ENVIRONMENTAL IMPACT ASSESSMENT REPORT

PROPOSED KABATI PETROL STATION
NAIROBI-NYERI ROAD
KABATI
PLOT L.R No. MITUBIRI/ WEMPA/BLOCK 2/4746
MURANG'A COUNTY

Prepared by:	*For and on behalf of:*
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JANUARY 2019

SUBMISSION OF DOCUMENTATION

I Julius Musyoka Musili, on behalf of Antony Nzau Muoki (Proponent), submit an Environmental Impact Assessment Report for the proposed **Kabati Petrol Station - Kabati**, in Murang'a County, along the Nairobi - Nyeri road, Plot Title L.R. No MITUBIRI/WEMPA/BLK 2/4746. To my knowledge all the information contained in this report is accurate and a truthful representation of all findings as relating to the project.

Signed at……. on this…… day of…….

Signature ……...

I Antony Nzau Muoki (Proponent), submit an Environmental Impact Assessment Report for the proposed **Kabati Petrol Station - Kimoroni**, in Murang'a County, along the Nairobi - Nyeri road, near Plot Title L.R. No MITUBIRI/WEMPA/BLK 2/4746. To my knowledge all information contained in this report is accurate and a truthful representation of all findings as relating to the project.

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PROPOSED KABATI PETROL STATION NAIROBI-NYERI ROAD KABATI PLOT L.R No. MITUBIRI/ WEMPA/BLOCK 2/4746 MURANG'A COUNTY

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APPENDICES

ACRONYMS

AST	Aboveground Storage Tank
EMCA	Environment Management and Coordination Act
EA	Environmental Audit
EIA	Environmental Impact Assessment
HSE	Health,Safety and Environment
KPLC	Kenya Power Power & Lighting
KS	Kenyan Standards
LPG	Liquid Petroleum Gas
M-bgl	Metres Below Ground Level
Mg/kg	Milli grams per kilogram
Mg/l	Milli grams per litre
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Authority
PPM	Parts per million
RERP	Retail Emergency Response Plan
ToR	Terms of Reference
TPH	Total Petroleum Hydrocarbon
ug/l	Microgram per litre
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WHO	World Health Organisation

EXECUTIVE SUMMARY

The requirement for an EIA license is obligated by section 58 of the Environmental Management and Coordination Act, 1999 (EMCA) which stipulates that a proponent must seek an EIA license "notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya…". The requirement for an EIA license applies to all projects listed in the Second Schedule to the Act.

Environmental concerns have now been integrated in the planning and implementation processes of any proposed projects, to mitigate conflicts with the environment at the vicinity. In addition, it is now mandatory for projects of such nature to carry out an environmental impact Assessment (EIA) Study, to enhance sustainable environmental management as well as controlling and revitalizing the much-degraded environment. Among the listed activities is an activity out of character with its surrounding, any structure of a scale not in keeping with its surrounding or major changes in land use.

For the purpose of safeguarding our environment while meeting the regulatory requirements stipulated in the Environmental Management and Co-ordination Act (EMCA) of 1999 and the Environmental impact Assessment and Audit Regulations, 2003, Mr. Antony Nzau Muoki **(Proponent)** has commissioned Julius Musyoka Musili **(Lead Expert No. 3074)** to conduct an Environmental Impact Assessment (EIA) Study for the proposed Kabati Petrol Station - proposed **Kabati Petrol Station - Kabati**, in Murang'a County, along the Nairobi - Nyeri road, Plot Title L.R. No MITUBIRI/WEMPA/BLK 2/4746.

This Environmental Impact Assessment Study has been done with reasonable skills, care and diligence in accordance with the Environmental Management and Co-ordination Act, 1999 and the Environmental Impact Assessment and Audit Regulations, 2003.

Development of EIA Guidelines

The petroleum sub-sector in Kenya comprises established oil companies, national oil companies, new entrants, independent oil companies and indigenous oil companies. These companies require practical and pragmatic environmental guidelines to ensure compliance with requirements of existing and emerging legislation. This guideline was developed by the Petroleum Sector Environment Committee (PSEC) for the petroleum sub sector in Kenya.

The PSEC is a committee comprising of the Oil Industry EHS Managers, NEMA, Petroleum Desk Officers and PIEA approved EIA Firms of Experts. The guideline will be reviewed from time to time by the PSEC to ensure that it is kept current in its application in Kenya. Purpose The purpose of this guideline was to assist those involved with the petroleum sub-sector in Kenya – project proponents, EIA practitioners, members of the public and lead agencies to understand and follow the specific requirements of petroleum sector EIA studies.

The guideline was written in alignment with Legal Notice 101: Environment (Impact Assessment and Audit) Regulations 2003. Subsequently the Guideline will enable those involved with the petroleum sub-sector to know the levels at, and the basis on which decisions on EIA applications are made. It is hoped that this in turn will facilitate greater consideration and integration of environmental concerns in petroleum related projects, policies, plans and programs.

Scope

This Guideline is applicable to all proposed and existing petroleum related projects in Kenya. The scope does not extend beyond the territorial boundaries of the country and therefore trans-boundary environmental impacts are not included in this Guideline. Subsequently the EIA Guideline will apply to the following proposed and existing types of petroleum projects:

- Exploration and production (E&P) of crude oil;
- Refineries;
- Pipelines;
- Terminal and depots;
- LPG facilities;
- Lubricant Oil Blending Plants;
- Petroleum Jelly Plants;
- Petrol Service Stations and Filling Stations;*(This project)*
- Bulk Consumer and Industrial (C&I) Installations;
- Asphalt plants.

This Guideline provides procedural requirements for implementation of EIA studies in the petroleum sub- sector. It further describes the contents and format of the reports to be submitted to NEMA.

Proposed Development

The proposed development will involve construction of the following:

Main building and forecourt

- Three Underground storage tanks (USTs) of 20,000 litres capacity each and underground piping;
- Forecourt with six dispensers islands;
- Oil Interceptor;
- Septic tank and soak away pit;
- Greasing pit;
- Compressor and generator room;
- Car wash under roof and third open air;
- Main building within the station, comprising of:-
    - Station Manager office;
    - Station Sales offices;
    - Station store;

    - Strong room;
    - Ladies & Gents washrooms;
    - Ladies & Gents staff changing rooms;
    - Display shop.
- Entrance and exit signage;
- Acceleration and deceleration lanes along the service road;
- Perimeter fence (masonry);
- Ribbed reinforced concrete forecourt;
- Canopy and price billboard;
- Fire fighting equipment;
- Sewerage and storm-water drainage systems;
- Landscaping area.
- Installation of electrical service components;
- Infrastructure and services.

Impacts from the proposed development

Positive Impacts

- Generation of employment opportunities;
- Improved Government revenue.
- Increased business opportunities;
- Improved social infrastructure;
- Interaction of people from different communities;
- Growth of town;
- Potential for increased economic activities;
- Transfer of skills;
- Improved security.

Negative Impacts

Anticipated impact	**Recommended mitigation measure**
Vegetation disturbance:	• Ensure proper demarcation and delineation of the project area to be affected by construction works; • Specify locations for vehicles and equipments, and areas of the site which shall be kept free of traffic, equipment and storage; • Designate access routes and parking area within the site; • Introduction of vegetation (trees, shrubs and grass) on open spaces and around the project site and their maintenance; • Design and implement appropriate landscaping programme to help on re-vegetation of part of the project area after construction.
Soil Erosion Control:	• Earthworks should be controlled so that land that is not required for the construction works is not disturbed. Wherever possible, earthworks should be carried out

Anticipated impact	Recommended mitigation measure
	during the dry season to prevent soil from being washed away by the rain. • Excavated materials and excess earth will be kept at appropriate sites approved by the supervising engineer and the earth dumping sites designed in such a manner as to facilitate natural water discharge; • The Contractor shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible.
Air Pollution	• Ensure strict enforcement of on-site speed limit regulations; • Sprinkle water during excavation works by heavy machines; • Sprinkle water on graded access roads when necessary to reduce dust generation by construction vehicles; • Provide nose masks to be provided to employees and encourage them to use the masks.
Noise Pollution	• Noise levels shall be kept within acceptable limits by NEMA; • Use of ear protectors by workers when performing noisy operations; • Recondition engine exhaust systems; • Engine tune-up; • Establish inspection and maintenance program for equipment; • Post appropriate notices to warn drivers against unnecessary hooting of vehicles; • Switch off engines or reduce idling time when not in use; • Confine activities between 8.00 am and 5.00 pm; • Enclose the construction site with three metre high iron sheets.
Solid waste generation and disposal	• Provide suitable and well labelled solid waste containers; • Proper segregation of solid waste; • Reduce generation of solid waste at the source; • Reuse of top soil for landscaping of the site; • Empty packaging materials like cartons and cement bags should be piled in a safe place and sold to waste paper recyclers; • Other solid waste to be disposed of at designated sites; • Install oil interceptors along the storm water drainage channels; • Provision of sanitary facilities for use by workers; • The use of the "3Rs" philosophy of reuse, recycle and reduce will be adopted.
Over-extraction of construction materials	• Construction materials shall be from approved sources: for example: hardstone for building should be obtained from

Anticipated impact	Recommended mitigation measure
	bonafide commercial quarries; • Procure environmentally friendly and sustainable materials; • Do not use the following materials for construction of the building: a. Asbestos in any form; b. Asbestos substitutes or any naturally occurring man-made mineral fibres c. Lead, Lead paint or other materials containing Lead which may be inhaled, ingested or absorbed; d. Vermiculite, unless it is established as being fibre-free; e. Any product containing Cadmium that are regarded as being deleterious building material which are not in accordance with statutory requirements or with current accepted good building practice at the time of specification or construction.
Liquid Wastes	• Carefully collect used oil in drums and dispose of by licensed refuse contractor; • Adhere to wastewater management regulation of the legal Notice 121 and Water quality regulations of the Legal Notice 120; • Conduct wastewater monitoring to check compliance and submit the results to NEMA; • Document and train staff in the emergency spill response plan. • Revegetation of open ground should be done to reduce run off hence reducing storm water drain.
Contamination of soil and ground water sources incase of accidental oil spillages	• Have sorbent materials available on site; • If a spill or leak occurs, stop it from flowing at the source; • The tank and lines will be used as per their design life of 30 years and a UST / line replacement programme put in to ensure tanks and lines are replaced prior to failure in timely fashion; • Monitor daily reconciliation of wet stock and inventory records; • In case of suspect losses, institute tank and line integrity testing; and • Conduct a soil gas survey to check the extent of contamination from the leaks. • Most of the open grounds should be cemented to prevent spills from leaking into underground water and soils; • Ensure that all drainages are fitted with oil interceptors to retain any oils that will find their ways into the drainages; • Monitor quality of water draining from the site.
Public health and occupational health and	• Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restrictions

Anticipated impact	Recommended mitigation measure
safety	on site, frequency and personnel responsible for safety inspections and controls; • Daily site inspections should be done to ensure safe work practises are adhered to; • All workmen should be provided with personal protective equipment; • The Conditions of Contract in the tender documents should stipulate health, safety and environment regulations and work procedures; • The Contractor must appoint a foreman with knowledge on health, safety and environment regulations; • All injuries that occur on site must be recorded in the accident registers and corrective actions for their prevention be instigated as appropriate; • Site personnel should be encouraged to report "near-miss incidents" in order to avoid potential problems and increase safety awareness.
Energy Utilisation	• Develop an energy management plan; • Construction machinery and vehicles should be maintained and used in accordance with manufacturer's specifications, to maximise efficiency and lower use of energy; • Construction workers should be sensitised on the importance of energy management.
Water Utilisation	• The Contractor should monitor water consumption and utilisation; • The Contractor should sensitise construction workers on the importance of proper water management.
Traffic Management	• The Contractor should plan and implement traffic management programme on daily basis; • Comply with all applicable legislation and by-laws with regard to road safety and transport; • Lane and junction design and signage to meet appropriate standards; • Movement of construction vehicles timed to avoid peak periods • Ensure adequate entry and exit lane design and appropriate signage.
Underground fuel storage and handling	• The fuel storage tanks to be installed should undergo calibration, pressure checks, and leakage tests and have been passed as safe for use by an accredited company. • Ensure that the underground tanks are compliant with Kenya standards (KS 200:2002) • Conduct pressure tests before commissioning of the station to ensure that the product lines (pipe works) comply with KS 1969:2006, KS 1967: 2006 and 1968:2006.

Anticipated impact	Recommended mitigation measure
	• Use properly maintained hoses and fittings; • Make the cement screeds in all the chambers using water proof material; • Install a monitoring well next to the tanks to check on leaks; • Use water finding dipstick and/ or a hydrometer to check on density/ specific gravity; • Ensuring no spills during refilling and / or when offloading the fuel; • Installation of the storage tanks will be done by an accredited company to the standards specified in the Petroleum Act Cap 116, Part III which highlights the methods of storage of petroleum products.

Fire Hazards:

The following are proposed to mitigate fire hazards at the proposed petrol station:

Aspect	Issue	Recommendations
Fire prevention and safety measures:	Fire policy and emergency Plan:	The station should have a written fire policy and an emergency plan that specifically addresses actions to be taken in the event of a fire in the facility. The emergency plan should include: • Actions and responsibilities of employees in reporting a fire; • Responsibilities and actions to be taken to control vapours and prevent ignition of vapours resulting from spills; • Actions and procedures to be taken in fighting fires both manually and by activation and deactivation of fixed systems; • Desired method of extinguishing fire such as through a controlled burn-out or by application of an extinguishing agent; • Notification of appropriate authorities.
	Fire fighting equipment:	• Provide specific fire fighting equipment and containment measures to cater for fire hazards specific to each operation; • The water tank dedicated to fire fighting should be able to provide water at sufficient pressure to operate foam generating sets and in sufficient quantity to contain a tank fire and provide cooling; • The fire systems in critical areas should be designed to activate automatically (through detection systems).

Aspect	Issue	Recommendations
	Fire protection:	• Critical equipment and buildings should be fire resistant, protected against fire and blast damage e.g. passive fire protection on emergency shutdown valves, blast proofing of control rooms, etc; • Maintaining integrity of storage tanks and piping systems containing flammable or combustible liquids essential for prevention of fires in around tanks.
	Staff training:	• Facility staff should be trained in fire systems activation as well as operation, maintenance and testing of the system; • Regular equipment inspections, maintenance and testing, as well as strict compliance to company's HSE policy, should help curb loss of containment as a result of 'generic' failures and operationally related failures.
Fire prevention and safety measures:	Safety practices:	• Adequate security needs to be put in place to guard against sabotage such as control of access for personnel and customers entering the site; • There should be adequate access routes for fire tank approach; • Any operation or job such as mobile phones calls, cigarette smoking, welding, etc. which could become or create an ignition source for any flammable or combustible material should be prohibited. • Compliance with Fire Risk Reduction rules – annual fire safety audits.

If the mitigation measures are implemented during the design, construction and operation of the proposed Kabati Petrol Station, the potential negative environmental impacts will be managed and maintained to acceptable standards.

Mechanisms for implementation and monitoring have been recommended in an *Environmental Management and Monitoring Plan* presented in Chapter 8 of this project report.

1 INTRODUCTION

1.1 Project Summary

Proponent:	Antony Nzau Muoki
Nature of Development:	Petrol Station - Kabati;
Property to be Developed:	Along the Nairobi - Nyeri road, near Plot Title L.R. No MITUBIRI/WEMPA/BLK 2/4746. Murang'a County.
Plot size:	0.220 Ha;
Coordinates	Latitude 0^0 54' 59.47"S and Longitude 37^0 11' 59.41"E;
Power:	To be installed;
Water Supply:	To be installed;
Sewerage Facilities:	To be installed.

1.2 Project Background and Introduction

The proponent, Antony Nzau Muoki, plans to build new Kabati Petrol Station - on a vacant plot within Murang'a County along the Nairobi - Nyeri road, near Plot Title L.R. No MITUBIRI/WEMPA/BLK 2/4746.

Geographically, the proposed site is on coordinates **Latitude 0^0 54' 59.47"S and Longitude 37^0 11' 59.41"E .**

It also falls under the management of hydrocarbons including the storage of petroleum products and combustible or explosive fuels. It is therefore included in the projects in Schedule 2 of the EMCA 1999 that require an Environmental Impact Assessment Report.

1.3 Project Features in Brief

The project involves construction of a fully equipped Petrol Station with the following:-

- Underground storage tanks (USTs), piping and Dispensers;
- Forecourt, Pump Islands and Canopy;
- Support equipment (Generator, Compressor and Air gauge);
- Main building (Operation offices, Washrooms, Changing rooms & stores);
- Acceleration and deceleration lanes along the service road;
- Perimeter fence (masonry) and Fire fighting equipment;
- Sewerage, Oil Interceptor & storm-water drainage systems;
- Eating place, shops, butchery and mall services.

The main activities at the proposed site upon completion shall include vehicle refuelling, vehicle servicing and tyre repairs. Packed LPG (in cylinders) and lube products shall be sold to the consumers who visit the station. Food eating services and shopping. Station operations can be harmful to the environment through contamination of the groundwater, soil, and surface waters and vapour emissions to air.

The operations could also have health and safety impacts, both on-site and to the immediate surrounding areas. Appropriate measures shall therefore be put in place to ensure environmental protection and sustainable co-existence of the site activities with other social and economic activities. The construction phase of the project shall commence immediately after the relevant statutory requirements have been met.

The site and borders is:-

- No development on the proposed plot currently;
- The surrounding area is not developed there are farmland, homestead and planted trees;
- Area is scarcely populated;
- Generally there will be a security boost at the area once the project is done.

1.4 Risk Assessment of the Proposed Kabati Petrol Station

Petroleum is a highly flammable liquid especially petrol and gives off flammable vapour even at very low temperatures. When the vapour mixes with air in proportions between 1:8 ratio in percentage, a risk of fire or explosion exists. Petrol vapour is heavier than air and does not disperse easily in still conditions. It tends to sink to the lowest possible level of its surroundings and may accumulate in tanks, cavities, drains, pits or other depressions.

Flammable atmospheres may also exist where clothing or other absorbent material or substances are contaminated with petrol. Petrol vapour can have acute or chronic effects if inhaled. In the context of this project, risk is a combination of the probability or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrences. It is a flexible method of analysis, a systematic approach to organizing and analyzing scientific information about potentially hazardous activities or about substances that might pose risk under certain conditions.

Possible risks at the petrol station would be explosions, fires, accidents, leakages, spillages, robberies, etc. The necessary and appropriate measures have been identified and implementation guidelines proposed in order to control the risks identified. Hazardous materials at the service stations will include white products, liquefied petroleum gas, lubricants, battery acid and brake fluids. The personnel working at the service station shall be well trained regularly and made conversant with the safety and environmental aspects relating to the products they shall be handling.

1.5 Justification of the Project

The proponent intends to construct a petrol station to take advantage of the increasing demand for petroleum products in Kenya. During operation the proponent will get income and at the same time create jobs for young people who are looking for jobs.

The proponent is on the lookout to identify profitable outlet to supply LPG and fuel oil, among other petroleum products, to meet the regional demand. Several factors, amongst them power generation using fuel oil and the recent growth in the Kenyan economy have led to a substantial increase in fuel oil consumption. LPG consumption has grown mainly due to the booming tourism sector, while a concerted effort by the

government to improve the Country's infrastructure has led to a high demand of the other petroleum products and presented unprecedented opportunity for growth in the consumer sector.

The petrol station will seek to address the following;

- Fuel shortages in the locality, caused by high consumption by the motorists on transit, and the area immediate surrounding;
- Frequent shortages of LPG gas, normally caused by businessmen who hoard the commodity in anticipation of hiking prices;
- Offer competitive prices of petroleum products to its customers;
- Provision of cash wash and vehicle service at the area;
- Provision of fast food in the area.

1.6 Considerations done for the Proposed Project

- Neighbours and stakeholders views and opinion about the project;
- The previous use of the land where the proposed project is being undertaken;
- Population density of the area;
- Zoning of the area;
- General land use of the adjacent sites;

During the course of formulating the proposed project, several project alternatives were considered to ensure that the best option of project development was adopted.

1.7 Major requirements

- **Power requirement:** - To enable the station operate, electrical energy is required. This shall be provided by Kenya Power and Lighting Company Limited and a standby (back up) diesel generator;
- **Water requirement:-** Water is required for washing the offices floor, sanitary purposes in the ablution block, forecourt cleaning carwash. Piped water will be sourced from Murang'a Water and Sanitation Company;
- **Manpower: -** During construction and the operation phase of the station, there will be opportunity to engage temporary and permanent employees (skilled and unskilled) for the efficient provision of labour.
- **Communication and security:** -The communication facilities shall include telephones, fax, e-mails, sign posts, precautionary signs, etc. The most critical precautionary signage shall include **'No smoking'**, '**switch off mobile phones'**, **switch off engine**, **'vehicles parked at owners' risk'** and so on. The station shall be manned throughout its operation phase.

1.8 Aim of the Study

The aim of carrying out the EIA study for the project was to:

- Identify possible impacts;
- Give an assessment of key processes and operations for their potential to cause pollution in the future;

- Provide solutions for the management of these possible liabilities in the long term;
- Provide a baseline against which future environmental performance can be gauged;
- To fulfil the requirements of the Environmental Management & Co-ordination Act as outlined in Section 58 and Regulation 7 of the EIA Regulations;
- To obtain background biophysical and social information of the site;
- To present the legal and regulatory issues associated with the project;
- To propose mitigation measures for the potential significant adverse environmental impacts and safety risks;
- To compile an EIA Report for submission to NEMA for licensing of the project construction and operation.

Background information pertaining to the site was collected during discussions between the EIA Lead experts (Environmental Consultants), the proponent, neighbours and the public during site visits and meetings as follows:

- An site visits to familiarise with the site and prepare a Project report was done in the month of January 2019 several days;
- Soil sampling was carried during the site visits;
- Public Consultation was conducted during the site visits at the project site and its environs.

1.8.1 Scope, Objectives and Criteria of Conducting the EIA Study

The Government of Kenya policy on all new projects, programs or activities requires that an Environmental Impact Assessment be carried out at the planning stages of any proposed undertaking. The scope of this Environmental Impact Assessment, therefore, covers:

The broad objectives and scope of this *Study* are as follows:-

- Study the baseline environmental and social conditions in the project area, including the physical, biological and socio-economic environment;
- Study the project conditions and requirements in terms of design, construction and operational requirements;
- Assess environmental and social impacts of the project and suggest suitable mitigation measures for adverse impacts;
- Public consultations;
- Prepare an environmental management plan (EMP) for implementation and monitoring of mitigation measures, along with institutional and reporting requirements.

1.9 Approach to the Study

1.9.1 Environmental Assessment Procedures

The procedure used in undertaking the environmental assessment included the following:

The Terms of Reference (ToR) for this EIA report are based on the NEMA *Environmental Impact Assessment and Audit Regulations* dated June 2003. According to the *Regulations* the EIA Report should, where possible, contain descriptions of the following:

- *Establish the suitability of the proposed location of the project;*
- *A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project;*
- *A description of the technology, procedures and processes to be used, in the implementation of the project;*
- *A description of materials to be used in the construction and implementation of the project, the products, by-products and wastes to be generated by the project;*
- *A description of the potentially affected environment;*
- *Carry out ambient air quality, noise levels and soil quality baseline measurements;*
- *A description of environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated;*
- *To recommend a specific environmentally sound and affordable wastes' management system;*
- *Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes;*
- *Analysis of alternatives including project site, design and technologies;*
- *Development of Environmental Management Plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures;*
- *Provide an action plan for the prevention and management of the foreseeable hazardous activities in the cause of the project cycle;*
- *Propose measures to prevent health hazards and to ensure security in the working environment for the employees, residents and for the management of emergencies;*
- *An identification of gaps in knowledge and uncertainties which were encountered in compiling the information;*
- *An economic and social analysis of the project.*

1.9.2 EIA Approach and Methodology

The approach to this exercise was structured such as to cover the requirements under the EMCA, 1999 as well as the Environmental Impact Assessment and Audit

Regulations, 2003. It involved largely an understanding of the project background, the preliminary designs and the implementation plan as well as commissioning.

In addition, baseline information was obtained through physical investigation of the site and the surrounding areas, informal interviews with a random sample of people from the surrounding community, use of public participation forms, site checklist, photography, and discussions with other stakeholders.

The key activities undertaken during the assessment were:

- Continuous discussions with the stakeholders and accessing other sources of information on the proposed project details, the site planning and implementation plan;
- Physical inspection of the proposed site, photography and interviews with people in the immediate neighbourhood. Public participation forms were used to record their opinion regarding the project (samples have been attached to this report in Appendix 6);
- Evaluation of the activities around the site and the environmental setting of the wider area. This was achieved through existing information, literature and physical observations;
- Review of available documentation;
- Soil sampling and laboratory analysis See Appendix 4;

Reporting, review and submissions Below is an outline of the basic EIA steps that were followed during this assessment:

Step 1: Project Concepts
The project details, scope, design, implementation, commissioning were first analyzed.

Step 2: Project Screening
Details about baseline conditions and potential environmental impacts were collected through desktop study, stakeholder consultations, site visits, photography, and inductive methods.

Step 3: Identification of Potential Environmental and Social Impacts
The Potential Environmental impacts were identified, Classified and magnitude determined.

Step 4: Impact Assessment and Consultations
The Environmental Impacts were analyzed, assessed and discussed in details involving consultations with the Proponent and stakeholders.

Step 5: Formulation of Mitigation measures
Mitigation measures to ameliorate or minimize the potential Environmental impacts were formulated for the entire project life.

Step 6: Development of an Environmental & Social Management and Monitoring Plan:

An EMP for the project life was developed indicating parameters to be monitored, persons responsible, timing and costs involved.

Specific issues covered in the project report include, but are not, limited to:

- Name of the proponent, address and contact person;
- Title of the project;
- Objectives and scope of the project;
- Nature of the project;
- Location of the proposed project, including the physical area that may be affected by the project's activities;
- Types of activities that will be undertaken during the project construction, operation and decommissioning phases;
- Design of the project;
- Proposed Project budget;
- Materials to be used, products and by-products, including waste to be generated by the project and the method(s) of their disposal;
- Potential environmental impacts of the project;
- Economic and social impacts to the local community and the nation in general;
- Views of the public/potentially affected people about the project; and
- An Environmental Management Plan (EMP) for the entire project cycle to include mitigation measures to be taken during and after implementation of the project and an action plan for the prevention and management of foreseeable accidents during the project cycle.

1.10 Structure of the Report

The structure of this report is as follows:

Chapter 0: Executive summary.

Chapter 1: Introduction: This chapter gives the background information relevant to the project and describes the objectives and requirements of the study.

Chapter 2: Policy, legal and regulatory framework: This chapter outlines Government policy on the environment, the relevant legislation relating to natural resource management and environmental protection and the institutions that deal with various aspects of environmental management.

Chapter 3: Description of the existing environment: Provides a description of the existing environment to achieve an understanding of the bio-physical and social environmental setting.

Chapter 4: Project Description: Describes the Project design, project construction and operation.

Chapter 5: **Project Alternative**: The alternative consists of the proponent's final proposal with the inclusion of the NEMA guidelines and regulations and procedures. This is as stipulated in the Environmental Management and Co-ordination Act (EMCA) of 1999, which aims at reducing environmental impacts to the minimum extent practicable.

Chapter 6: **Public Consultations**: Describes the consultation process, views of stakeholders and the future consultations.

Chapter 7: **Environmental impacts and mitigation measures**: Identifies the potential impacts on the bio-physical and socio-economic environment, together with appropriate mitigation measures to minimise and manage the effects on the environment.

Chapter 8: **Environmental management and monitoring plan**: Describes the measures to be taken and the monitoring requirements and responsibilities for mitigating the potential negative impacts.

Chapter 9: **Conclusion and Recommendation**: Provides a brief non-technical summary of the report findings and recommendations.

2 POLICY LEGAL AND REGULATORY FRAMEWORK

2.1 Introduction

The Environmental Management and Co-ordination Act (EMCA) No.8 of 1999 provide the legal and statutory guidelines for the Environment and Social Impact Assessment process in Kenya.

EMCA is divided into 13 Parts, covering main areas of environmental concern as follows: Preliminary (I); General principles (II); Administration (III); Environmental planning (IV); Protection and Conservation of the Environment (V), Environmental Impact Assessments (EIA), Audits and Monitoring (VI); Environmental Audit and Monitoring (VII); Environmental Quality Standards (VIII); Environmental Restoration Orders, Environmental Easements (IX); Inspection Analysis and Records (X); International Treaties, Conventions and Agreements (XI) National Environment Tribunal (XII); Environmental Offences (XIII).

Under section 58 (1) *of EMCA* the proposed project falls under the prescribed list of projects for which **full environmental and impact assessment is mandatory**, prior to implementation. These are projects that must undergo Screening, Scoping and full Environment and Social Impact Assessment. The basis is that the proposed project constitutes several components of activities, which would generate considerable changes and significant effects to the environment including on land, water, atmospheric resources, biological diversity and socio economic impacts.

Part II of EMCA confers the right of every person to a clean environment and to its judicial enforcement. EMCA therefore makes it mandatory for the project proponent to work in a clean environment and protect people living close to the project.

Table 2-1, 2-2 and 2-3 below indicates a summary of the applicable legislative and institutional framework that are applicable to the proposed project.

2.2 Policy Framework

Table 2-1: Policy Framework and its relevance to the study

Policy	Relevant section	Relevance to the project
Kenya Vision 2030	Kenya Vision 2030 is the country's long term development blueprint guiding development in Kenya from 2008 to 2030.Its objective is to transform Kenya into a newly industrialising, ''middle income country providing a high quality life to all its citizens by the year 2030'' Section 5.4 on the Environment, the Vision 2030 in regards to the environment states that Kenya aims to be a nation living in a clean, secure and sustainable environment by 2030. It also states that Kenya will enhance disaster preparedness in all disaster-prone areas and improve the	Mitigation measures and the health and safety aspects that have been formulated for this project are relevant as they will ensure minimal oil spillage, accidental fires from the hazardous products which all aim at protecting the environment (Physical, Biological and Social).

Policy	Relevant section	Relevance to the project
	capacity for adaptation to global climatic change. In addition the country will also harmonize environment-related laws for better environmental planning and governance.	
Millennium Development Goals (MDGs)	Goal 7: Ensure Environmental Sustainability-Target 9 Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.	Goal 7 demands Environmental Sustainability when interacting with the Environment. Chapter 7 of this report highlights the mitigation measures to be adopted for the project to ensure environmental sustainability such as preventing pollution that contributes to greenhouse gases emission.
National Environment Policy 2013	The goal of this Policy is to Better quality of life for present and future generations through sustainable management and use of the environment and natural resources. Section 6.5 highlights on handling and disposal of hazardous substances.	The report has developed an ESMP for the study on how to handle and dispose wastes from the service station to ensure that the environment is not compromised by illegal dumping of wastes.
Land Policy	The National Land Policy in Chapter 3 under section 3.4, Environmental Management Principles, provides for the policy actions for addressing the environmental problems such as the degradation of natural resources, soil erosion, and pollution of air, water and land. The policy advocates for environmental assessment and audit as a land management tool to ensure environmental impact assessments and audits are carried out on all land developments that may degrade the environment and take appropriate actions to correct the situation. Public participation has also been indicated as key in the monitoring and protection of the environment. Section 3.4.3.3 prohibits discharge of untreated wastes into the environment.	Chapter 7 and 8 of this report have recommended mitigation measures to be put in place especially with oil spillages that may cause soil and ground water contamination.

2.3 Legislative Framework

Table 2-2: Legislative Framework and its relevance to the study

Legislation	Relevant Section	Relevance to the project
Constitution of Kenya, 2010	Part II (Environment and Natural Resources), (I) the State clearly undertakes to carry out the following: • Ensure sustainable exploitation, utilization, management and conservation of the environment and	The project should observe these conditions in as far as environmental protection is concerned throughout the project cycle.

Legislation	Relevant Section	Relevance to the project
	natural resources, and ensure the equitable sharing of the accruing benefits; • Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya; • Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities; • Encourage public participation in the management, protection and conservation of the environment; • Protect genetic resources and biological diversity; • Establish systems of environmental impact assessment, environmental audit and monitoring of the environment; • Eliminate processes and activities that are likely to endanger the environment; and • Utilize the environment and natural resources for the benefit of the people of Kenya. Part (II) "Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.	
Environment Management and Coordination Act, (EMCA) 1999	Section 58 of the Act makes it a mandatory requirement for an EIA study to be carried out by proponents intending to implement projects specified in the second schedule of the Act. Such projects have a potential of causing significant impacts on the environment. Similarly, section 68 of the same Act requires operators of existing projects or undertakings to carry out environmental audits in order to determine the level of conformance with statements made during the EIA study. The proponent is required to submit the EIA and environmental audit reports to NEMA for review and necessary action.	The proposed project is listed under section (10) Management of hydrocarbons including the storage of natural gas and combustible or explosive fuels. in the second schedule of the Act therefore it's among the list of projects that are to go through an EIA study.
Environmental Impact Assessment and Audit Regulations 2003	Regulation 3 states that "the Regulations should apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V and the Second Schedule of the Act. Part III of the Regulations indicates the procedures to be taken during preparation, submission and approval of the environmental study report. Part 4(1) of the Regulation further states that: *''…no Proponent shall implement a project:* *(a) Likely to have a negative environmental impact; or* *(b) For which an environmental impact*	This project falls under section 10 among the projects that have been listed in the second schedule of EMCA and therefore requires an ESIA study prior to its implementation.

Legislation	Relevant Section	Relevance to the project
	assessment is required under the Act or these Regulations, unless an environmental impact assessment has been concluded and approved in accordance with these Regulations…''	
Environmental Management and Co-ordination (Water Quality) Regulations, 2006)	It is an offence under Regulation No. 4 (2), for any person to throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution. Regulation No. 11 further makes it an offence for any person to discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment.	During implementation of the project the contractor's activities and during the operational phase, storm water from the service station may contain traces of hazardous components. It is recommended that the above regulations be met with prior to the storm water run-off joining the environment.
Environmental Management and Co-ordination (Waste Management) Regulations, 2006	Regulation No. 4 (1) makes it an offence for any person to dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle. Regulation 5 (1) provides categories of cleaner production methods that should be adopted by waste generators in order to minimize the amount of waste generated and they include: **Improvement of production process through** • Conserving raw materials and energy; • Eliminating the use of toxic raw materials and wastes; • Reducing toxic emissions and wastes. **Monitoring the product cycle from beginning to end by** • Identifying and eliminating potential negative impacts of the product; • Enabling the recovery and re-use of the product where possible, • Reclamation and recycling and • Incorporating environmental concerns in the design and disposal of a product. Regulation 6 requires waste generators to segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal. Regulation 15 prohibits any industry from discharging or disposing of any untreated waste in any state into the environment. Regulation 17 (1) makes it an offence for any person to engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license	The proposed project, during construction, operational and decommissioning phases will generate wastes which will need to be disposed as per the guidelines in the regulations.

Legislation	Relevant Section	Relevance to the project
	issued by NEMA.	
Environmental Management and Coordination Act (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009	According to regulation 3 (1), no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Regulation 4 prohibits any person to (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source. Regulation 5 further makes it an offence for any person to make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property. Regulation 12 (1) makes it an offence for any person to operate a motor vehicle which (a) produces any loud and unusual sound; and (b) exceeds 84 dB(A) when accelerating. According to sub-regulation 2 of this regulation, No person shall at any time sound the horn or other warning device of a vehicle except when necessary to prevent an accident or an incident. Regulation 13 (1) provides that except for the purposes specified in sub-Regulation (2) there under, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) 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 these Regulations. Regulation 19 (1) prohibits any person to carry out activities relating to fireworks, demolitions, firing ranges or specific heavy industry without a valid permit issued by the Authority. According to sub-regulation 4, such permit shall be valid for a period not exceeding three months.	The contractor and project proponent will be required to ensure compliance with the above regulations in order to promote a healthy and safe working environment throughout the project cycle. This shall include regular inspection and maintenance of equipment and prohibition of unnecessary hooting of vehicles as well as scheduling work between 8.00am and 5.00pm.
Environmental Management and Coordination (Fossil Fuel Emission Control Regulations 2006)	Section 4(1) of the Regulations states that "any internal combustion engine is subject to inspection under these regulations and shall, as a condition of compliance with the inspection, pass such tests as may be required to demonstrate that the internal combustion engine complies with any standards and requirements for the control of air pollution or contamination as may be prescribed.	The proposed service station should adhere to the stated regulations especially during the operational phase of the project.

Legislation	Relevant Section	Relevance to the project
	Section 5 states that "The authority may appoint such number of environmental inspectors as it may deem appropriate for purposes of carrying out emissions inspections under these Regulations and may ,without prejudice and may, to the foregoing, appoint any employee of a lead agency conducting inspection of internal combustion engines on behalf of the Government.	
Public Health Act (Cap. 242)	Section 115 of this act prohibits causing nuisance or other condition liable to be injurious or dangerous to health. Section 118 provides a list of nuisances which includes any noxious matter, or waste water, flowing or discharged from any premises, wherever situated, into any public street, or into the gutter or side channel of any watercourse, irrigation channel or bed thereof not approved for the reception of such discharge.	This Act is applicable to the project since the contractor will be required to construct toilets for use by workers and visitors to the site during the construction phase and operational phase of the proposed petrol station.
Public Health (Drainage and Latrine) Rules	Rule 85 provides that every owner or occupier of every workshop, workplace or other premises where persons are employed shall provide proper and sufficient latrines for use by employees. Rule 87 requires every contractor, builder or other person employing workmen for the demolition, construction, reconstruction or alteration of any building or other work in any way connected with building to provide in an approved position sufficient and convenient temporary latrines for use by such workmen. Rule 91 provides that no person shall construct a latrine in connection with a building other than a water closet or a urinal, where any part of the site of such building is within 200 feet of a sewer belonging to the local authority which is at a suitable level, and where there is sufficient water supply.	
Penal Code (Cap. 63)	Section 191 of the Penal Code makes it an offence for any person or institution that voluntarily corrupts, or foils water for public springs or reservoirs rendering it less fit for its ordinary use. Similarly, section 192 of the same act prohibits making 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 a public way.	The Contractor will be required to ensure strict adherence to the Environmental Management Plan throughout the project cycle in order to mitigate against any possible negative impact associated with dust, noise and effluent discharge.
Energy Act 2006	Part IV of the Act deals with petroleum and natural gas with sections including: • Licensing; • Construction permits;	This Act is relevant to the service station as the project is going to deal with bulk storage of petroleum products.

Legislation	Relevant Section	Relevance to the project
	• Standards for petroleum products, equipment, facilities and installations; • Compliance with environmental health and safety standards including requirements for clean-up of polluted or damaged environment. Section 117 of the Act outlines requirements for reporting of accidents and incidents to the Energy Regulatory Commission. Section 90 and 91 of the Act empower the Energy Regulatory Commission to grant construction permits for a pipeline, refinery, bulk storage facility or retail dispensing site. Licenses are also required for petroleum business under importation, refining, exportation, wholesale, retail, storage or transportation of petroleum as well as a permit for the owner of a vehicle transporting petroleum with certified driver.	
Physical Planning Act	Section 36 states that if in connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an environmental impact assessment report. Section 30(1) requires a developer in any local authority to be granted development permission by the respective local authority, failure to which heavy fines will ensue; and the land registrar shall decline to register such a document. No sub-division of private land shall take place within a local authority unless the sub-division is in accordance with the requirements of an approved local physical development plan.	The proponent will be required to present its development plan to the Murang'a County Planning office for approval before the project commences.
Employment Act	53. (1) Notwithstanding any provision of any written law, no person shall employ a child in any activity which constitutes worst form of child labour. 56:- (1) No person shall employ a child who has not attained the age of thirteen years whether gainfully or otherwise in any undertaking. (2) A child of between thirteen years of age and sixteen years of age may be employed to perform light work which is (a) Not likely to be harmful to the child's health or development; and (b) Not such as to prejudice the child's attendance at school, his	The project proponent and the contractor will need to understand the requirements of the Act during employment at construction stage and operation phases of the project

Legislation	Relevant Section	Relevance to the project
	participation in vocational orientation or training programmes approved by Minister or his capacity to benefit from the instructions received.	
Traffic Act	This Act specifies that motor vehicles use proper fuel. The traffic Regulations promulgated under the Act specifies that every vehicle is required to be well constructed, maintained and used so as not to emit any smoke or visible vapour.	The contractor should ensure that all locomotives used throughout the project construction and operational phase for transportation comply with this Act.
Work Injury Benefits Act (WIBA)	It is an act of Parliament to provide for compensation to workmen for injuries suffered in the course of their employment. It outlines the following: • Employer's liability for compensation for death or incapacity resulting from accident; • Compensation in fatal cases; • Compensation in case of permanent partial incapacity; • Compensation in case of temporary incapacity; • Persons entitled to compensation and methods of calculating the earnings; • No compensation shall be payable under this Act in respect of any incapacity or death resulting from a deliberate self-injury; • Notice of an accident, causing injury to a workman, of such a nature as would entitle him for compensation shall be given in the prescribed form to the director.	The Contractor will need to abide by all the provisions of WIBA.
Occupational Safety and Health Act, 2007	This is an Act of Parliament to provide for the safety, health and welfare of all workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. It applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of this Act is to: • Secure the safety, health and welfare of persons at work; • Protect persons other than persons at work against safety and health arising out of, or in connection with the activities of persons at work. The Occupational Safety and Health Act 2007 (OSHA 2007) Kenya Gazette Supplement No. 111 (Acts No.15) dated October 26, 2007 revokes the Factories and Other Places of Work Cap.514.	The Contractor will be required to comply with all the provisions of the Act throughout the project cycle.

Legislation	Relevant Section	Relevance to the project
	The scope of OSHA 2007 has been expanded to cover all workplaces including offices, schools, academic institutions, factories and plantations. It establishes codes of practices to be approved and issued by the Directorate of Occupational Safety and Health Services (DOSHS) for practical guidance of the various provisions of the Act.	
County Governments Act 2012	The local government act has been repealed after the final announcement of all the results of the first elections held under the Constitution as per the County Governments Act of 2012. Under section 134 subsection *(1), The Local Government Act is repealed upon the final announcement of all the results of the first elections held under the Constitution*. It further states in section 134, subsection (2) reads "*All issues that may arise as a consequence of the repeal under subsection (1) shall be dealt with and discharged by the body responsible for matters relating to transition".* Part VIII of the act on Citizen Participation (87) (b) emphasizes on the right of citizens to participate to any development projects prior to their implementation.	The project will have to abide by the requirements of the act applicable.
Work Injury and benefits Act (Chapter 236) Laws of Kenya	It is an act of Parliament to provide for compensation to workmen for injuries suffered in the course of their employment. It outlines the following: • Employer's liability for compensation for death or incapacity resulting from accident; • Compensation in fatal cases; • Compensation in case of permanent partial incapacity; • Compensation in case of temporary incapacity; • Persons entitled to compensation and methods of calculating the earnings; • No compensation shall be payable under this Act in respect of any incapacity or death resulting from a deliberate self-injury; • Notice of an accident, causing injury to a workman, of such a nature as would entitle him for compensation shall be given in the prescribed form to the labour officer of the area or District Commissioner.	The project must adhere to the Act throughout its life cycle.

(a) Occupational Safety and Health Act, 2007

This is an Act of Parliament to provide for the safety, health and welfare of all workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes.

It applies to all workplaces where any person is at work, whether temporarily or permanently.

The purpose of this Act is to:

- Secure the safety, health and welfare of persons at work;
- Protect persons other than persons at work against safety and health arising out of, or in connection with the activities of persons at work.

The Occupational Safety and Health Act 2007 (OSHA 2007) Kenya Gazette Supplement No. 111 (Acts No.15) dated October 26, 2007 revokes the Factories and Other Places of Work Cap.514.

The scope of OSHA 2007 has been expanded to cover all workplaces including offices, schools, academic institutions, factories and plantations. It establishes codes of practices to be approved and issued by the Directorate of Occupational Safety and Health Services (DOHSS) for practical guidance of the various provisions of the Act.

Other parameters within the Act include:

- Duties of employers, owners or occupiers of workplace;
- Establishment of safety and health committees;
- Annual safety and health audit of workplaces;
- Safety and Health obligations for persons who may come to premises for work and are not employees of that particular workplace;
- Reporting of any accident, dangerous occurrence or occupational poisoning caused in the workplace to the area Occupational Health and Safety Office. These incidents should be entered in the General Register. In case of a fatal accident, information to the area Safety and Health Office should be within 24 hours and a written notice to the same within 7 days;
- The registration of all workplaces by the Director forming the basis of his work statistics;

- Machinery safety to include:
  - Safe use of machinery, plant and equipment;
  - Prime makers and transmission machines;
  - The maintenance, construction of fencing safeguards;
  - The statutory requirements of various machines, plants and equipment (hoists and lifts, chains and ropes, cranes, steam receivers and containers, air receivers, cylinders for compressed liquefied and dissolve gases and refrigeration plants).

- Chemical safety including:
  - Handling, transportation and disposal of chemicals and other hazardous substances;
  - Importance of Materials Safety Data Sheets (MSDS);
  - Labelling and marking of chemical substances;
  - Classification of hazardous chemicals and substances;
  - Establishment and adoption of exposure limits on hazardous substances

in a workplace;
- Control of air pollution, noise and vibrations;
- Redeployment on medical advice;

- Health, safety and welfare special provision including:
  - Permit to Work systems;
  - Work processes that are likely to harm persons below eighteen (18) years;
  - Supervision of apprentices and indentured learners;
  - Training and supervision of inexperienced workers;
  - Medical surveillance;

- Penalties, offences and legal proceedings including:
  - The upward adjustments of all fines imposed in the event of failure to comply with provisions of the Act;
  - The need to investigate and prosecute the real offender otherwise all those who fail to comply with any provisions of this Act that have been legally imposed on him/her shall be prosecuted.

Regulations under The Factories and Other Places of Work Act now deemed to be under The Occupational Health and Safety Act (OSHA) 2007 are:

- The Factories and Other Places of Work (Fire Risk Reduction) Rules 2007;
- The Factories and Other Places of Work (Hazardous Substances) Rules 2007.
- The Factories and Other Places of Work (Medical Examination) Rules 2005;
- The Factories and Other Places of Work (Noise Prevention and Control) Rules 2005;
- The Factories and Other Places of Work (Health & Safety Committees) Rules 2004;
- The Factories (Eye Protection) Rules 1978

(b) Fire Risk Reduction Rules (2007)

The following subsidiary regulations were made under the Factories and Other Places of Work Act, Legal notice No. 59 of the Kenya Gazette Supplement No. 46 of May 4, 2007.

The rules define classes of fires:

Class A fire: Fire involving ordinary combustible materials such as paper, wood cloth, rubber or plastic materials;
Class B fire: Fire involving flammable or combustible liquid, flammable gasses, greases or similar material, rubber or plastic material;
Class C fire: Fire involving energized electrical equipment where safety to the worker requires the use of electrically non-conductive extinguishers media;
Class D fire: Fire involving combustible metal such as magnesium, zirconium, sodium, lithium or potassium.

These rules outline standards on:

- Handling, storage and disposal of flammable substances and vapours;
- Provisions for preparedness, drills, training and procedures in the event of fire hazards, fire escape exits, control of spread of smoke, means of evacuation and formation of fire fighting team
- Marking and labelling (English and Kiswahili) highly flammable substances storage areas and containers;
- Monitoring of flammable substances, First Aid, notices, colour coding of pipes, fire safety policy, and fire safety audit.

(c) Hazardous Substances Rules (2007)

These regulations cover specifications for factories and workplaces where hazardous substances are handled. Provisions are made for exposure limits, protection of workers and the environment, maintenance of equipment and future guidelines on hazardous substances.

(d) Medical Examination Rules (2005)

The Medical Examination Rules are described in Legal Notice No. 24 of the Kenya Gazette Supplement No. 22 of April 2005. These Rules apply to all those employees in employment or have been in employment in every workplace, to which the provisions of the Factories and Other Places of Work Act (Cap 514) apply. The Rules describe the following:

- Occupations requiring medical examination;
- Duties of employer and employees as to medical examination;
- Reports on examination;
- Certificate of redeployment;
- Certificate of fitness;
- Notification of occupational diseases;
- Offences and penalties.

(e) Noise Prevention and Control Rules (2005)

The Noise Prevention and Control Rules are described in Legal Notice No. 25 of the Kenya Gazette Supplement No. 22 of April 2005 and apply to every factory, premises, place, process and operations to which the provisions of the Factories and Other Places of Work Act (Cap 514) applies. These Rules describe the following:

- Permissible noise levels;
- Noise prevention programme;
- Noise measurements and records;
- Information on noise and training of workers;
- Noise measuring equipment;
- Engineering controls;
- Installation and maintenance of machinery or plant;
- Means of communication;

- Hearing protection;
- Noise hazard areas;
- Workers responsibility in noise hazard areas;
- Duties of the occupier;
- Medical examination and hearing tests;
- Compensation and notification of occupational hearing impairment;
- Noise programme review;
- Offences and penalties.

(f) Health and Safety Committee Rules (2004)

The Health and Safety Committee rules are described in Legal Notice No. 31 of the Kenya Gazette Supplement No. 25 of 14 May, 2004 and apply to all factories and other workplaces that regularly employ twenty or more employees. Among other items, the rules state that:

- The occupier of every factory or other workplace shall establish a Health & Safety committee;
- The Committee shall consist of safety representatives from the management and the workers;
- The factory occupier shall appoint a competent person from the management staff to be responsible for safety, health and welfare in the factory or workplace; and the person appointed shall be the secretary to the Committee;
- Every member of the Health & Safety Committee shall undertake a prescribed basic training course in occupational health and safety within a period of six months from the date of appointment or election, and thereafter further training from time to time;
- The occupier of every factory or workplace shall cause a health and safety audit of the workplace to be carried out at least once in every period of twelve months by a registered health and safety adviser.

The above legal notice also describes the functions and duties of the Health & Safety committees, meetings and minutes, and roles in the Committee. It further describes the duties of the occupier and those of the Health & Safety Adviser.

2.4 Institutional Framework

Table 2-3: Institutional Framework and its relevance to the study

Institution	Function /Relevant section	Relevance to the project
National Environmental Tribunal	The National Environment Tribunal (NET) is created under Section 125 of the Environmental Management and Coordination Act (EMCA) of 1999. Its functions are: • To hear and determine appeals from NEMA's decisions and other actions relating to issuance, revocation or denial of Environmental Impact Assessment (EIA) licences or amount of money to be paid under the	Any disputes arising from issuance or denial of the project licence will be addressed by NET.

Institution	Function /Relevant section	Relevance to the project
	Act and imposition of restoration orders; • To give direction to NEMA on any matter of complex nature referred to it by the Director General.	
Land and Environment Court	This is an Act of Parliament to give effect to Article 162(2) (b) of the Constitution; to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land, and to make provision for its jurisdiction functions and powers, and for connected purposes. The principal objective of this Act is to enable the Court to facilitate the just, expeditious, proportionate and accessible resolution of disputes governed by this Act. Section 13 (2) (b) of the Act outlines that in exercise of its jurisdiction under Article 162 (2) (b) of the Constitution, the Court shall have power to hear and determine disputes relating to environment and land.	Any land or/and environmental cases arising from the project will be handled in accordance with the provisions of this act.
National Environment Council	The National Environmental Council is responsible for policy formulation and directions for the purposes of the EMCA 1999 Act. The Council also sets national goals and objectives, and determines policies and priorities for the protection of the environment.	The proponent should ensure that the project abides by the set goals and objectives of the council.
National Environment Management Authority (NEMA) Committees	The National Environmental Council is responsible for policy formulation and directions for the purposes of the Act. The Council also sets national goals and objectives, and determines policies and priorities for the protection of the environment. **Standards and Enforcement Review Committee (SERC)** EMCA provides for the establishment and enforcement of environmental quality standards to be set by a technical committee of NEMA known as the Standards and Enforcement Review Committee (SERC). **Public Complaints Committee** EMCA has also established a Public Complaints Committee, which provides the administrative mechanism for addressing environmental harm. The Committee has the mandate to investigate complaints relating to environmental damage and degradation. The members of the Public Complaints Committee include representatives from the Law Society of	The Proponent should address all issues arising from the project in accordance with the said committees.

Institution	Function /Relevant section	Relevance to the project
	Kenya, NGOs and the business community.	
Physical Planning Department	Physical Planning Act	Governs land change of user in zoning and Categorizes development plan as residential, commercial, industrial and other purposes. Petroleum is classified as industrial and therefore the proposed development fall squarely within the zoning requirement.
Kenya Bureau of Standards	Kenya Bureau of Standards- KS 1938	States that any petroleum handler must comply with Kenya standard specifications for the construction, handling, storage and distribution of Petroleum Products (KS 1938) as set out by Kenya Bureau of Standards. When the scheme is complied with, it will give an assurance that products and procedures are continuously meeting the relevant Kenya Standards or approved specifications.
	Kenya Bureau of Standards KS 1969:2006 ICS 75:200	This is an indication of how compliance to the KS standards on petroleum handling facilities shall be achieved. The Petroleum Industry – The installation of underground storage tanks. Pumps/dispensers and pipe work at service stations and consumer installations – Code of practice: **<u>Tanks</u>** • Positioning; • Steel tanks; • Fibre – reinforced resin tanks; • Ultraviolet protection; • Site topography; • Corrosion protection; • Transportation and off-loading of steel tanks. **<u>Backfilling</u>** • Stability; • Observation wells; • Backfilling material. Installation of tanks and method of backfilling with cohesive backfilling material;

Institution	Function /Relevant section	Relevance to the project
		• Water level; • Excavation of floor; • Tank installation; • Ballast; • Distribution of backfill; • Other materials. Installation of tanks and method of backfilling with cohesion-less backfill materials • Installation procedure. Holding down • Saddles; • Concrete slab; • Holding slabs. **Pipe connections and manholes on fibre-reinforced resin tanks** • Pipe connections; • Manhole construction; • Pipe work and fittings.
Energy Regulatory Commission	ERC is a single sector regulatory agency, with responsibility for economic and technical regulation of electric power, renewable energy, and downstream petroleum sub-sectors, including tariff setting and review, licensing, enforcement, dispute settlement and approval of power purchase and network service contracts.	Project proponent should acquire all necessary permits.
Murang,a County Government	It constitutes various developmental approvals departments such as the planning department.	The project proponent should present the project drawings and plans to the department for approval prior to the project implementation.

2.5 Licenses and Permits

Table 2-4 summarises the legislation, requirements and regulatory bodies relevant to the proposed service station.

Table 2-4: Licences and permits

Legislation	Requirement (Licences / Permits)	Regulator
Public Health Act (rev. 1996)	• Inspections on cleanliness and prevention of nuisances.	Murang'a Municipality.

Legislation	Requirement (Licences / Permits)	Regulator
	• To inspect and approve adequate protection of water supplies. • Approval of plans for new buildings from the Council.	
Occupational Health and Safety Regulations 2007 (OSHA), Part (V), Section 44.	• Registration certificate. • Display Abstract of Factories and other places of Work / OSHA.	Ministry of Labour.
Local Government Act (rev. 1998) Cap 265	Trade / Business Licence (Single Business Permit).	Murang'a Municipality.
Trade Licensing Act	Trade Licence.	Ministry of Trade & Industry
Physical Planning Act (1996)	• Development application to be made for any new buildings. • Development permission for any new units.	Murang'a Municipality.
Environmental Management & Co-ordination Act (1999)	Environmental audit report. • Emissions licences; • Effluent discharge licence; • Noise; • Noxious smells.	National Environment Management Authority.
Building Code (1997)	Local Council approval required for plans for any building units.	Murang'a Municipality.
Local Government Act (rev. 1998).	Trade / Business Licence.	Trade / Business Licence.

2.5.1 Key Regulatory Agencies

The regulatory agencies of relevance to the proposed activities are shown in Table 2-below.

Table 2-5 Regulatory Agencies

Regulatory Agency	Responsible Ministry	Requirements
National Environment Management Authority (NEMA)	Ministry of Environment and Mineral Resources.	Submission of Environmental Audit and Monitoring Reports pursuant to Sections 68 and 69 of the Act.
National Environment Management Authority (NEMA)	Ministry of Environment and Mineral Resources.	Effluent Standards Compliance.
Department of Occupational Health and Safety:	Ministry of Labour.	Responsible for the implementation of the Factories and Other Places of

Regulatory Agency	Responsible Ministry	Requirements
		Work Act and OSHA.

2.6 International Conventions and Treaties

Kenya is a signatory to a number of conventions on sustainable development and is a member of various bilateral and multilateral organizations. Some of the relevant International treaties and conventions include:

Vienna Convention for the Protection of the Ozone Layer:

Inter-governmental negotiations for an international agreement to phase out ozone depleting substances concluded in March 1985 with the adoption of this Convention to encourage inter-governmental co-operation on research, systematic observation of the ozone layer, monitoring of CFC production and the exchange of information.

Montreal Protocol on Substances that Deplete the Ozone Layer:

Adopted in September 1987 and intended to allow the revision of phase out schedules on the basis of periodic scientific and technological assessments, the Protocol was adjusted to accelerate the phase out schedules and has since been amended to introduce other kinds of control measures and to add new controlled substances to the list.

Kyoto Protocol:

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

The Basel Convention:

Sets an ultimate objective of stabilizing greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system;

Convention on Biological Diversity (CBD, 1992):

This Convention entered into force on 29 December 1993, and its objectives are to: conserve biological diversity; use biological diversity in a sustainable fashion and share the benefits of biological diversity fairly and equitably. This Convention governs Kenya's international obligations regarding biological diversity;

UNESCO Convention for the protection of the World Cultural and Natural Heritage (World Heritage Convention, 1972):

This Convention aims to encourage the identification, protection, and preservation of Earth's cultural and natural heritage.

Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention):

The Convention was signed in Iran in 1971 and came into force in 1975. It represents the first attempt to establish a legal instrument providing comprehensive protection for a particular type of ecosystem. The Ramsar parties agree to implement their planning so as to promote conservation of the wetlands included in the list.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):

This convention seeks to control the trade in species of wild animals and plants that are, or may be, threatened with extinction as a result of International trade. CITES is an important line of defence against the threat posed to diversity by invasive species.

African Convention on Conservation of Nature and Natural Resources (1968):

This Convention of the African Union is ratified by 40 African countries, including Kenya. The fundamental principle requires contracting states to adopt the measures necessary to ensure conservation, utilization and development of soil, water, flora and fauna resources in accordance with scientific principles and with due regard to the best interests of the people.

3 DESCRIPTION OF THE EXISTING ENVIRONMENT

The proposed development is located along the Nairobi - Nyeri road, near Plot Title L.R. No MITUBIRI/WEMPA/BLK 2/4746. Murang'a County.

The plot is a green field and there the neighbours to the plot are as follows:

- The surrounding area is not developed there are farmland, homestead and planted trees;
- Area is scarcely populated;
- Generally there will be a security boost at the area once the project is done.

3.1 Murang'a County

Lying approximately 85 kilometers northeast of Nairobi, the county covers 2,558 square kilometers. The current day Murang'a was once known as Forthall. Murang'a County borders Nyandarua to the west, Embu to the east, Nyeri to the north, Kiambu to the south and Machakos and Kirinyaga counties to the southeast and the northeast respectively.

The origin of the name Murang'a is believed to have been used by the Kikuyu people who referred to going for a visit in the area as 'Kurang'a' and later changed to Murang'a.
Murang'a County constitutes seven constituencies; Gatanga, Kandara, Kangema, Kigumo, Kiharu, Maragua and Mathioya

Murang'a County has an approximate population total of 942,581 (male - 48% and female - 52%) according to the Kenya National Bureau of Statistics 2009 National Census report. The larger majority of locals are Kikuyus who are born here. Most of them engage in mixed farming for staple food which includes maize, beans, cabbages, sorghum, millet and cassava among others. The county has a small percentage of people from other communities including Kamba, Meru, Embu, Luhya and Indians who are primarily involved in running small to medium-size trade businesses in major towns of the county.

Murang'a Town

It's centrally located and thus Murang'a town is the headquarters of the county. The town offers administrative and socio-economic services to locals. It's the favorite and main market for agricultural produce.

3.2 Physical Environment

3.2.1 Topography

The area is composed riparian grasslands mainly for year-round livestock grazing land for surrounding communities. Generally the area slopes from west to east.

3.2.2 Climate

The area has two rainy seasons between October to December and March to May. The October to December rain season comprises of the long rains whereas March to May comprises of the short rains. The longest dry season is from June to September. The annual average precipitation is 1000 mm. The annual average temperature ranges between 17.50^{C} to 28.30^{C}.

3.2.3 Hydrology

Water collects at the plot when it rains then it flows toward the Eastern side. Groundwater is shallow characterised by trees (Acacia) that indicate where shallow water exists.

3.2.4 Geology

The area is composed of faults forming a complex of shallow horst and grebe structures. The area is bounded by a series of tilted fault blocks separated by more than a dozen fault scarps.

3.2.5 Soils

The site is flat characterised by laterate soils (black/brown) and black cotton soil.

3.3 Biological Environment

3.3.1 Flora

The plot is undeveloped plot with grass and bushes. Grass is cut to feed animals.

3.3.2 Fauna

Fauna spotted on site during the site visit were rodents, birds and livestock during grazing.

3.4 Social Environment

The backbone of Murang'a County's economy is deeply rooted in agriculture. The residents also engage in small scale farming and livestock keeping. Agriculture is practiced on small family land holding. Over 60 percent of small scale farmers grow cash crops tea and coffee. Six tea factories serve most of the farmers; Githambo, Gatunguru, Kanyenya-ini and Kiru. Coffee factories in the area include Kanyenyaini, Mihuti and Gathima, Kiharu coffee factories among others.

Other agricultural activities that support the county's economy include Macadamia farming. Among main farms for Macadamia is Farmnut Macadamia in Murang'a and Maragua town.

Dairy farming is popular in the county with milk processing plants spread across various towns. You will find Kenya Cooperative Creameries and Mountain Fresh milk plants in Kangema.

Murang'a Quarries is the main source of building materials especially bricks and building stones. There are also sand quarries on the border of Murang'a and Machakos that are a source of income for local residents.

3.4.1 Health facilities

Murang'a County has about 271 health facilities which include 112 centers run by government, 125 that are privately owned and 31 run by faith based organizations. A few centers are managed by community based organizations.

Among the government-managed is Murang'a District Hospital in Murang'a Town, Maragua District Hospital, Kangema and Muriranjas Sub-District Hospitals. Church-run health facilities include Kiria-ini Mission and Githumu Hospital. Private hospitals include the Kangari Dental Clinic and Marie Stopes Nursing Home at Mbiiri among others.

3.4.2 Educational facilities

There are 739 primary schools and 271 secondary schools both public and private. Some of the top high schools in Murang'a County include Kahuhia Girls Secondary School, Mugoiri Girls High School, Kahuhia Girls High School and Njiiris Boys Secondary School. Murang'a County hosts several renowned colleges among them Murang'a Teacher's College, Murang'a Technical Institute and Kenya Medical Training College (KMTC) - Murang'a.
Other top colleges include Michuki Technical Training Institute, Murang'a College of Technology and Mbiiri Institute of Professional Studies. There's also a Kenya National Library Service in Murang'a town.

3.4.3 Infrastructure

Provision of infrastructure and social services are essential to the County's development. The road network in the County is expansive. Most of the earth surface roads in the County are impassable during rain seasons due to poor maintenance, poor drainage and unstable soils.

3.4.4 Utility (Electricity and Water supply)

Electricity is available within the vicinity.

Water supply will be from Murang'a Water and Sanitation Company.

3.4.5 Telecommunication

The posts and telecommunications sub-sector is relatively developed in the County with sub-post offices. The four mobile network providers namely; Safaricom, Airtel, Yu and Orange operate in the County with 99% coverage. There are also fixed lines and five private courier service providers

4 PROJECT DESCRIPTION

The plot earmarked for the development is currently open vacant land belonging to the Proponent. The proposed development is located along the Nairobi - Nyeri road, near Plot Title L.R. No MITUBIRI/WEMPA/BLK 2/4746. Murang'a County.

The proposed development will involve construction of the following:

Main building and forecourt

- Three Underground storage tanks (USTs) of 20,000 litres capacity each and underground piping;
- Forecourt with six dispensers islands;
- Oil Interceptor;
- Septic tank and soak away pit;
- Greasing pit;
- Compressor and generator room;
- Car wash under roof and third open air;
- Main building within the station, comprising of:-
  - Station Manager office;
  - Station Sales offices;
  - Station store;
  - Strong room;
  - Ladies & Gents washrooms;
  - Ladies & Gents staff changing rooms;
  - Display shop.
- Entrance and exit signage;
- Acceleration and deceleration lanes along the service road;
- Perimeter fence (masonry);
- Ribbed reinforced concrete forecourt;
- Canopy and price billboard;
- Fire fighting equipment;
- Sewerage and storm-water drainage systems;
- Landscaping area.
- Installation of electrical service components;
- Infrastructure and services.

See Appendix 1: The proposed site facilities layout details showing the construction details and roofing using concrete tiles.

4.1 General Notes of construction

1. All dimensions to be checked on site. Written dimensions rules over scaled drawings. Any discrepancy in dimensions to be reported to the Architect before proceeding;
2. Depth at foundation to be determined on site, all foundations R.C. column and R.C. works to structural Engineer's details;

3. Heavy duty polythene sheeting and termite treatment to be provided under ground floor slab. DPC to be three ply Bituminous fleet laid under all walls;
4. Pv denotes permanent ventilation and FL denotes fan light above;
5. All walls to be reinforced with hoop iron at every alternate course;
6. All sanitary works to be executed in accordance with MoH rules and regulations;
7. All drains under building, driveways and parking to be 150mm cast iron pipe encased in 150mm concrete inspection chamber within building to be fitted within heavy duty double seal air tight covers.

4.2 Interceptor construction details

The interceptor will have three chambers plus inlet and output, see attached plan.

1. Cover slab to be reinforced with Y10 bars both ways concrete class 20(20);
2. Base slab to be concrete class mix 1:3:6;
3. Outlet and inlet pipes to be 100mm O-cast iron;
4. Scum baffle to be 100mm thick reinforced with 2No Y10 at both end concrete 20(20);
5. Diving wall to be 100mm thick reinforced with wire mesh.

5 PROJECT ALTERNATIVES

5.1 The Proposed Development Alternative

This EIA Project Report will be presented to the National Environmental Management Authority. This will help in evaluating and examining the effects of the project on the environment. After the evaluation of the proposed development alternative an Environmental Impact Assessment License would be issued. This way, NEMA would approve for the implementation of the project. However, the development has to ensure that all environmental measures are complied with during the construction and operation period.

The alternative consists of the proponent's final proposal with the inclusion of the NEMA guidelines and regulations and procedures. This is as stipulated in the Environmental Management and Co-ordination Act (EMCA) of 1999, which aims at reducing environmental impacts to minimum extent practicable.

5.2 Relocation Alternative

Relocation option to a different site is an option available for the project implementation. At the moment, there are no alternative sites for the proposed development (i.e. the project proponent doesn't have an alternative site). This means that the proponent has to look for the land if relocation is proposed and land is not readily available, and if available it will be too expensive for the proponent to realize his dream.

Looking for the land to accommodate the scale and size of the project and completing official transaction on it may take a long period. In addition, it is not a guarantee that such land would be available. It's also worth noting that the said project is already underway in terms of seeking development approvals in various government departments such Council planning department in Murang'a County.

The project proponent would spend another long period of time on design and approvals of the plans by the relevant government departments. The project design and planning before the stage of implementation would call for cost; already encountered in the proposed development i.e. whatever has been done and paid to date would be counted as a loss to the proponent. Assuming the project will be given a positive response (after relocation) by the relevant Authorities including NEMA, it (project) would have been delayed for a long period before implementation. This would also lead to a situation like No Action Alternative (as explained below). The other consequence of this is that it would discourage both foreign and local investors especially in the petroleum sector.

In consideration of the above concerns and assessment of the current proposed site, relocation is not a viable option.

5.3 The No Action Alternative

The No Action Alternative in respect to the proposed project implies that the status quo is maintained. This option is most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will however, involve several losses to the project proponent. The No Action Option is the least preferred from the socio-economic and partly environmental since if the project is not done:-

- The economic benefits especially during construction i.e. provision of jobs for skilled and non-skilled workers will not be realized;
- There will be no generation of income by the developer to the Government;
- The social-economic status of Kenyans and local people would remain unchanged.

From the analysis above, it becomes apparent that the No Action Alternative is not the appropriate alternative to the local people and the Government of Kenya.

6 PUBLIC CONSULTATION

6.1 Introduction

Public consultation is useful for gathering environmental data, understanding likely impacts, determining community and individual preferences, selecting project alternatives and designing viable and sustainable mitigation and compensation plans.

Public consultation in the EIA process is undertaken during the project design, implementation and initial operation. The aim is to disseminate information to interested and affected parties (stakeholders), solicit their views and consult on sensitive issues.

6.2 The Consultation process

Community participation is encouraged during the implementation of development projects.

Section 35-2 of The Environmental Impact Assessment and Audit Regulations 2003, requires that an EA should *"examine and seek views on environment, health and safety issues from the local community and other potentially affected* communities*"*.

The objectives of the public consultation process are as follows:

- To inform the public of the details of the proposed project;
- To ask local residents about problems they anticipate with the project and how these can be mitigated;
- To gather information on likely impacts of the project as perceived by stakeholders

The consultant carried out the public consultation as follows:

- Through interviews to neighbours and stake holders;
- Public notices.

6.3 Views of the Stakeholders

Generally, the local administration representatives and communities were consulted to give their views towards the proposed project since they anticipate numerous benefits upon implementation of the project.

6.3.1 Benefits of the proposed project

- Enhanced security around the location area, as the station will be operational 24 hours with security deployed full time;
- Provision of parking facility;
- Food eating place and shopping at the mini market;
- Improved local socio-economy by contribution to Kenya Government revenue;
- Creation of employment opportunities;

- Market for construction materials;
- Contribution to Government Resources;
- Impacts on local and national economy;
- Improved infrastructure;
- Low price of petroleum products due to competition;
- Socialisation place;
- Public consultation and awareness for gathering environmental data, understanding likely impacts, determining community/ individual preferences, designing viable and sustainable mitigation plans.

6.3.2 Problems and concerns cited on the proposed development

- Possibility of pollution / contamination of surface and groundwater resources;
- Effect on business; Neighbouring facilities offering the same services might complain of sharing of existing customers hence their business going down.
- Monitoring waste water to ascertain impact from spilled petroleum products;
- Health and safety policy and familiarisation with it;
- Noise management;
- Waste management;
- Minimization of water use;
- Minimization of energy use;
- Fire outbreak protection;
- Security.

6.4 Future Consultations

The initial consultations during the preliminary design phase should be followed by more consultations as follows:

- Prior to commencement of construction;
- Construction phase;
- Operation phases.

7 POTENTIAL IMPACTS AND MITIGATION MEASURES

7.1 General

The purpose of the environmental impact assessment (EIA) of the proposed development is to improve decision making and to ensure that the project progresses in a sustainable approach. The EIA identifies ways of improving the project environmentally and socially by preventing, minimising, mitigating, or compensating for adverse impacts. These measures will help to avoid potentially costly remedial measures.

In order to alleviate negative impacts emanating from the implementation of the project, relevant mitigation measures have also been proposed in this chapter.

An overview of the proposed project components has been presented in Chapter 4.

The potential impacts of the proposed project have been listed in Table 7-1 below and analysed into different categories based on the perceptions and the consultant's previous experience in undertaking similar projects EIAs and experiences gained from construction projects.

Table 7-1 Summary of potential impacts

Environmental and social impact	Positive/ negative	Direct / indirect	Temporary / permanent	Major / Minor	Occurrence	
					Design and Constructio	operation
Knowledge transfer	Positive	Direct	Permanent	Major	✓	✓
Increased employment opportunities.	Positive	Direct	Permanent	Major	✓	✓
Vegetation Disturbance	Negative	Direct	Permanent	Major	✓	-
Improved local socio-economy	Positive	Direct	Permanent	Major	✓	✓
Utility consumption	Negative	Direct	Temporary	Minor	✓	✓
Fire and accident	Negative	Direct	Permanent	Major	✓	✓
Over extraction of construction materials	Negative	Direct	Temporary	Major	✓	-
Soil erosion.	Negative	Direct	Temporary	Major	✓	-
Traffic Management	Negative	Direct	Temporary	Minor	✓	✓
Reduced air quality.	Negative	Direct	Permanent	Major	✓	✓
Noise pollution.	Negative	Direct	Permanent	Major	✓	-

Environmental and social impact	Positive/ negative	Direct / indirect	Temporary / permanent	Major / Minor	Occurrence	
					Design and Constructio	operation
Solid waste generation and disposal	Negative	Indirect	Temporary	Major	✓	✓
Improved Government revenue	Positive	Indirect	Permanent	Minor	✓	✓
Public health and occupational health and safety	Negative	Direct	Permanent	Major	✓	✓
Contamination of soil and ground water sources incase of accidental spillages	Negative	Direct	Permanent	Major		✓

The following impacts are predicted as well as their mitigation measures throughout the life cycle of the project.

7.2 Positive Impacts during Construction phase

7.2.1 Generation of employment opportunities

There will be job opportunities for both skilled and unskilled labour during the construction phase. The contractor will be employing some amount of local manpower for the project execution.

7.2.2 Knowledge transfer

The project will entail a lot of professional tasks such as in installation of the fuel tanks and connection to the pump stations. The locals will have an opportunity to learn from some of the specialised skills that are going to be employed while putting up the tanks.

7.3 Negative Impacts during Construction phase

7.3.1 Vegetation disturbance:

Vegetation clearance will be done in order to prepare the site for construction purposes.

Mitigation measures

- Ensure proper demarcation and delineation of the project area to be affected by construction works;
- Specify locations for vehicles and equipment, and areas of the site which shall be kept free of traffic, equipment and storage;

- Designate access routes and parking area within the site;
- Introduction of vegetation (trees, shrubs and grass) on open spaces and around the project site and their maintenance;
- Design and implement appropriate landscaping programme to help on re-vegetation of part of the project area after construction.

7.3.2 Soil Erosion control

Soil erosion may take place if proper mitigation measures are not put in place during the site clearance activities in order to pave way for construction.

Mitigation measures

- Earthworks should be controlled so that land that is not required for the construction works is not disturbed. Wherever possible, earthworks should be carried out during the dry season to prevent soil from being washed away by the rain.
- Excavated materials and excess earth will be kept at appropriate sites approved by the supervising engineer and the earth dumping sites designed in such a manner as to facilitate natural water discharge;
- The Contractor shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible.

7.3.3 Air Pollution

During construction air and noise pollution will arise from exhaust, engine emissions, excavations that will emit dust into the air.

Mitigation measures

- Ensure strict enforcement of on-site speed limit regulations;
- Sprinkle water during excavation works by heavy machines;
- Sprinkle water on graded access roads when necessary to reduce dust generation by construction vehicles;
- Provide nose masks to be provided to employees and encourage them to use the masks.

7.3.4 Noise pollution

During construction noise pollution will arise from the various construction machinery. During operation increased air pollution would occur due to generator emissions.

Mitigation measures

- Noise levels shall be kept within acceptable limits by NEMA;
- Use of ear protectors by workers when performing noisy operations;
- Recondition engine exhaust systems;
- Engine tune-up;
- Establish inspection and maintenance program for equipment;

- Post appropriate notices to warn drivers against unnecessary hooting of vehicles;
- Switch off engines or reduce idling time when not in use;
- Confine activities between 8.00 am and 5.00 pm;
- Enclose the construction site with three metre high iron sheets.

7.3.5 Solid waste Generation and Disposal

The major solid waste generated will include debris, soil, used oils, and empty packaging materials for cement and paint).Solid waste has the potential of causing aesthetic degradation and nuisance to employees and visitors to the site.

Mitigation measures:

Construction waste should be managed as follows:

- Provide suitable and well labelled solid waste containers;
- Proper segregation of solid waste;
- Reduce generation of solid waste at the source;
- Reuse of top soil for landscaping of the site;
- Empty packaging materials like cartons and cement bags should be piled in a safe place and sold to waste paper recyclers;
- Other solid waste to be disposed of at designated sites;
- Install oil interceptors along the storm water drainage channels;
- Provision of sanitary facilities for use by workers;
- The use of the "3Rs" philosophy of reuse, recycle and reduce will be adopted.

7.3.6 Over extraction of construction materials

During the construction phase, the contractor will outsource construction materials from various sources. Cases of over extracting these materials from one use may arise beyond their regenerative capacity.

Mitigation measures:

- Construction materials shall be from approved sources: for example: hardstone for building should be obtained from bonafide commercial quarries;
- Procure environmentally friendly and sustainable materials;
- Do not use the following materials for construction of the building:
  i. Asbestos in any form;
  ii. Asbestos substitutes or any naturally occurring man-made mineral fibres
  iii. Lead, Lead paint or other materials containing Lead which may be inhaled, ingested or absorbed;
  iv. Vermiculite, unless it is established as being fibre-free;
  v. Any product containing Cadmium that are regarded as being deleterious building material which are not in accordance with statutory requirements or with current accepted good building practice at the time of specification or construction.

7.4 Positive Impacts during Operation phase

7.4.1 Improved Government revenue

The Government will be able to collect revenue from the sales at the petrol station and food places hence generating an additional revenue source. This will be through the tax and levies that will be paid directly to the government through sales.

7.4.2 Generation of employment opportunities

The petrol station will employ both skilled and unskilled labour during the operational phase. This will be source of employment opportunities for the employees who will earn a living from the wages paid.

7.5 Negative Impacts during Operation phase

7.5.1 Solid waste generation

During the operation stage, solid waste may be generated from the offices, wash rooms, changing rooms, shops, cafeteria and partly from customers who may litter around as they fuel their vehicles. Solid waste has the potential of causing aesthetic degradation and may act as vector breeding sites especially during the rainy season.

Mitigation measures:

Construction waste should be managed as follows:

- Comply with the requirements of the Environmental Management (Waste Management) Regulations Legal Notice 120;
- Use of an integrated solid waste management plan i.e. through a hierarchy of options-: 1. Reduction of source, 2. Recycling, 3. Reusing, 4. Incineration, 5. Sanitary landfilling.
- Use durable, long-lasting materials that shall not need to be replaced as often, thereby reducing the amount of construction waste generated over time;
- Waste should not be burned on site or dumped in undesignated waste disposal areas;
- Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements;
- Clearly designate and construct an appropriate waste collection facility or provide covered refuse skips;
- Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at site;
- Segregate waste at source;
- Monitor waste volumes;

7.5.2 Noise pollution

During the operational phase noise sources will include use of generators and compressors.

Mitigation Measures:

- Noise levels shall be kept within acceptable limits by NEMA;
- Use of ear protectors by workers when performing noisy operations;
- Recondition engine exhaust systems;
- Engine tune-up;
- Establish inspection and maintenance program for equipment;
- Post appropriate notices to warn drivers against unnecessary hooting of vehicles;
- Switch off engines or reduce idling time when not in use;
- Confine activities between 8.00 am and 5.00 pm;

7.5.3 Liquid waste (waste water)

Liquid wastes will be generated from storm water run off from the forecourts and other clean up areas such as the wash room, changing rooms and the offices.

Mitigation measures

- Carefully collect used oil in drums and dispose of by licensed refuse contractor;
- Adhere to wastewater management regulation of the legal Notice 121 and Water quality regulations of the Legal Notice 120;
- Conduct wastewater monitoring to check compliance and submit the results to NEMA;
- Document and train staff in the emergency spill response plan.
- Revegetation of open ground should be done to reduce run off hence reducing storm water drain.

7.5.4 Contamination of soil and ground water sources incase of accidental spillages

In case of accidental oil spillages especially during the off loading processes, if not controlled the oils may find a way into the soils and finally into groundwater sources.

Mitigation measures:

- Have sorbent materials available on site;
- If a spill or leak occurs, stop it from flowing at the source;
- The tank and lines will be used as per their design life of 30 years and a UST / line replacement programme put in to ensure tanks and lines are replaced prior to failure in timely fashion;
- Monitor daily reconciliation of wet stock and inventory records;
- In case of suspect losses, institute tank and line integrity testing; and
- Conduct a soil gas survey to check the extent of contamination from the leaks.
- Most of the open grounds should be cemented to prevent spills from leaking into underground water and soils;
- Ensure that all drainages are fitted with oil interceptors to retain any oils that will find their ways into the drainages;
- Monitor quality of water draining from the site.

Underground fuel storage and handling

- The fuel storage tanks to be installed should undergo calibration, pressure checks, and leakage tests and have been passed as safe for use by an accredited company.
- Ensure that the underground tanks are compliant with Kenya standards (KS 200:2002)
- Conduct pressure tests before commissioning of the station to ensure that the product lines (pipe works) comply with KS 1969:2006, KS 1967: 2006 and 1968:2006.
- Use properly maintained hoses and fittings;
- Make the cement screeds in all the chambers using water proof material;
- Install a monitoring well next to the tanks to check on leaks;
- Use water finding dipstick and/ or a hydrometer to check on density/ specific gravity;
- Ensuring no spills during refilling and / or when offloading the fuel;
- Installation of the storage tanks will be done by an accredited company to the standards specified in the Petroleum Act Cap 116, Part III which highlights the methods of storage of petroleum products.

7.5.5 Public health and occupational health and safety

It applies to all phases of the project. Physical, biological and chemical hazards are ever present at all the workplaces and therefore (permanent and recurrent places of work) should be designed and equipped to protect Occupational Health and Safety as well as community health and safety.

The petrol station will have fuel tanks which will be containing hazardous fuels which may cause skin reactions incase they come into contact with the skin and any escaping fumes may compromise the status of air quality around the tanks. There is also a risk of a fire outbreak incase of any spills coming into contact with ignition.

Mitigation measures

- Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restrictions on site, frequency and personnel responsible for safety inspections and controls;
- Daily site inspections should be done to ensure safe work practises are adhered to;
- All workmen should be provided with personal protective equipment;
- The Conditions of Contract in the tender documents should stipulate health, safety and environment regulations and work procedures;
- The Contractor must appoint a foreman with knowledge on health, safety and environment regulations;
- All injuries that occur on site must be recorded in the accident registers and corrective actions for their prevention be instigated as appropriate;
- Site personnel should be encouraged to report “near-miss incidents” in order to avoid potential problems and increase safety awareness.

7.5.6 Fire and accident

Common ignition sources at service stations include lightning, static electricity, stray currents, hot works, internal combustion engines, smoking and improperly classified or improperly protected electrical equipment.

The following are proposed to mitigate fire hazards at the station:

Table 7-2: Mitigation measures for Fire Hazards

Aspect	Issue	Recommendations
Fire prevention and safety measures:	Fire policy and emergency Plan:	The station should have a written fire policy and an emergency plan that specifically addresses actions to be taken in the event of a fire in the facility. The emergency plan should include: • Actions and responsibilities of employees in reporting a fire; • Responsibilities and actions to be taken to control vapours and prevent ignition of vapours resulting from spills; • Actions and procedures to be taken in fighting fires both manually and by activation and deactivation of fixed systems; • Desired method of extinguishing fire such as through a controlled burn-out or by application of an extinguishing agent; • Notification of appropriate authorities.
	Fire fighting equipment:	• Provide specific fire fighting equipment and containment measures to cater for fire hazards specific to each operation; • The water tank dedicated to fire fighting should be able to provide water at sufficient pressure to operate foam generating sets and in sufficient quantity to contain a tank fire and provide cooling; • The fire systems in critical areas should be designed to activate automatically (through detection systems).
	Fire protection:	• Critical equipment and buildings should be fire resistant, protected against fire and blast damage e.g. passive fire protection on emergency shutdown valves, blast proofing of control rooms, etc; • Maintaining integrity of storage tanks and piping systems containing flammable or combustible liquids essential for prevention of fires in around tanks.
	Staff training:	• Facility staff should be trained in fire systems activation as well as operation, maintenance and testing of the system;

Aspect	Issue	Recommendations
		• Regular equipment inspections, maintenance and testing, as well as strict compliance to company's HSE policy, should help curb loss of containment as a result of 'generic' failures and operationally related failures.
Fire prevention and safety measures:	Safety practices:	• Adequate security needs to be put in place to guard against sabotage such as control of access for personnel and customers entering the site; • There should be adequate access routes for fire tank approach; • Any operation or job such as mobile phones calls, cigarette smoking, welding, etc. which could become or create an ignition source for any flammable or combustible material should be prohibited. • Compliance with Fire Risk Reduction rules – annual fire safety audits.

7.5.7 Water utilisation:

Various activities are expected to use water such as flushing toilets, cleaning activities among others. If not well utilised the water consumption levels will rise as opposed to the estimated usage details.

Mitigation measures:

- The Contractor/ workers should monitor water consumption and utilisation;
- The Contractor should sensitise construction workers on the importance of proper water management.

7.5.8 Energy utilisation:

Various activities are expected to use energy such as pump stations, lighting the offices and other equipments. If not well utilised the energy consumption levels will rise as opposed to the estimated usage details.

Mitigation measures:

- Develop an energy management plan;
- Construction machinery and vehicles should be maintained and used in accordance with manufacturer's specifications, to maximise efficiency and lower use of energy;
- Construction workers should be sensitised on the importance of energy management.

7.5.9 Traffic Management

The station compound is expected to experience increase in the volume of traffic by vehicle flow to and from the station.

Mitigation measures:

- The Contractor should plan and implement traffic management programme on daily basis;
- Comply with all applicable legislation and by-laws with regard to road safety and transport;
- Lane and junction design and signage to meet appropriate standards;
- Movement of construction vehicles timed to avoid peak periods
- Ensure adequate entry and exit lane design and appropriate signage.

7.6 Potential Negative Environmental impacts during Decommissioning phase

In a situation where the petrol station has completed its useful life then it should be decommissioned. The decommissioning process will include:

- Removal of the storage tanks;
- Dismantling of the equipment;
- Removal of support accessories infrastructure;
- Demolition of buildings, such as administrative offices related to the tanks management.

The major impacts will be:

7.6.1 Spillage of oil to soil and underground water sources

Dismantling the tanks will result in exposing the environment to the fuel products from the tanks. If not handled properly this may lead to soils and groundwater contamination.

Mitigation measures:

- Have sorbent materials available on site;
- If a spill or leak occurs, stop it from flowing at the source;
- Develop a spill response action plan and display it in a strategic place;
- Most of the open grounds should be cemented to prevent spills from leaking into underground water and soils;
- Do not discharge petroleum products to sewers, drainage ditches, septic tanks, or streams;
- Do not dispose of petroleum products in landfills or mix them with wastes that will be disposed of in landfills;
- Ensure that all drainages are fitted with oil interceptors to retain any oils that will find their ways into the drainages;
- Monitor quality of water draining from the site;
- Monitor quality of underground water and soils for potential contamination, if necessary remediate the sites.

7.6.2 Disposal of scrap metal an equipment

During the demolition works scrap metal and equipment will be part of solid wastes that require proper disposal.

Mitigation measures:

- Use a licensed waste collector to dispose the scrap metal and equipment.

7.6.3 Loss of jobs and income

Workers who will be employed at the petrol station will lose their jobs immediately after the closure of the project. The loss of jobs will have far reaching impacts as it will lead to loss of income and social stress.

Mitigation measures:

- Notify the employees in advance on the project closure date and adequately compensate them;
- Dismissal procedures to be compliant with Employment Act, 2007;and
- Provide counselling & alternative skills for alternative activities.

7.6.4 Air/dust Pollution

Dust emissions are expected to result from demolishing of the petrol station.

Mitigation measures:

- Practice dust management techniques, including watering down the site;
- Set up dust barriers/ screens at strategic locations;
- Provide and enforce the appropriate use of PPE against dust such as nose masks.

7.6.5 Solid Waste generation

Solid waste material such as metals arising from demolition activities during the decommissioning phase is expected.

Mitigation measures:

- Disposal of solid waste in compliance with EMCA 2006 Waste Management Regulations;
- Segregation of waste to encourage reuse and recycling, where feasible;
- Ensuring that the contracted waste collector is registered with NEMA to collect and dispose wastes.

If the mitigation measures are implemented during the design, construction and operation of the proposed Service Station, the potential negative environmental impacts will be managed and maintained to acceptable standards. Mechanisms for

implementation and monitoring have been recommended in an *Environmental Management and Monitoring Plan*.

8 ENVIRONMENTAL MANAGEMENT MONITORING PLAN

8.1 Introduction

The *Environmental Management Plan* (EMP) is a synthesis of all identified impacts and proposed mitigation measures, and assigns responsibility for implementation of these measures. The EMP is a working document, which provides direction and assistance in the following:

- Construction activity planning and procedures to protect the environment;
- Environmental mitigation during operations;
- Environmental emergency response planning and procedures.

8.1.1 Objectives of the EMP

The objectives of the EMP are:

- To bring the project into compliance with applicable national environmental and social legal requirements, social policies and procedures;
- To outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimise, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts.

8.1.2 Responsibilities

In order to ensure the sound development and effective implementation of the EMP, it will be necessary to identify and define the responsibilities and authority of the various persons and organisations that will be involved in the project.

The following entities will be involved on the implementation of this EMP:

- Murang'a Municipal Council;
- Proponent;
- Supervising Engineer/ Architect;
- Contractor;
- National Environmental Management Authority (NEMA).

The Supervising Engineer/ Architect must be registered to supervise all activities related to construction works.

Table 8-1: Environmental Management Plan for the proposed petrol station - Kimoroni

Possible Environmental Impacts	Suggested Mitigation Measures	Responsibility	Timing	Cost estimate (KShs)
Construction Phase				
Vegetation disturbance	• Ensure proper demarcation and delineation of the project area to be affected by construction works; • Specify locations for vehicles and equipments, and areas of the site which shall be kept free of traffic, equipment and storage; • Designate access routes and parking area within the site; • Introduction of vegetation (trees, shrubs and grass) on open spaces and around the project site and their maintenance; • Design and implement appropriate landscaping programme to help on re-vegetation of part of the project area after construction.	• Building contractor	Construction and operational phases.	100,000.00
Soil Erosion control	• Earthworks should be controlled so that land that is not required for the construction works is not disturbed. Wherever possible, earthworks should be carried out during the dry season to prevent soil from being washed away by the rain. • Excavated materials and excess earth will be kept at appropriate sites approved by the supervising engineer and the earth dumping sites designed in such a manner as to facilitate natural water discharge; • The Contractor shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible.	• Building contractor	Construction Phase	No Cost

Possible Environmental Impacts	Suggested Mitigation Measures	Responsibility	Timing	Cost estimate (KShs)
Air pollution and dust generation	• Sprinkling all active construction sites with water; • Control of speed and movements of all automobiles within the construction site; • Hoarding the entire construction site; • Use of low-sulphur diesel for diesel-operated construction machinery; • Provide dust musk to workers; • Install an eco-efficient back-up generator fitted with scrubs and silencer.	• Project Proponent; • Building contractor; • Drivers.	Continuous throughout construction stage and operation phase (with regards to the back-up generator)	60,000.00
Noise Pollution	• No unnecessary hooting by project and occupants vehicles; • Restriction of construction activities to day time; • Use of ear protection aids by construction workers; • Temporarily fencing off noisy machinery such as vibrators; • Install a back-up generator fitted with silencer.	• Project Proponent; • Contractor; • Construction workers.	Continuous throughout construction stage and operation phase	50,000.00
Solid waste Generation and disposal	• Provide suitable and well labelled solid waste containers; • Proper segregation of solid waste; • Reduce generation of solid waste at the source; • Reuse of top soil for landscaping of the site; • Empty packaging materials like cartons and cement bags should be piled in a safe place and sold to waste paper recyclers; • Other solid waste to be disposed of at designated sites; • Install oil interceptors along the storm water drainage channels; • Provision of sanitary facilities for use by workers; • The use of the "3Rs" philosophy of reuse, recycle	• Project Proponent • Contractor • Workers;	Construction Phase	To be determined.

Possible Environmental Impacts	Suggested Mitigation Measures	Responsibility	Timing	Cost estimate (KShs)
	and reduce will be adopted.			
Over-extraction of construction materials	• Construction materials shall be from approved sources: for example: hardstone for building should be obtained from bonafide commercial quarries; • Procure environmentally friendly and sustainable materials; • Do not use the following materials for construction of the building: a. Asbestos in any form; b. Asbestos substitutes or any naturally occurring man-made mineral fibres c. Lead, Lead paint or other materials containing Lead which may be inhaled, ingested or absorbed; d. Vermiculite, unless it is established as being fibre-free; e. Any product containing Cadmium that are regarded as being deleterious building material which are not in accordance with statutory requirements or with current accepted good building practice at the time of specification or construction.	• Project Proponent • Contractor	Construction Phase	No Cost
Operation Phase				
Increased demand for water and electricity	• Conservation (wise use) of water and electricity; • Provision of adequate water storage facilities; • Installation of rainwater harvesting structures; • Re-use of water where possible, mainly at construction phase; • Explore additional sources of water and energy;	• Project Proponent • Workers.	Continuous throughout the project life.	100,000.00

Possible Environmental Impacts	Suggested Mitigation Measures	Responsibility	Timing	Cost estimate (KShs)
	• Use of energy conserving electrical appliances; • Switching off electric appliances whenever not in use.			
Solid waste generation	• Comply with the requirements of the Environmental Management (Waste Management) Regulations Legal Notice 120; • Use of an integrated solid waste management plan i.e. through a hierarchy of options-: 1. Reduction of source, 2. Recycling, 3. Reusing, 4. Incineration, 5. Sanitary landfilling; • Use durable, long-lasting materials that shall not need to be replaced as often, thereby reducing the amount of construction waste generated over time; • Waste should not be burned on site or dumped in undesignated waste disposal areas; • Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements; • Clearly designate and construct an appropriate waste collection facility or provide covered refuse skips; • Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at site; • Segregate waste at source; • Monitor waste volumes.	• Project Proponent • Workers	Continuous throughout the project life.	To be determined

Possible Environmental Impacts	Suggested Mitigation Measures	Responsibility	Timing	Cost estimate (KShs)
Public Health and Occupational Health and safety	• Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restrictions on site, frequency and personnel responsible for safety inspections and controls; • Daily site inspections should be done to ensure safe work practises are adhered to; • All workmen should be provided with personal protective equipment; • The Conditions of Contract in the tender documents should stipulate health, safety and environment regulations and work procedures; • The Contractor must appoint a foreman with knowledge on health, safety and environment regulations; • All injuries that occur on site must be recorded in the accident registers and corrective actions for their prevention be instigated as appropriate; • Site personnel should be encouraged to report "near-miss incidents" in order to avoid potential problems and increase safety awareness.	• Project Proponent; • Workers.	Throughout operational phase.	To be determined.
Fire hazards and accidents	• Acquire fire fighting facilities; • Sensitize workers on fire safety; • No storage of inflammables at site; • Keep well stocked first aid box; • Proper handling and use of tools and/or machinery; • Use of correct PPE; • Initiate fire safety drills; • Information and/or warning signs; • Install a water storage tank designated specifically for fire fighting purposes.	• Proponent.	Operational phase.	500,000.00

Possible Environmental Impacts	Suggested Mitigation Measures	Responsibility	Timing	Cost estimate (KShs)
Traffic Management	• The Contractor should plan and implement traffic management programme on daily basis; • Comply with all applicable legislation and by-laws with regard to road safety and transport; • Lane and junction design and signage to meet appropriate standards; • Movement of construction vehicles timed to avoid peak periods • Ensure adequate entry and exit lane design and appropriate signage.	• Proponent; • Workers	Operational phase.	To be determined
Liquid wastes	• Carefully collect used oil in drums and dispose of by licensed refuse contractor; • Adhere to wastewater management regulation of the legal Notice 121 and Water quality regulations of the Legal Notice 120; • Conduct wastewater monitoring to check compliance and submit the results to NEMA; • Document and train staff in the emergency spill response plan. • Revegetation of open ground should be done to reduce run off hence reducing storm water drain.	• Proponent; • Workers	Operational phase.	To be determined
Decommissioning Phase				
Spillage of oil to soil and underground water sources	• Have sorbent materials available on site; • If a spill or leak occurs, stop it from flowing at the source; • Develop a spill response action plan and display it in a strategic place; • Most of the open grounds should be cemented to prevent spills from leaking into underground water and soils;	• Proponent; • Workers	• Decommissioning Phase	600,000.00

Possible Environmental Impacts	Suggested Mitigation Measures	Responsibility	Timing	Cost estimate (KShs)
	• Do not discharge petroleum products to sewers, drainage ditches, septic tanks, or streams; • Do not dispose of petroleum products in landfills or mix them with wastes that will be disposed of in landfills; • Ensure that all drainages are fitted with oil interceptors to retain any oils that will find their ways into the drainages; • Monitor quality of water draining from the site; • Monitor quality of underground water and soils for potential contamination, if necessary remediate the sites.			
Disposal of scrap metal an equipment	• Use a licensed waste collector to dispose the scrap metal and equipment.	• Proponent; • Workers	Decommissioning Phase	100,000.00
Loss of Jobs	• Notify the employees in advance on the project closure date and adequately compensate them; • Dismissal procedures to be compliant with Employment Act, 2007;and • Provide counselling & alternative skills for alternative activities.	• Proponent/Employer;	Decommissioning Phase	To be determined
Air/dust pollution	• Practice dust management techniques, including watering down the site; • Set up dust barriers/ screens at strategic locations; • Provide and enforce the appropriate use of PPE against dust such as nose masks.	• Proponent	Decommissioning Phase	To be determined
Solid waste disposal	• Disposal of solid waste in compliance with EMCA 2006 Waste Management Regulations;	• Proponent	Decommissioning Phase	To be determined

Possible Environmental Impacts	Suggested Mitigation Measures	Responsibility	Timing	Cost estimate (KShs)
	• Segregation of waste to encourage reuse and recycling, where feasible; • Ensuring that the contracted waste collector is registered with NEMA to collect and dispose wastes.			
Security	• Ensure that the site is always guarded by a reputable security firm; • Constant site patrol; • Collaboration with existing security machineries; • Partnership with neighbours and police in community policing; • Keeping daily record of visitors to the project's site.	• Project Proponent; • Contracted security firm.	24-hours a day throughout the project cycle.	To be determined.
Public health and safety	• Ensure use of provided pit latrines by construction staff; • Proper handling and disposal of solid waste; • Operation of noisy machinery at daytime only; • Control of visitors to the site; • Traffic control; • Installation of adequate clean water supply; • Enhanced site security; • Controlled developments around the facility.	Project Proponent.	All stages of the project's life.	100,000.00
Loss of aesthetic value of land and infringement on neighbours' privacy	• Landscaping the facility's compound; • Embrace good neighbourhood practices like proper waste disposal and avoiding unnecessary externalities.	• Project Proponent; • Hired landscaping firm and workers.	Operational phase	To be determined

8.2 Health, safety and accident prevention action plan

In order to ensure public health and safety, and to prevent accidents or emergency situations at construction, operation or decommissioning phases, the following action plan shall be incorporated in the project cycle.

Table 8-2 below outlines an action plan for enhancement of Health and Safety and for prevention of accidents at the various stages of the project cycle.

Table 8-2: Health, Safety and Accident Prevention Action Plan

Issue	Specific Measures	Responsibility	Timing
Project design	• Incorporation of health and fire safety measures in project design.	• Project Architect; • Structural and civil engineers.	Design stage.
Site organization and cleanliness	• Keep construction materials in correct place; • Maintain cleanliness at the construction site.	• Construction company; • Project Proponent.	Construction stage.
Fire safety	• No storage of inflammables; • Installation of fire extinguishers; • Fire safety awareness; • Water storage tank for fire extinguishing purposes; • Keep fire fighting facilities at the site; • Safe handling of fire; • No smoking on site; • Designate fire assembly point(s).	• Construction company; • Project Proponent • Visitors.	All stages of project cycle.
Accident prevention	• Safe handling of tools and machinery; • Use of appropriate personal protection equipment; • Engagement of qualified personnel; • Controlling visitor entry into the site.	• Construction company; • Project Proponent; • Visitors; • Security Company.	Construction stage
Waste disposal	• Provision of adequate waste disposal facilities at the site; • Engagement of licensed waste company; • Reuse of certain waste materials.	• Construction company; • Contracted waste disposal company • Workers.	All stages of project cycle
Tools and machinery safety	• Use of tools and machines for designated job; • Regular servicing of	Construction company.	Construction stage.

Issue	Specific Measures	Responsibility	Timing
	machinery; • Proper storage of tools.		
Emergency preparedness	• Keeping passages clear; • Marking emergency exits; • Training staff on emergency preparedness and response; • Keeping a well-equipped first aid kit on site.	• Construction company; • Project Proponent.	All stages of project cycle
Insurance	Insure all construction workers.	Construction company.	Construction stage.
Site security	• 24-hour security at site; • Control of visitor entry into site.	• Construction company; • Security Company.	Construction and operation stage

9 CONCLUSIONS

This EIA Report has been prepared to provide sufficient and relevant information on the proposed project to establish whether the activities of the project are likely to have significant adverse environmental impacts.

This Report documents the findings of an assessment and study of the proposed development construction, operations and neighbour's concerns. Mitigation measures have been proposed for identified impacts and an environmental management plan for the implementation of the proposed measures has been presented.

The proposed project will have numerous positive impacts which are detailed in the project report.

The Proponent shall be committed to putting in place several measures to mitigate the negative environmental, safety, health and social impacts associated with the life cycle of this project. It is recommended that in addition to this commitment, the Proponent shall focus on implementing the measures outlined in the EMP as well as adhering to all relevant national and international environmental, health and safety standards, policies and regulations that govern establishment and operation of such projects.

It is also recommended that the positive impacts that emanate from such activities shall be enhanced as much as possible. It is expected that these measures will go a long way in ensuring the best possible environmental management and compliance with relevant legislations and standards.

The consultant (Lead Expert) recommends approval of the proposed activities subject to the project proponent adhering to all the proposed mitigation measures in this Report, the various relevant contents of the Water quality regulations and Waste management Rules of 2006 and the conditions that will be attached to the Compliance license. The proponent must confirm adherence in writing to the Director General National Environmental Management Authority.

9.1 Proposed applicable good planning strategy during construction

The following techniques shall be employed:

- Recycling where applicable so as to reduce on associated costs;
- Design shall be based on standard sizes and materials shall be ordered accurately;
- Use of high quality materials such as engineered products shall be encouraged so as to reduce rejects.
- Collection bins and containers shall be available at the site, some of which may require protection from the rain;
- During construction, building stones and other masonry materials shall be collected, stack and covered to prevent soiling or loss;

- Clean concrete chunks, old bricks, broken blocks and other masonry rubble shall be buried onsite during foundation back filling;
- Usable blocks and other masonry materials that remain after construction may be salvaged and stored for future use onsite or offsite.

REFERENCES

1. *Local Governments Act (Cap 265). Government Printers.*
2. *Government of Kenya (GoK), Building code, Building order 1968 and Grade 11 Building Order 1968*
3. *Government of Kenya (GoK), The Physical Planning Act*
4. *http://www.asdsp.co.ke/index.php/Murang'a-county*
5. *Publications from PIEA;*
6. *The Physical Planning Act;*
7. *The Water Act;*
8. *Legal Notice No. 120 (relating to Water Quality Regulations 2006);*
9. *Legal Notice No. 121 (relating to Waste Management Regulations 2006);*
10. *The Public Health Act - Chapter 242;*
11. *District Development Plan.*
12. *Energy Act 2006*
13. *Environmental Management and Co-ordination Act, 1999, No. 6 of 1996.*
14. *Environmental Management and Co-ordination Act, 1999, No. 8 of 1999.*
15. *Legal Notice Number 101 Environmental (Impact Assessment and Audit) Regulations, 2003,*
16. *Waste Management Regulations 2006*
17. *Legal Notice Number 120 -Environmental Management and Co-ordination Water Quality Regulations, 2006*
18. *Environmental Management and Co-ordination (Controlled Substances) Regulations 2007.*
19. *Occupational Health and Safety Act 2007*
20. *Kenya Standards*
    KS ISO 1998 – 5
    PETROLEUM INDUSTRY – terminology –Part 5: Transport, storage and distribution.
    KS 1969 (2006)
    The petroleum industry - The installation of underground storage tanks, pumps/ dispensers and pipe work at SERVICE STATIONS and consumer installations - Code of practice.

21. *ERC Pollution Prevention Guidelines:*
    General Guide to the Prevention of Pollution
    Disposal of sewage where no mains drainage is available
    Design and Use of Oil Separators in Surface Water Drainage Systems
    Design, Construction, Commissioning, Decommissioning and Decommissioning of Petroleum Retail Service Stations
    Managing Fire Water and Major Spillages
    Pollution Incident Response Planning
    Soil, Groundwater and Surface Water Protection and Vapor Emission Control
    Goggle Map @2000.

APPENDICES

Appendix 1 Proposed Site Plan
Appendix 2 Lead Expert Certificate
Appendix 3 Public participation questionnaire forms
Appendix 4 Photographs

Appendix 1 Proposed Site Plan

Appendix 2 Lead Expert Certificate

Appendix 3 Public participation questionnaire forms

Appendix 4 Photographs

Plate	Description	Photograph
Plate 1	Proposed site, Neighbour to the west	
Plate 2	Proposed site neighbour to the East.	

Plate 3	Proposed site neighbour to the North East.	
Plate 3	Main highway, Thika - Kenol Highway.