlikely event of a LPG release dispersion of a liquid LPG release to below its Lower Explosive Limit is neither toxic nor polluting.

8.3.4.1. Mitigation Measures

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

- 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.

Potential air quality impacts during operation are therefore assessed as **low.**

8.3.5. Water usage

A potable water connection shall be provided by the Mombasa Water Supply and Sanitation supply pipeline. Based on a daily consumption estimate of 50L per person per day the water supply required shall be no more than 1,000L per day. This increased demand in the local MOWASCO network may be considered negligible; however commitment of supply must still be sought from MOWASCO and any improvements to offsite infrastructure agreed.

8.3.5.1. Mitigation Measures

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

- The site distribution network and connection to the CWSB supply will be designed and constructed to industry standard specifications to ensure losses within the new network

are reduced to a minimum.

Where appropriate, water efficient fittings will be used, i.e. wash hand basins, showers etc.

The firewater distribution system will connect to an Eleven Energy Limited owned and maintained dedicated firewater pump house located at the facility. This utilises sea water and therefore does not require any form of tanked storage or connection to the MOWASSCO supply.

Potential potable water usage impacts during operation are therefore assessed as **low.**

8.3.6. Energy usage

An electrical power connection shall be provided by the Kenya Power. The electrical power requirements for the facility during normal background operations are estimated as 30KVA. The peak electrical power requirement is estimated 650KVA whilst re-exporting to ships. This increased demand in the local Kenya Power network may be considered negligible; however commitment of supply must still be sought from Kenya Power and any improvements to offsite infrastructure agreed.

8.3.6.1. Mitigation Measures

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

- The facility will be provided with LPG fueled generators to provide operational back-up should the Kenya Power supply be interrupted.
- Where appropriate, energy efficient fittings will be used, i.e. lighting, controls etc.

Potential energy usage impacts during operation are therefore assessed as **low.**

8.3.7. Road Traffic

The staffing levels during normal operation and maintenance are estimated between 18 and 33. Road traffic to the site will comprise staff vehicles and the occasional delivery vehicle for maintenance or ‘domestic’ goods as well as trucks loading LPG for wider distribution, Eleven Energy Limited expects 1-2 trucks per hour at peak.

8.3.7.1. Mitigation Measures

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

- Ensure that outward distributions are made outside of the periods of high congestion on

the public road system (i.e. early morning, late afternoon).

- Materials haulage companies to use competent drivers and ensure that shift patterns do not result in excessive working hours resulting in compromised road safety
- All haulage vehicles shall be maintained in good running order and should comply with the requirements of Road Traffic Act.

Potential Road traffic impacts during operation are therefore assessed as **low.**

8.3.8. Marine Traffic

LPG carriers will use the existing private berthing facility, which is located on site.

The number of LPG ship calls is anticipated to be one per month at peak of operations. This increase should be considered within the overall context of the port.

The size of the import LPG carriers will increase up to approximately 25,000 DTW. The container ships, which currently operate out of the Port Reitz Container Terminal are often significantly larger than the maximum anticipated size of LPG carrier, and will outnumber the large LPG significantly.

Increased LPG import through the private berth shall allow some congestion from the current import position at KOT to be alleviated.

Impact receptors will be:

- Other shipping operating within the vicinity harbour
- The marine environment and ecosystems
- Existing port infrastructure, berthing and offloading facilities

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

8.3.8.1. Mitigation measures

- KPA to control and regulate shipping movements within the port area,
- KPA to have adequate controls enforced to ensure the safety of ship manoeuvres and berthing operations, and that this includes the avoidance and mitigation of potential negative environmental impacts.
- Put in place good marine traffic plan

- Work in collaboration with KPA to ensure the safety of ship movement and berthing operations.

On the assumption that adequate controls are in place regarding port shipping movements, the potential impacts due to the overall increase in movements and size of LPG Carriers are assessed as **low.**

The potential benefit to KPA and the anticipated alleviation of congestion at KOT are assessed as **positive.**

8.3.9. Water Quality

The main issue with regard to water quality during operation is the potential for hydrocarbon spills from vehicles or equipment during ´maintenance" discharging into the marine receiving waters immediate West and South of the site. Another major source of risk to water quality is storm water run-off from the mound being contaminated by oil or other pollutants by virtue of any release of product being gas which will vaporise if released. *NB – there is no venting of gas during normal operations or maintenance*

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

8.3.9.1. Mitigation Measures

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

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

8.3.10. Generation of Solid Waste

During normal operation and maintenance of the facility no 'residues' are expected to be produced which will require disposal. Solid wastes produced during the operation of the facility are expected to be of a domestic nature comprising; Non-degradable and non-toxic: Plastic wrappings, miscellaneous office wastes such as printer cartridges and compact disks CDs amongst others while degradable and non-toxic: Food wastes, Paper and cardboards.

It is anticipated that not more than 10kg of wastes will be produced per day; this will be stored in plastic bins, collected and disposed of through the municipal waste system. Other feasible measures include;

8.3.10.1. Mitigation Measures

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

Potential impacts during operation due to the generation of solid wastes are therefore assessed as **low.**

8.3.11. Generation of Foul Effluents

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

8.3.11.1. Mitigation Measures

- Conduct regular inspections for sewer pipe blockages or damages and fix them before any leakage to terrestrial or aquatic environment;
- All drain pipes passing under the building, driveway or parking should be of heavy duty

PVC pipe tube encased in 150mm concrete all round. All manholes on drive ways and parking areas should have heavy duty covers.

- Ensure no undue interference with the laid drainage system.

Potential impacts due to the generation of foul effluent during operation are therefore assessed as **low.**

8.3.12. Terrestrial Biodiversity

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

8.3.12.1. Mitigation Measures

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

Potential impacts to the terrestrial biodiversity during operation are therefore assessed as **low.**

8.3.13. Occupational health and safety

The calculated Individual Risk levels for all categories of staff do not exceed the acceptability criteria for broadly acceptable risk, and are one order of magnitude lower than the benchmark used by the major oil and gas companies (including Shell, Total, Esso, BP). The mounding minimises the risks present to the adjacent neighbours to a position where additional risk imposed on their operation is insignificant. The mound effectively eradicates jet fire and flash fire risk modes from propagating towards the adjacent neighbours. Pumps, compressors, liquid and vapour lines are planned to be located in a way that any potential leaks and subsequent

potential jet fire from the equipment is deemed unlikely to impact the Operations, Maintenance and Administration Building. The orientation of the mound and position of the import and export pipework have been chosen to ensure that the predominant risk faces out towards the sea channel which is currently unoccupied. For this case, future development in this area will need to consider the mitigation of these risks either through the construction of a firewall, appropriate set-back and / or other measures.

8.3.13.1. Mitigation Measures for Site safety

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

- In the event of a cyclone the facility will be placed in Shutdown Mode with all ESD valves isolated. The control room will remain manned by a security guard. The existing rock revetment is approximately 4.0m above mean sea level (AMSL) and affords a first line of defence to storm surge and waves. The building will be constructed at an appropriate level AMSL to reduce the risk of flooding from storm surge to a minimum. Appropriate freeboard and slopes will be afforded around the building to avoid potential flooding due to surface water run-off. The building structure will be designed to resist wind gusts imposed during severe cyclones. Therefore the risk to the security guard during the cyclone will be similar to any well designed modern building.
- Applicable Occupational Health and Safety mitigation measures as outlined in construction phase will be implemented

8.3.14. Fire Prevention and Management

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

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

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

- Incompatible materials will not be stored in proximity to each other.
- No smoking policy' will be applied. Provide smoking areas away from the work site.

The fire detection, suppression and suppression systems to be installed will meet the highest international standards and are listed again below for convenience:

8.3.14.1. Safety Instrumented System (SIS)

A central dual mode redundant Safety Instrumented System (SIS) designed to SIL2 shall be deployed on a second Hima H51q platform with approximately 200 I/O (input/output). The Safety System shall be housed in a separate area of the cabinet suite with field cabling for safety loops segregated from PCMS wiring.

The SIS and PCMS systems will communicate with the Citect SCADA system and with each other via Ethernet using Hima's safety protocol and Modbus TCP respectively.

The Safety Instrumented System consolidates a number of systems together and provides real time information graphically for the following function groups.

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

8.3.15. Fire Fighting

Process unit fires should be extinguished principally by fuel removal. This will depend upon operational changes to reduce pressure, introducing steam to the systems and the de-pressuring of part or the entire unit involved. Small fires will be combated with dry chemical or steam. Foam will be used where it can blanket an ignited pool of liquid. Water in the form of spray or high pressure fog will be most effective on large area or intensive fires that threaten damage to supporting structures and adjacent equipment. However, the use of water on hot equipment may

cause flanges and joints to leak, thereby adding to the fire hence the same will not be utilized. In case of electrical machinery fires, machine operators will switch to spare machine and no use of water or foam or de-energization allowed and only the use of dry chemical equipment or carbon dioxide extinguishers promoted.

8.3.15.1. Portable Fire Fighting Equipment

There should be portable fire-fighting equipment on the site and the proponent has committed to the provision of the same. Appropriate fire extinguishers, e.g. Carbon Dioxide or Dry Powder; must be provided close to electrical distribution panels and other major items of electrical equipment. An adequate number of portable fire extinguishers will also be made available throughout the project site, located in conspicuous positions close to exits on each floor, mounted off the floor at a height of approximately 1.0metre and clearly signed fire point. Training will also be undertaken for an adequate number of personnel in the use of these equipment and regular reviews be undertaken to make improvements of the short-falls.

8.3.15.2. Maintenance and Inspection

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

8.3.15.3. Evacuation Routes

Eleven Energy Limited will setup defined evacuation routes for vehicles and personnel. If a fire breaks out, all vehicles will quickly be moved from the area. Personnel not involved in fire-fighting fire must also leave. Evacuation routes should be the most direct route out of the fuel facility and the same routes should be clearly be displayed and shown on maps for all personnel to be aware.

Fire drills will be to train personnel to react quickly to fires. Fire drills should be as realistic as possible. Evacuation routes should be used and fire extinguishers manned. Fire drills should be conducted at least once a month or when there is personnel turnover.

In the event of a fire, major plant failure, explosion, bomb threat or the need to evacuate the plant, the actions listed below should be followed:

- On the continuous sound of the alarm siren (bells), STOP all activities and vacate the building or area without delay, by the nearest exit;
- Plant operators to initiate appropriate Emergency Management Procedures, and where possible, confirm plant is in safe state prior to vacating buildings; x Move quickly, but do not run;
- Do not return to a work area to collect belongings;
- Keep left in corridors and stairs;
- Do not overtake others along the route;
- Assemble in the designated Assembly Point;
- At Assembly Point report to the responsible warden; and
- Do not enter the building or work area under any circumstances until the all clear is given.

During staff induction, all visitors and contractors admitted to the site should be advised of the Site Evacuation Procedure and the location of Assembly Point.

8.3.16. Emergency Preparedness and Response

Eleven Energy Limited shall establish and implement an Emergency Response Plan (ERP) 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
- 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.

8.3.16.1. Emergency Planning –

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

The QRA undertaken concludes that;

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

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

The number of mechanical joints should be kept to a minimum, Consider replacing mechanical joints by welded joints where practicable. This shall be of help in reducing the leaks from flanges.

- Deployment of a local firewall around the equipment found on top of the mound to eradicate any potential fire radiation impact onto the roof of the building.
- Flammable gas detection system shall be fitted across the site, including in the vicinity of

the building.

- Ensure that upon flammable gas detection local to the HVAC intake duct, the building air HVAC is tripped to prevent gas ingress into the building
- Buildings shall be constructed in line with International standards, guided by the purpose of its usage.
- Hazardous Area Classification shall be conducted and findings shall be implemented.
- Active fire protection system shall be designed in line with relevant international codes/standards.
- Suitable standard operating procedures shall be prepared.
- Preventative maintenance programme shall be implemented.
- Site specific Emergency Response Plan has been prepared.
- Any inspection and maintenance undertaken within the pressure vessels will be undertaken by personnel trained in confined spaces. All LPG liquids and vapours will be removed from the system using the dedicated compressors / recovery system, prior to entry.
- Public access to areas immediately adjacent to the facility shall continue to be controlled and monitored by the KPA (in liaison with the operational staff), and kept to a minimum.

Potential occupational health and safety impacts during operation are therefore assessed as **moderate.**

8.3.17. Cultural and historical heritage

The proposed facility is located on land owned by EPZA; therefore no impacts to cultural of historical impacts are anticipated during normal operation. The construction of the LPG terminal on existing land will not have a significant impact on the existing context of the area

8.3.18. Socio-economic

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

- Provision of the projected bulk storage requirements for Kenya up to 2025, as determined

by the 2014 Petroleum Master Plan for Kenya.

- Allows larger delivery cargo sizes, the use of mid-sized refrigerated carriers and an economy of scale in the terminal build costs. All these factors combine to improve the delivered cost of gas for the import terminal operation.
- The commissioning of this facility will provide the additional storage capacity to permit the bulk storage facilities within the centre of the port area to be potentially decommissioned, in line with the KPA's strategic plan. This will result in a positive impact to safety risk in the centre of the Port.
- The proposed project has the potential of improving the living standards of the local people through employment and supplies opportunities. In addition Milio International through their CSR policy may initiate projects that have cumulative benefits to the residents of the project area.

Potential socio-economic impacts during operation are therefore assessed as **positive.**

8.4. IMPACTS DURING DECOMMISSIONING

The life of the facility is expected to be a minimum of 30 years but it is anticipated that this can be extended provided a thorough Pressure Systems Written Scheme of Examination is adhered to.

The decommissioning of the facility will involve the pumping of sea-water into the pressure vessels to displace residual LPG. Nearly all of the LPG will be recovered and it is estimated that no more than 5T of LPG will be released to the atmosphere in a controlled manner by cyclic purge using Nitrogen dilution. The sea-water will be discharged direct to sea. This will be uncontaminated given that the source LPG is derived from refrigerated sources.

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

- The foundations and base slab for the mound will be rehabilitated for future alternative use, or left in-situ. Breaking up and removal should be avoided if possible.
- The precast components of the retaining wall should be examined as suitable for stockpiling and reuse, or sent to a local crusher plant for recycling.
- The piping components will be examined as suitable for recycling.
- It is anticipated that the mound fill, following removal and disposal of the geogrid, will

be stockpiled on site for alternative re-use as a construction material locally. An alternative may be to raise the level of the site by spreading evenly.

- Vessels are unlikely to be scrapped. Upon examination the LPG vessels may be exported elsewhere for re-use.

8.4.1. Loss of Aesthetics due to abandoned project facilities

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

8.4.2. Loss of Employment

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

8.4.3. Abandoned Infrastructure

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

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

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

- Generation of foul effluents - low
- Terrestrial biodiversity - low
- Employment opportunities - positive

8.4.4. Fire Prevention and Management

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

9.0. CUMULATIVE IMPACTS

9.1. Introduction

Cumulative impacts are divided into two categories; additive and in combination.

Additive impacts – these are impacts that may result from the combined or incremental effects of present and future activities. While a single activity may itself result in an insignificant impact, it may, when combined with other impacts (significant or insignificant) in the same geographical area and occurring at the same time, result in a cumulative impact that is significant.

In-combination impacts – occur where different types of impact from the project being considered are likely to affect the same environmental or socioeconomic features. For example, a sensitive receptor being affected by both noise and dust during construction could potentially experience a combined effect greater than the individual impacts in isolation. Details of the various expected cumulative impacts are provided in the following sections.

9.2. Temporal and spatial boundaries

The spatial boundaries within which a cumulative effect could happen are defined by the area of influence of the project. The temporal boundaries within which a cumulative effect could occur include: the period during which the construction of LPG storage area and associated facilities and as well as during the project operational phase.

9.3. Assessment of potential additive impacts

Additive impacts that may arise as a result of the project activities are explained as follows:

- The combined impacts on terrestrial environment and vegetation clearance would be of low significance given the construction work will be confined to the site. However, Eleven Energy Limited and the contractor should liaise with each other so as to reduce the vegetation clearance on the site;
- Both during construction and operational phases considerable oil leaks and associated surface run-off may be experience hence the need to have a Site Oil Contingency Plan
- Negative effects on air quality may occur from dust generated by project traffic and

construction related activities, but these will be of low significance, given the temporary nature of the construction work in a one given area and the limited amount of trucks used to transport the gas;

- It is anticipated that there will be an increase in traffic along the roads leading to the site and this could lead to an increased risk of traffic accidents. There is need for effective and efficient journey and traffic management plans to be developed and implemented;
- There is potential for cumulative beneficial impacts arising from employment of local people, but the overall impact will be low as the majority of the workforce needed require skills that might not be available locally; and
- The presence of the LPG Storage facility will reduce effects of stock outs and in the long run help reduce the prices of cooking gas in the country.

9.4. Assessment of 'in-combination' impacts

The assessment of the combined effects of individual impacts of a project relies on a qualitative assessment of potential interactions using available information and professional judgment and experience. Some types of impact are considered to have direct inter-relationships that could potentially occur interactively to generate a combined effect on sensitive receptors. For example noise, vibration, traffic, dust and visual intrusion occurring together during construction or operations have a combined effect. Some other types of impact have limited or no potential to have a combined impact on sensitive receptors. If this occurs, they could potentially experience a combination of temporary effects associated with increased noise, vibration, localised dust generation, visual intrusion and risk of accidents with both construction and operational traffic.

9.5. Other Projects

The other projects or operational facilities that will interact with the Eleven Energy Limited LPG storage facility and with likely significant impacts are outlined below:

9.5.1. MICD Clinker storage Yard

The Eleven Energy Limited project site is adjacent to the MICD yard and without due diligence the combined impacts/ practices will be highly significant on the biophysical and

human environment. The likely practices will include release of oils, dust and toxic paints into the local environment. This is likely to disrupt the marine line as well as impact on the workers on the site through pollution and exposure to toxins.

During the clinker storage process emissions are likely to be emitted into the air as well as controlled and uncontrolled fires. For example, fires can be caused by burning cables in open as well as irresponsible ways of separating valuable metals from insulation materials such as Polyvinyl Chloride (PVC). PVC produces dioxin, Hydrochloric acid vapour and thick smoke when burned. Uncontrolled fires are also likely to result as a consequence of explosions that occur during cutting when there is fuel or flammable cargo residues inside the ship hull. When a scrap ship bursts into flames, the variety of emission in to the air is extensive and when the emissions released from the LPG storage facility there will be significant impacts at the local level. Fires released from the MICD yard are likely to come into contact with leakages from the Eleven Energy Limited LPG facility and thus the need for safety precautions. Basel Convention (2013) report recognizes that even with best practices still some amount of emissions will be emitted in to the atmosphere, but under controlled working environment the quantities are small.

The other combined impact from both the MICD yard and the Eleven Energy Limited storage LPG facility is the one against marine ecosystem. The yard run ashore when the tide water is high and anchored to wait for the low tide. During the low tides the vessels are accessed by foot and ships emptied of all the machinery and equipment. Other cause of pollution is from remains of fuel and other oily consumables such as lubricants and hydraulic oils that are removed and rolled in barrels across the beaches. The main pollutants that are likely to be experienced and have the potential to cause pollution and impact on the marine ecosystem include; toxic and persistent heavy metals, petroleum hydrocarbons and bacterial contaminants. The environmental impacts are further likely to be exacerbated by working on bare soil and thus also impact on the micro-organisms.

MICD workers are exposed to hazards that are not immediate but have serious long-term impact on their health. The hazards include workers being in contact with substances that are harmful to the health. Long term exposure to toxic materials to the health of the workers and the associated exposures from Eleven Energy Limited facility will increase occupational health hazards.

Significance

- Ocean pollution and marine ecosystem disturbance;
- Emissions to air and possible fire outbreaks; and
- Occupational health hazards

9.5.2. Kengen and Tsavo Power

The impacts associated with power generation will include; air emissions, waste water and solid wastes.

The power generation process is a high-temperature, energy-intensive activity with associated emission of combustion by-products (sulphur dioxide, carbon dioxide, and nitrogen oxides) as well as oxidizing atmospheric nitrogen. Particulate Matter (PM) is also found in furnace emissions and may contain low levels of metals while emissions from the forming and finishing phases are related to the various types of glass production processes.

Particulate Matter are a significant pollutant emitted by glass manufacturing facilities as all the various sub-sectors of glass manufacturing involve the use of powdered, granular, or dusty raw materials. Raw materials storage and mixing are also common activities for all glass industry sub-sectors. Dust emissions are an expected result of raw materials transportation, handling, storage, and mixing. Dust generated by these processes is typically coarser than the particulates emitted from the hot processes, which have sizes below 1 μm, but the small particulates readily agglomerate into larger particles. For the dust emitted from handling processes result to occupational health and safety (OHS) issues, PM from hot processes in the batch plant is a potential environmental issue. Particulate Matter is a key health issue as particles of metals, chemicals, acids and dust that the particulates are comprised of are so tiny (10 micrometers or even smaller) and are able or easily enters the nose and throat to reach the lungs where damage is felt.

During glass manufacturing process, air-polluting compounds such as nitrogen oxides, sulphur dioxide and particulate matter are normally released.

Another important aspect of the power generating process is the industrial waste water. Water uses typically will involve those used for cooling and cullet cleaning. Aqueous emissions thus consist of contact cooling water system purges, cleaning waters, and surface water runoff. The

water from the industrial process should thus be well managed and not released into the environment before attaining the relevant required water standards as it relates to Waste Water Management. Care should also be taken to minimize the liquid effluents being released from the glass manufacturing process.

Solid waste is also released from the processes. Solid waste is mainly generated from glass shipping areas. Clean-up and maintenance in receiving areas can reduce this waste and allow material spills to be collected and added to the raw materials. Paving the receiving areas could allow for efficient and effective collection or clean-up and allows spilled material to be adequately identified, segregated, and recycled into the process.

The most significant occupational health and safety hazards occurring during the operational phase include the following; exposure to heat, exposure to noise, exposure to respiratory hazards, physical hazards and electrical hazards.

Mitigation measures will include construction of a proximity wall between Eleven Energy Limited and neighbouring facilities/sites.

Significance

- Occupational health and safety hazards;
- Liquid and solid wastes generation; and
- Air Pollution

9.5.3. Transtrailers, Makupa shed, Civicon, Mitchel cotts

From the development of a ctivities and Operations at Kipevu area and access roads created, moderate impact on plant species diversity such as the coral rag fauna will be disturbed. The clearance of the site for the proposed development will lead to the loss of habitat and the fragmentation and thus impacting on the fauna. Construction of a jetty will also cause impacts on the benthic habitat, oil spillages and heavy metals or mineral spillage into the Ocean are also possible sources of marine pollution and will impact on the marine life. From the operation of the facility edge communities will be affected, effects of opportunistic species are also likely to result in the long term and invasive marine species could be experienced. The operation of the Facility is also likely to impact on the occupational, health and safety of the workers employed.

Significance

- There is the risk of shipping accidents that would be caused at the project site;
- Marine traffic at the project facility; and
- Community health and safety

9.5.4. Neighbourring Civil China Roads Company

The China Civil Company (adjacent neighbor) has a leased site currently holding Materials and equipment (batching plant) used for construction of the Newly Constructed Makupa causeway and the New Makupa Bridge, the facility is winding up its operations since the road construction works and bridge are over.

Significance

- Occupational accidents; and
- Road traffic is expected
- Dust and vibrations

9.5.5. Transboundary impacts

According to IFC Guide Note (GN) 36, transboundary impacts refer those impacts that extend to multiple countries, beyond the host country of the project, but are not global in nature. Some of the notable Trans-boundary impacts include air pollution extending to multiple countries, use or pollution of international waterways, and transboundary epidemic disease transmission. For the Eleven Energy Limited LPG Storage facility, trans boundary impacts are not anticipated as minimal oil spillages might occur and containment measures have been put in place while although there might be compromise to the air quality , the same will be localized at the project site.

10.0. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Environmental and Social Management Plan (ESMP) specifies the mitigation and management measures which the proponent will undertake and shows how the project will mobilize organizational capacity and resources to implement these measures. The EMP covers information on the management and/or mitigation measures that will be taken into consideration to address impacts in respect of the following project phases: design, construction, operation and decommissioning. The proposed ESMP will be the responsibility of the project proponent and the approach to be employed in managing impacts is as follows;

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

Table 10:1 Key Project Roles and Responsibilities

Role	Responsibility
Management	✓ Manage implementation of the ESMS: plan, implement, assess and improve. ✓ Oversee and monitor implementation of the ESMP for the Project. ✓ Provide strategic environmental and social direction to the Project.
Supervision	✓ Work with contractors to achieve environmental and social performance by undertaking the following: - conduct readiness reviews with contractors to ensure their ESMS implementation meets Project requirements; - Work with contractors to improve their ESMS where gaps are identified; - Conduct training and awareness programmes with personnel involved in ESMP implementation; - Ensure regular monitoring and evaluation of the project's performance against the ESMP; - Maintain records of all non-conformances and work with the relevant parties to resolve within reasonable time frames; - Assess the efficacy of the mitigation measures and manage continuous improvement around these measures; - Work with contractors to close out grievances lodged by communities within the defined timelines; - Maintain accurate records of open and closed grievances, and work with contractors towards reducing the number of grievances lodged by implementing appropriate mitigation measures; and - Assist with the development of relevant and timely communications to Project-impacted communities by providing information to the Stakeholder Engagement team on upcoming project activities.
Delivery/ Implementation	✓ Monitor and report on any Project activities that could negatively impact on communities. ✓ Facilitate on-going, reciprocal information sharing and communication between the Project and Impacted communities; including helping to resolve any Project-related issues raised. ✓ Support the project's grievance procedure by providing on-going grievance procedure guidance and training to Project personnel, contractors and impacted communities and other relevant stakeholder groups (e.g. tourism industry stakeholders). ✓ Conduct regular inspections and note non-conformances with the Project's environmental and social requirements.

10.1. Training, Education and Competency

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

10.2. 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:

- Internal environmental, health and safety inspections will be carried out once every week by HSE Executive;
- Minor non-conformances will be discussed during the inspection and recorded as a finding in the inspection report. Major non-conformances will be formally reported as an incident and will be subject to the Proponent's existing incident reporting and handling procedures
- 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, 1999 and its subsidiary legislation, EIA/EA Regulations, 2003. Any negative findings arising from the audits will be addressed accordingly

10.3. Incident handling and Reporting

An incident can arise from the following:

- ✓ Significant non-conformance with the EMP identified during an internal inspection
  Any non-conformance identified by either the authorities or an external audit
- ✓ Accidents or spills resulting in potential or actual environmental harm
- ✓ Accidents or near misses that did or could result in injury to staff, visitors to site or the

surrounding communities

- ✓ Significant complaints received from any source.

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

10.4. Checking /Assessment and Improvement

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:

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

10.5. Corrective Action

As part of the ESMS, the Project will implement a formal environmental and social tracking system that will include the details of all environmental and social non-conformances, identify the corrective actions required, assign actions/timings to responsible parties and indicate the status of the actions required. This will ensure a coordinated approach between the Project and its contractors, and drive changes for continuous improvement

10.6. Grievance Management

The Project will develop and implement a Grievance Procedure that is described in the Project‘s Stakeholder Engagement Plan (SEP). The Grievance Procedure describes how community members can raise grievances regarding the Project‘s activities. The Grievance Procedure addresses verbal or written grievances, which must include sufficient information about the complaint or claim so that a proper and informed evaluation of the grievance can be made. When a grievance is filed, it will be logged and evaluated using the process outlined in the SEP. All grievances will be tracked for monitoring and reporting purposes and to ensure timely and proper resolution.

10.7. Reporting

This section outlines the reporting and notification associated with implementation of the ESMP. The Project and contractors will work closely together to identify and agree all such Project notification and reporting requirements.

It is envisaged that reporting will cover at least the following areas:

10.7.1. Contractor Monthly Reporting

Contractors will prepare a monthly report containing key information around the contractors' implementation of the environmental and social requirements and mitigation measures and will cover, among others:

- ✓ environmental and social assessment and improvement findings;
- ✓ incident notifications;
- ✓ Non-conformances/ non-compliances and corrective actions;
- ✓ key performance indicators;
- ✓ details of any environmental or social surveys or studies; and
- ✓ Environmental and social training conducted.

10.7.2. Incident Notification and Reporting

Contractors will notify the Project proponent immediately following any environmental or social incident. The project proponent will ensure that all environmental and social incidences are appropriately documented, that the relevant parties are notified, and that reporting requirements around the incident are adhered to.

10.7.3. Management Review

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

10.8. Liaison /Communication to Stakeholders

Throughout the project cycle, the Proponent will liaise with authorities especially NEMA Kenya

to ensure on-going feedback on the environment performance of the project. As part of the project monitoring and evaluation, it is that an independent environmental and social consultant will be engaged by the proponent and their auditing reports will be shared with stakeholders in a transparent manner, as they become available.

10.9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)
Table 10:2 Environmental and Social Management Plan (ESMP)

Parameters	Impact	Mitigation Measures	Responsibility	Cost (KShs)
General Site Organization	Occupational accidents	– Site plan to be developed showing areas for stockpiles, material storage site compound / facilities, pedestrian vehicle routes etc. – Access controlled to site via supervised gated access, manned 24/7. – Temporary building constructed for Engineers/Sub-Contractors, with adequate parking. Suitable shelters provided for construction workers – Site and/or site compound shall be fenced and fully Maintained during construction. – Preparation and strict adherence to a site specific health and safety plan – Use of skilled labour and appropriate training given to construction workers – Construction workers to be provided with, an use, appropriate personal protective equipment (PPE) – Where practical, use of vibratory hand operated equipment to be minimized to reduce long term risk to operators	Contractor	3,000,000.00
Geology and Physiography	Civil Works: Site clearance, Setting out and Excavations/Trenching ▪ Improper handling of Solid and Liquid wastes during operations	– Ensure trenching/excavations are only done where necessary – Ensure backfilling of excavations, reinstatement of disturbed ground and general restoration of site – Clear all waste from site – Maintain proper handling of solid and liquid waste during construction	Contractor Proponent	To inform

Parameters	Impact	Mitigation Measures	Responsibility	Cost (KShs)
Soil	- Spillage of chemicals, oils and fuels from construction equipment and vehicles - Runoff erosion resulting in Sedimentation problems. - Soil contamination from hazardous material spills during construction, excavations and Backfilling activities. - Compaction of soils in the construction areas and access ways changing percolation rates and drainage Patterns. - Disturbance of soil through construction, Excavations and backfilling activities.	– Minimal earthworks should be undertaken during construction – Excavated soil should be used in landscape design of the project site rather than stockpiling – Construction equipment and vehicles should be well maintained, checked and promptly repaired – Avoid deep excavations in areas sensitive to erosion; – Carry out construction works in the dry season; – Stabilize the soils in order to reduce potential erosion after project construction phase is over; – Restore all the sites that were damaged during construction; and – At the end of construction works, level off the soils and facilitate vegetation regeneration.	Contractor	-
Terrestrial (Flora and Fauna)	Vegetation loss and habitat modification ▪ Introduction of invasive plant species.	– Educate contractors on the importance of flora and fauna in the area, including the appropriate regulatory requirements to preserve fauna and flora. – Minimize vegetation clearance and demarcate areas of construction. – Restrict foreign material export to and from the site to curtail spread of invasive species.	EIA Expert Contractor Proponent/ representative	-

Parameters	Impact	Mitigation Measures	Responsibility	Cost (KShs)
Water Quality	- Discharge of untreated effluent to surface water sources/bodies.	– Earthworks shall be halted when rain conditions are such that excessive erosion and silt loaded run-off can be expected. – The construction programme will avoid excessive exposure of bare earth surfaces which may be more prone to erosion. – If appropriate, settlement lagoons to be used to allow silts to be retained prior to discharge of run-off to the existing drainage channels or direct to sea (through the rock revetment) – Consideration will be given to undertaking routine Maintenance of plant and vehicles off-site in a properly equipped paved workshop with oil interceptors. – Avoidance of water accumulation and stagnation – Existing drainage channels to be cleared of silt / debris and trash screens installed if appropriate.	Contractor	-
Solid Waste	✓ Pollution of surface water body Indian Ocean ✓ Clog drainage Systems. ✓ Harbour rodents and Reptiles. ✓ Creates visual Impairment.	– The contractor shall put in place a waste management plan aimed at minimising the production of all wastes. – Where possible measures will be put in place to recycle materials such as metal off-cuts, some plastics and clean paper/cardboard utilising existing specialist recycling firms in Kenya. – A suitable location within site for placing excess concrete and washing down equipment will be agreed to reduce visual impact. – Non-recyclable materials will be stored in plastic bins, collected and disposed of through the municipal waste system. – Potentially hazardous wastes shall be stored	Contractor Proponent/ representative	250,000.00 per year

		separately, i.e. hydrocarbon containers, used batteries and collected by registered hazardous waste handler. – Enforce regular collection and disposal of garbage by the project contractor through licensed NEMA waste handler – Clean storm water drains to minimize clogging.		
Noise and vibration	- Disturbance to workers within the site and personnel on adjacent properties close to the site. - Health risks	- Construction workers should be provided with appropriate ear protection - Use of vibratory hand operated equipment should be minimized - Noisy operations should be restricted to daytime operation Power generator and other equipment should be state of the art and equipped with silencers/mufflers where necessary. - Effect a noise regulation policy for all operations in accordance with the Environmental management and Coordination (Noise and Excessive vibration pollution) Regulation. - Construction plant should be maintained in good running order; all vehicles should comply with the requirements of Road Traffic Act. - The measurement of noise levels should be carried out in accordance to the Environmental management and Coordination (Noise and Excessive vibration pollution) Regulation.	Contractor	
Air Quality	- Pollution from exhaust gases from the operation of heavy plants - Pollution from dust generated during the earthworks and traffic on roads	- For potentially dusty earth works operations, construction workers to be enclosed within ventilated cabs or provided with facemasks for potentially dusty earth works operations. - Where appropriate water damping to be used to control dust. - Limit traffic speed and restrict movement of	Contractor	

		vehicles as to minimize dust generation - Construction plant will be maintained in good running order; all vehicles should comply with the requirements of Road Traffic Act and its subsequent regulations for emission control.		
Water Usage	- Localized contamination of Seawater/thermal pollution - Depletion of water resources	- Install and properly manage site sanitation facilities/ recycle waste water on site - Turn off taps when not in use - Install water conserving taps that turn off immediately when not in use - Install water metre to monitor water usage and bills.	Contractor Proponent	
Energy Usage	- Noise disturbance to workers within the site from generator - Health risks	- Ensure that all lighting system are switched off when not in use - Install energy saving bulbs - Design the office infrastructure to maximize the use of natural light. - Install metering system for monitoring	Contractor Proponent	-
Road Traffic	- Disturbances to other road users - Noise from Heavy Good vehicle movements	- Deliveries will be made to site outside of the periods of high congestion on the public road system (i.e. early morning, late afternoon). - Materials haulage companies to use competent drivers and ensure that shift patterns do not result in excessive working hours resulting in compromised road safety - All haulage vehicles shall be maintained in good running Order and should comply with the requirements of Road Traffic Act. - Where feasible, and to limit the number of movements of haulage vehicles to and from the Port area, it is anticipated that bulk materials will be shipped to Port and moved directly to site (i.e. steel reinforcement, geogrid, etc. subject to appropriate port clearance).	Contractor	
Occupational Health and Safety	- Accidents as a result of poor handling of equipment, use of faulty	- Construction workers safety should be in accordance with clients' prepared site specific health and safety plan that identifies site specific	Contractor	

	equipment, improper signing of equipment, - Injuries to workers, visitors and area residents arising from project operations related to motor vehicles, strains, sprains, bruises, lacerations, and triple fall equipment. - Fire hazard - Exposure to nuisance in the form of noise, dust, vibrations and emissions. Other health risks	risks, safety equipment, decontamination procedures, action plans, and emergency response plans; - Daily site inspections should be done to ensure safe work practices are adhered; - Toolbox talks to be conducted on daily basis; - All workmen should be provided with Personal Protective Equipment - Maintain safe workplaces and work systems; and - Provide information, instruction and training enabling employees to work without hazards.		
Cultural and historical heritage	- Damage to immovable/fixed objects or features. - Erosion of local communities' way of life, cultural norms and practices.	- The contractor should appraise themselves with the local culture and traditions as well as seek the guidance of local elders before construction activities commence.	Contractor Proponent	

Parameters	Impact	Mitigation Measures	Responsibility	Cost (KShs)
		Operation phase		
General	Occupational Accidents	- Development and implementation of occupational health and safety plan. The Plan will cover on the following: ❖ Formulation of EHS Management system ❖ Development of health and safety programme ❖ Risk assessment and health monitoring for workers ❖ Contractor selection criteria in relation to health and safety ❖ Job description to include health and safety requirements - Workplace inspection to ensure operations/ activities are being undertaken in accordance with the safe operating procedures, standards and regulations - Regular audits and reviews will be undertaken, and recommendations and corrective actions shall be implemented. - Personnel will be trained on health and safety. **Standard Operation Procedure** - Site specific Standard Operating Procedures to be agreed with LPG carriers, and downstream filling operators in accordance with international regulations and good practice. - Measures to be put in place to ensure that the Standard Operating Procedures are adhered to. - All members of staff to be appropriately skilled and receive appropriate training.	Management / proponent	No material additional costs are anticipated above general budgets for responsibilities of EHS manager for the implementation of the plan. Additionally, the health and safety audit of the facility will not be carried out in isolation, instead it will be audited together with other facilities onsite during annual statutory audit of the entire plant hence no additional cost is anticipated

		- Inspections and reviews of Standard Operating Procedures undertaken by the Promoters environmental health & safety officer **Emergency Response Plan** - Site specific Emergency Response Plan. - All members of staff to receive appropriate training on the implementation of the Emergency Response Plan **Occupational Health and Safety** - Hazardous Area Classification shall be conducted and the findings implemented - A flammable gas detection system will be installed at sensitive locations. - Records shall be maintained of all instances of detection and course of action. A preventative maintenance programme shall be implemented. - Public access to the undeveloped areas immediately adjacent to the facility shall continue to be controlled and monitored by the KPA, KPC and EPZA and shall be kept to a minimum. - OSH Audits to be carried out on a regular basis		
Soil	- Surface run-off from the site paved areas - Possibility of enhanced gullying and erosion (wind and water) in constructed areas and access roads; - Risk of soil contamination from littering. - Possible caving in of soil in waste pits (near	- Minimal excavations should be undertaken during rehabilitation activities; - Establish spill contingency measures on site; - Restore all the sites that are damaged during rehabilitation; - Develop Soil Sedimentation and Control Management Plan and implement; and - Raise waste pits to avoid run-off from the same. - Carry out landscaping on open area that is not going to be utilised	Proponent	1,000,000.00

	surface competence that bear on load capacity) due to soil stability factors. - Soil destabilization as a result of deep excavations			
Water Quality	- Pollution of surface water body caused by discharge or leakage of raw effluent. - Accidental Oil spill pollution	- Install trash screens and silt traps and to be regularly inspected/ maintained, particularly after cyclonic conditions when the system may be put under stress. - Conduct Regular inspection / maintenance of the oil interceptor (min. twice per year). - Conduct Sampling and analysis of storm water discharge from site outfalls by an accredited laboratory (min. twice per year) - Conduct inspections for sewer pipe blockages or damages and fix them. - Empty septic/sludge tanks whenever they are full to prevent overflow thus ´pollution' by a licensed exhauster services. - Regular checking and maintenance of all plant and machinery to minimize the risk of fuel or lubricant leakages - Storing hydrocarbons, fuels, lubricants and chemicals to be used in bunded and lockable oil storage tanks, with hoses and gauges kept within the bund. - Housekeeping checks to ensure waste is being stored correctly and no litter is occurring. - Carry out effluent analysis on a regular basis	Proponent	100,000.00
Waste	- Domestic foul smell - Pollution of surface	- All personnel will be instructed in project waste management practices as a component of the	Proponent	400,000.00

	water bodies (Indian Ocean) - Clogging storm drainage systems.	environmental induction Process. - If feasible measures to be considered to recycle materials such as plastics and clean paper/cardboard utilising existing specialist recycling firms in Kenya. - Provide suitable facilities/cubicles for the collection, segregation, and safe disposal of the wastes. - Store hazardous wastes in bunded areas away from watercourses. - Ensure regular de-sludging of the septic tank is done (inspections – min. twice per year) - The site should have waste receptacles with bulk storage facilities at convenient points to prevent littering during occupation. - Quantity and composition of waste shall be monitored and records maintained for purposes of monitoring. - Collect and remove (via NEMA Licensed waste handler) waste from site for recycling, reuse or disposal at facility licensed to accept such wastes. - Housekeeping checks to ensure waste is being stored correctly and no litter is occurring. - Report to NEMA cases of hazardous waste spills.		
Terrestrial (Flora and Fauna)	- Disturbance to flora and fauna.	- Educate contractors on the importance of flora and fauna in the area, including the appropriate regulatory requirements to preserve fauna and flora. - Avoid feeding faunal species within the project site to prevent stomach upset. - The flora and fauna should be restored after construction by landscaping and maintaining the introduced plants to the site.	EIA Expert Proponent	
Noise and vibration	- Disturbance to workers within the site and personnel on adjacent properties close to the site. - Health risks	- The measurement of noise levels should be carried out in accordance to the Environmental management and Coordination (Noise and Excessive vibration pollution) Regulation. - Ensure that all workers are provided with appropriate ear protection equipment	Proponent	90,000.00 p.a.

		- Noisy operations will be restricted to daytime operation - Power generator and other equipment should be state-of the-art and equipped with silencers/mufflers where the option is available - Effect a noise regulation policy for all operations in accordance with the Environmental management and Coordination (Noise and Excessive vibration pollution) Regulation. - Ensure that all vehicles should with the requirements of Road Traffic Act.		

Air Quality	- Pollution from exhaust gases from the operation of heavy plants - Pollution from dust generated by traffic on roads	- 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. - Carry out ambient air analysis on a regular basis - Maintenance activities requiring purging of gas will be minimised and conducted under favourable meteorological conditions (to facilitate rapid atmospheric dispersion). - Install standard leak detectors for hazardous Area installations. - The results of leaks detection and estimates of the volume of any gas vented, and recommendations and corrective actions shall be implemented. - Any detected leaks will be repaired as a high priority. - Regular reporting and audits will be undertaken by the Production Manager in accordance with the requirements of the LPG Safety. - Audit of the plant maintenance records for leaks detection and repair. - Non-compliance and incident reporting will be closed out to ensure prompt rectification and change management as required.	Proponent	
Water Usage	- Localized contamination of Seawater/thermal pollution - Depletion of water resources	- Turn off taps when not in use - Install water conserving taps that turn off immediately when not in use - Install water metre to monitor water usage and bills. - The site distribution network and connection to the MOWASCO supply will be designed and constructed to industry standard specifications to ensure losses within the new network are reduced to a minimum.		

		- Where appropriate, water efficient fittings will be used, i.e. wash hand basins, showers etc.		
Energy Usage	- Noise disturbance to workers within the site from generator - Health risks	- Install energy saving bulbs - Design the office infrastructure to maximise the use of natural light. - Install metering system for monitoring - The facility will be provided with LPG fueled generators to provide operational back-up should the Kenya Power supply be interrupted. - Where appropriate, energy efficient fittings will be used, i.e. lighting, controls etc	Proponent	
Fire and safety	- Gas leakage and explosion	- In the event of fire, fire management plan should be implemented. - Install automatic shut off and gas leakage detectors - The entire plant should be networked with pressurised fire hydrants lines which should have fire hydrant, long range monitors and deluge valve at strategic locations. - Carry out fire drill on an annual basis	Proponent Mombasa County Government Fire Rescue team	
Road Traffic	- Disturbances to other road users - Noise from Heavy Good vehicle movements	- Ensure that outward distributions are made outside of the periods of high congestion on the public road system (i.e. early morning, late afternoon). - Materials haulage companies to use competent drivers and ensure that shift patterns do not result in excessive working hours resulting in compromised road safety - All haulage vehicles shall be maintained in good running order and should comply with the requirements of Road Traffic Act. - Liase with KeNHA for decelerating/accelerating lane at junction to site along Mombasa Road	Proponent Changamwe police traffic unit KeNHA	
Occupational Health and Safety	- Injuries to workers, visitors and area	- Plan for regular maintenance and replacement of equipment and ensure site safety;	Proponent	

	residents arising from project operations - Fire hazard - Exposure to nuisance in the form of noise, dust, vibrations and emissions - Other health risks	- All operations will be conducted in compliance with proponents EHS policy, international best practices and Kenya Government requirements (as set out in the Occupational Health and Safety Act and the Public Health Act); - Provision of an Emergency Response and Evacuation Plan; - Adequate warning or cautionary signage should be posted as required - Job-specific Personal Protective Equipment to be provided to the workers, training should be given, and their use made mandatory in designated areas; - Appropriate and well-stocked first aid kits and fire-fighting equipment should be available at the site, and specific members should be trained on first aid administration and handling of fire-fighting equipment; - Ensure all work procedures are undertaken without exposing workers to hazards; - All electrical equipment should be properly installed, grounded and regularly inspected; and - Consult with employee-elected health and safety representatives and/ or other employees about occupational health, safety and welfare		
Security and Public Safety	- Improvement in security due to security enhancement for project activities - Petty crimes	- Eleven Energy Limited should liaise with Mombasa County government and County Administrations during the mobilization phase; - Ensure that all workers can be identified by staff uniform and badges at the site; - Adequate security measures should be provided, e.g. perimeter fencing and security manning at the site Journey management policy and monitoring to be enforced; - Smoking will only be permitted in designated areas; - No litter will be left along the construction sites;		

		- Barriers and guards should be installed as necessary to protect employees and visitors from physical hazards and criminal activity.		
Socio-economic Welfare	- Possible increase in the number of students dropping out of school in search of jobs. - Friction between the local community and immigrant workers. - Friction among various clans in the project area and outsiders	- The contractor should promote dialogue with the local community, especially community involvement in the project activities through employment; - Effectively plan for their transport of gas without interfering with the areas traffic - Inform the local community on the project activities through their local leaders; - Resolve conflicts mutually and immediately they occur; - The discretion of local community leaders should be used when offering employment; - The contractor should consult with chiefs and elders in communities to ensure equity in employment - The discretion of local community leaders should be used when offering employment;		
Marine Traffic	- Disturbance to other shipping operating activities within the vicinity harbour - Congestion along the port during berthing and offloading.	- KPA to control and regulate shipping movements within the port area, - KPA to have adequate controls enforced to ensure the safety of ship movements and berthing operations, and that this includes the avoidance and mitigation of potential negative environmental impacts. - Put in place good marine traffic plan - Work in collaboration with KPA to ensure the safety of ship movement and berthing operations.		

10.9. Environmental Monitoring Plan

This section sets out the mitigations measures identified in the ESMP above, together with the proposed monitoring plans and controls for both the construction and operation stages.

It will be the responsibility of the project proponent to ensure that the environmental control measures presented in this plan are adhered to and that work is progressed in compliance with all relevant environmental regulations and international standards.

10.10. Emergency Planning

The proponent will prepare a site specific Emergency Response Plan which shall be agreed upon with the Kenya Ports Authority (KPA) and corresponds with the KPA‘s overall Port Emergency Plan. All members of staff will need to receive appropriate training on the implementation of the Emergency Response Plan. The Emergency Response Plan forms part of the Environmental Monitoring Plan.

10.11. Construction Phase Environmental Monitoring Plan

It is envisaged that monthly construction stage environmental monitoring reports will be prepared by the Contractor (or Promoter‘s representative).

Table 10:3 Environmental Monitoring Plan

Construction stage	Environmental Plan Monitoring	Mitigation measures	Responsibility
General	Site organisation	- Eleven Energy Limited facility will be built to be fully compliant with the International Convention for the Safety of Life at Sea (SOLAS), the International Ship and Port Facility Security (ISPS) Code, KPA measures implemented after the introduction of the ISPS code in 2001 and will ensure strict adherence to the Kenya Merchant Shipping Act (2012 edition) (KMSA'). ELEVEN ENERGY LIMITED will continuously update the Threat and Risk Analysis Matrix (TRAM'). - Site plan to be developed showing areas for stockpiles, material storage, site compound / facilities, pedestrian / vehicle routes etc - Access controlled to site via supervised gated access, manned 24/7. - Temporary building constructed for Engineers / Sub-contractors, with adequate parking. - Suitable shelters provided for construction workers	Contractor
	Site security	- Site and / or site compound shall be fenced and fully maintained during construction	
	- Avoidance of health and safety incidents	- Preparation and adherence to a site specific health and safety plan - Use of skilled labour and appropriate training given to construction workers - Construction workers to be provided with, an use, appropriate personal protective equipment (PPE) - Where practical, use of vibratory hand operated equipment to be minimized to reduce long term risk to operators	

Construction stage	Environmental Plan Monitoring	Mitigation measures	Responsibility
Noise and Vibration	Avoidance of nuisance	- Maintain reasonable site working hours (daylight hours), particularly during potential noisy operations such as piling - Construction plant will be maintained in good running order; all vehicles should comply with the requirements of Road Traffic Act	Contractor
Air Quality	Avoidance of dust nuisance	- For potentially dusty earth works operations, construction workers to be enclosed within ventilated cabs or provided with face masks for potentially dusty earth works operations -	
	- Avoidance of health and safety incidents	- Preparation and adherence to a site specific health and safety plan - Use of skilled labour and appropriate training given to construction workers - Construction workers to be provided with, an use, appropriate personal protective equipment (PPE) - Where practical, use of vibratory hand operated equipment to be minimized to reduce long term risk to operators - Where appropriate water damping to be used to control dust. Particular attention to be paid when the wind is from the south or west.	
	- Avoidance of unreasonable exhaust emissions	- Plant operated by skilled operators and regularly maintained	
Water	- Efficient water usage	- Measures in place to ensure efficient on site use of potable / fresh water commensurate with good construction practices	
Energy	- Efficient energy usage	- Measures in place to ensure efficient on site use of electricity and fuel commensurate with good construction practices	

Construction stage	Environmental Monitoring Plan	Mitigation measures	Responsibility
Traffic	Minimise impact of increased road traffic	- Deliveries will be made to site outside of the periods of high congestion on the public road system (i.e. early morning, late afternoon). - Materials haulage companies to use competent drivers and ensure that shift patterns do not result in excessive working hours resulting in compromised road safety - All haulage vehicles shall be maintained in good running order and should comply with the requirements of Road Traffic Act. - Should the surface materials at site generated by preliminary earthworks and piling be of suitable quality these materials shall be deployed and the volume of imported materials diminished. - Where feasible, and to limit the number of movements of haulage vehicles to and from the Port area, it is anticipated that bulk materials will be shipped to Port and moved directly to site (i.e. steel reinforcement, geogrid, etc subject to appropriate port clearance).	
	Construction plant and equipment in good working order	- Construction plant will be maintained in good running order; all vehicles should comply with the requirements of Road Traffic Act and its subsequent regulations for emission control. - Plant operated by skilled and appropriately trained operators	
	Avoidance of mud on public access roads	- Minimise working in wet conditions. - Drive vehicles on firm part of site, if possible, to release excess mud from wheels, or clean excess mud off wheels before reaching road - If mud is transferred to roads, use sweeper / bowser to remove excess mud from road	

Construction stage	Environmental Monitoring Plan	Mitigation Measures	Responsibility
Water Quality	Avoid poor quality discharge of storm water	- Earthworks shall be halted when rain conditions are such that excessive erosion and silt loaded run-off can be expected. - The construction programme will avoid excessive exposure of bare earth surfaces which may be more prone to erosion. - If appropriate, settlement lagoons to be used to allow silts to be retained prior to discharge of run-off to the existing drainage channels or direct to sea (through the rock revetment) - Care will be taken to avoid excessive mud being transferred by construction plant to the access roads and public highway. Where this is likely to become a nuisance it will be cleared by the Contractor. - Consideration will be given to undertaking routine maintenance of plant and vehicles off-site in a properly equipped workshop. - Avoidance of water accumulation and stagnation - Existing drainage channels to be cleared of silt / debris and trash screens installed if appropriate.	
	Avoidance of hydrocarbon spills	- Fuel stored with containment wall - Refueling / servicing area with hydrocarbon trap - Equipment in good working condition - Used oil disposed of by approved practises	
	Avoidance of contamination during hydro-testing	- Pressure vessels to be carefully inspected internally and any residues removed through pressure washing prior to hydro-testing using sea water.	
Waste Management	Minimisation of solid waste production	- The contractor shall put in place a waste management plan - Where possible measures will be put in place to recycle materials such as metal off-cuts, some plastics and clean paper/cardboard utilising existing specialist recycling firms in Kenya. - A suitable location within site for placing excess concrete and washing down equipment will be agreed with no	

		discernable impact. - Non-recyclable materials will be stored in plastic bins, collected and disposed of through the municipal waste system. - Potentially hazardous wastes shall be stored separately, i.e. hydrocarbon containers, used batteries	
	Site is to be kept tidy and free of litter at all times	- Waste bins to be provided at toilet blocks, changing areas and other key locations - Inspections to be made of site and surrounding area, including the revetment, to remove litter. - All wastes collected and disposed of regularly by a licensed carrier	
	Adequate toilet facilities must be provided	- No. and location of toilet / shower blocks to be adequate for peak no. of construction workers, facilities to be regularly cleaned - Foul effluents to be collected on-site and arrangements will be put in place for regular emptying and disposal using a licensed carrier. If a septic tank is to be used then a properly designed leaching field shall be installed. - Measures to be enforced to ensure that construction workers do not foul areas surrounding the site.	

10.13 Operational Phase Environmental Monitoring Plan

It is envisaged that quarterly operational stage environmental monitoring reports will be prepared by the Promoter (or operator).

Operational stage indicator	Environmental Monitoring Plan	Mitigation/control measure	Responsibility
General	Standard Operation Procedures	- Site specific Standard Operating Procedures to be agreed with LPG carriers, and downstream filling operators in accordance with international regulations and good practice. Measures to be put in place to ensure that the Standard Operating Procedures are adhered to. - All members of staff to be appropriately skilled and receive appropriate training. - Inspections and reviews of Standard Operating Procedures undertaken by the Promoters environmental health & safety officer	Promoter Proponent
	Emergency Response Plan	- Site specific Emergency Response Plan to be agreed with the KPA. - All members of staff to receive appropriate training on the implementation of the Emergency Response Plan.	
	Occupational Health & Safety	- Hazardous Area Classification shall be conducted and the findings implemented - A central dual mode redundant Safety Instrumented System (SIS) designed to SIL2 shall be deployed on a second Hima H51q platform with approximately 200 I/O (input/output) housed in a separate area of the cabinet suite with field cabling for safety loops segregated from PCMS wiring.	

		- A flammable gas detection system will be installed at sensitive locations across the site. Records shall be maintained of all instances of detection and course of action. - A preventative maintenance programme shall be implemented. - The number of mechanical joints should be kept to minimum, replace mechanical joints by welded joints where practicable. This shall be of help in reducing the leaks from flanges. - Deployment of a local firewall around the equipment found on top of the mound to eradicate any potential fire radiation impact onto the roof of the building - Flammable gas detection system should be fitted across the site, including in the vicinity of the building. - Ensure that upon flammable gas detection local to the HVAC intake duct, the building air HVAC is tripped to prevent gas ingress into the building - Building should be constructed in-line with International standards, guided by the purpose of its usage. - Hazardous Area Classification should be conducted	

		and findings to be implemented. - Active fire protection system should be designed in line with relevant international codes/ standards. - Suitable standard operating procedures and Preventative maintenance programmes should be prepared and implemented. - Site specific Emergency Response Plan shall be prepared. - Any inspection and maintenance undertaken within the pressure vessels should be undertaken by personnel trained in confined spaces. - All LPG liquids and vapours will be removed from the system using the dedicated compressors / recovery system, prior to entry. - Public access to the undeveloped areas immediately adjacent to the facility shall continue to be controlled and monitored by the KPA (in liaison with the operational staff), and kept to a minimum. - In the event of a cyclone the facility will be placed in Shutdown Mode with all ESD valves isolated. The control room will remain manned by a security guard. The existing rock revetment is approximately 4.0m	

		above mean sea level (AMSL) and affords a first line of defence to storm surge and waves. The building will be constructed at an appropriate level AMSL to reduce the risk of flooding from storm surge to a minimum. Appropriate freeboard and slopes will be afforded around the building to avoid potential flooding due to surface water run-off. The building structure will be designed to resist wind gusts imposed during severe cyclones. Therefore the risk to the security guard during the cyclone will be similar to any well designed modern building - Applicable Occupational Health and Safety mitigation measures as outlined in construction phase will be implemented - Public access to the undeveloped areas immediately adjacent to the facility shall continue to be controlled and monitored by the KPA, and kept to a minimum	
	Site maintained in tidy appearance	- Regular inspection and tidying of site, including maintenance of any landscaped areas.	
Water	Minimise consumption	- Water usage to be recorded monthly. Opportunities for improved water efficiency during operations to be	

		considered.	
Energy	Minimise consumption	- Electricity usage to be recorded monthly. Opportunities for improved energy efficiency during operations to be considered.	
Water Quality	Avoidance of hydrocarbon contamination from vehicles	- Regular inspection / maintenance of the oil interceptor (min. twice per year)	
	Avoidance of litter	- Trash screens and silt traps prior to be regularly inspected / maintained,	
	Avoidance of miscellaneous contamination from storm water system	- Sampling and analysis by an accredited test house of storm water discharge from site outfalls (min. twice per year)	
Waste Management	Minimisation and disposal of solid wastes	- Quantity and composition of waste to be monitored and records maintained - Waste to be stored in plastic bins, collected and disposed of through the municipal waste system. - If feasible measures to be considered to recycle materials such as plastics and clean paper/cardboard utilising existing specialist recycling firms in Kenya.	
	Disposal of domestic foul effluents	- Regular de-sludging of the septic tank (inspections – min. twice per year)	

11.0. CONCLUSION AND RECOMMENDATION

The proposed project will have both positive and negative impacts however; the ESMP designed has integrated mitigation measures with a view to minimize the envisaged negative impacts while maximizing on the positive ones. This will ensure compliance with all the applicable laws, standards and procedures. The proposed project will be implemented to the approvals by among others, the Physical Planning Department (Mombasa City County), Kenya Ports Authority, National Construction Authority, EPRA and NEMA. During project implementation, Environmental and Social Management Plan (ESMP) will be ensured through avoiding inadequate/inappropriate use of natural resources, conserving nature sensitively and guaranteeing a respectful and fair treatment of all people working on the project, the general public and residents of the project area.

It is our recommendation that the project be licensed to proceed provided the outlined mitigation measures are adhered to in order to ensure that the project remains environmentally and technically friendly throughout its course. Major efforts should be focused towards minimizing the occurrence of impacts that would adversely affect port operations, other businesses, local residents and the environment.

This will be achieved through implementation of the Environmental and Social Management and Monitoring Plans (ESMPs).

11.1. Recommendation

Recommendations for the prevention and mitigation of adverse impacts are as follows;

1. Eleven Energy Limited must design the proposed terminal and associated infrastructure to the ISPS standards and be properly installed and commissioned by competent persons.
2. Eleven Energy Limited must have a dedicated Environmental Health and Safety Officer on-site always.
3. The terminal must be fitted with adequate safety and monitoring control devices e.g. Safety Instrumented System (SIS) and operated by competent persons;
4. Eleven Energy Limited to put in place suitable programme of maintenance and testing by competent persons
5. There should be a continuous stakeholder consultations and public awareness creation about the project, its activities and scheduling, and potential impacts in order to prevent conflict with the residents;
6. The proponent should follow the guidelines as set out by relevant lead agencies to safeguard and visualise environmental management principles during construction and operation/occupation phases of the proposed project
7. All solid waste materials and debris resulting from construction activities should be disposed-off at approved dumpsites
8. Once earthworks are complete, restoration of the worked areas should be carried out immediately by backfilling, landscaping/ levelling and planting of suitable native tree species in the project area.

9. Eleven Energy Limited should provide elaborate treatment for active gaseous waste, active liquid and solid waste before any discharges.
10. Eleven Energy Limited should adopt an onsite recycle/reuse potential of treated water for dust suppression at sites, damping and/or flushing of toilets.
11. Eleven Energy Limited should provide protective gadgets to all workers/staff on site.
12. Eleven Energy Limited should consider implementing social and community welfare measures aimed at improving infrastructural facilities including road, education, and health in the project area as part of CSR.
13. Eleven Energy Limited should develop and implement a traffic management plan in consultation with the Mombasa County Government, KURA, KeNHA and the Traffic Police to aid the movement of HGV in and from the site to avoid blocking the roads from local use.
14. Eleven Energy Limited should put a waste management plan aimed at minimising production of hazardous wastes.
15. All project activities should be restricted from ocean shoreline to prevent damage to sea grass beds, coral reef areas, productive shallow water areas and any other environmentally sensitive area.
16. Precautions must be taken to prevent fire and explosion including appropriate protection of storage vessels

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