ENVIRONMENTAL IMPACT ASSESSMENT
FULL STUDY REPORT (Ref: NEMA/PR/5/2/10931)

FOR THE PROPOSED MODEL STANDARD PETROL STATION
ON PLOT TITLE NO. 11594, KAMULU, NAIROBI COUNTY

CLIENT: NATIONAL OIL CORPORATION OF KENYA LTD, P.O BOX 58567-00200, NAIROBI

JULY 2013
Sustainability Kenya Ltd Consultants submit this Full Study on Environmental Impact Assessment (EIA) project report for National Oil Corporation of Kenya. We certify to the best of our knowledge that the information contained in this report is accurate and a truthful representation as presented by the client.

Signed By: ______________________________________________

Signed on: ______________________ day of: _______________ 2013

Proponent:
We, Management of National Oil Corporation of Kenya certify to the best of our knowledge that information contained in this report is accurate and a truthful representation.

P.O. Box 58567-00200, Nairobi, Kenya

Signed By: ______________________________________________
National Oil Corporation of Kenya Representative: _________________________________
Designation: ______________________________________________________________
Signed on: ______________________ day of: _______________ 2013
Stamp / Seal: ______________________________________________________________
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ABBREVIATION

EIA: Environmental Impact Assessment
EA: Environmental Audit
NEMA: National Environment Management Authority
EMCA: Environmental Management and Coordination Act
NBSAP National Bio-diversity Strategy and Action Plan
CBD: Convention on Biological Diversity
NEAP: National Environmental Action Plan
EMP: Environmental Management Plan
EHS: Environmental Health and Safety
KPLC: Kenya Power and Lighting Company
OHS: Occupational Health and Safety
TOR: Terms of Reference
EHS: Environmental Health and Safety
EXECUTIVE SUMMARY

National Oil Corporation of Kenya herein referred as the proponent proposes to develop a petrol station at Kamulu- City Council of Nairobi, along Nairobi – Kangundo Road and neighbouring Highway Resort and opposite Connections Pub. The proposed site is on vacant land with little vegetation. The proposed petrol station will enhance the provision of petroleum products for the motorists on that road and its environs. It’s also in line with the government objective of building more petrol stations for the state owned company so as to subsidize fuel costs by introducing competition in the petroleum industry.

The Objectives of this project are:
- To provide fuel for the motorists plying the Nairobi-Ruai-Kangundo route.
- To supply fuel to Kamulu Residents and Businesses
- To provide services such as a restaurant, car park services, car wash and automated tyre fitting to the motorists.
- To sell fuel such as kerosene and cooking gas to the residents of the area

Development of the petrol station will maximally utilize the idle piece of land, create employment during construction and operation phases, and ensure fuel consumers get quality and cheap fuel for their vehicles. It will also achieve the governments’, through the ministry of Energy objective of developing more petrol stations around the country so as to protect fuel consumers.

In order to safeguard the environment, environmental concerns have to be integrated in the planning and implementation phases of any proposed developments in Kenya. Pursuant to the prevailing legal requirements envisaged in the EMCA, 1999 and to ensure sustainable environmental management, the proponent contacted Experts to undertake an EIA for the proposed petrol station.

This report therefore presents the results of the Impact Assessment in accordance with EMCA, 1999 and EIA/ EA regulations, 2003. The EIA evaluated the effectiveness of the environmental considerations undertaken by the project proponent in safeguarding the environment to ensure sustainability. With due considerations to sustainable development, it’s recommended that, the proposed project be approved by the Authority.
CHAPTER ONE: INTRODUCTION

1.1 Introduction
National Oil was incorporated in April 1981 under the Companies Act, Cap 481 and charged with participation in all aspects of the petroleum industry. The company has a 100% Kenya Government shareholding. The formation of National Oil was precipitated by the oil crisis of the 1970's (1973/74 and 1979/80) and the correspondent supply disruptions and price hikes which resulted in the country's oil bill comprising of almost one third of the total value of imports and therefore making petroleum the largest single drain of Kenya’s foreign exchange earnings. In the national interest it was therefore felt necessary to have greater control of this crucial factor of the performance of the economy by having a company, which would act as an instrument of government policy in matters related to oil.

National Oil became operational in 1984. Initial activities mainly consisted of exploration activities delegated from the Ministry of Energy. National Oil started downstream activities in March 1988 with the importation of the first crude oil cargo. This was in fulfillment of the government mandate for National Oil to supply 30% of the country's petroleum requirements. These supplies were sold to major oil marketers at a small margin in bulk prior to processing. One of the other major roles at this time was to act as an advisor of the government on pricing and other related oil policies. National Oil’s experience in procurement prevented the award of unjustified price increase to the oil marketers. In some instances, the corporation undertook to bring in all the country's petroleum crude and finished products requirements when private companies declined to do so in order to pressurize the government to concede on their demands for price increases. This was especially evident during the 1989/90 Gulf War when National Oil’s imports sustained the country for about six weeks. By this move, Kenya was the only country in East and Central Africa, which did not experience a shortage of products.

Since October 1994 when the oil industry was deregulated, the mandate to import 30% of the country's crude oil requirements ceased and National Oil has been marketing petroleum products to the final consumers. National Oil has since acquired sixty (60) service stations from individuals and other oil marketers such as the 13 stations from BP and 33 stations from Somken. National Oil has one hundred and two (102) fully-fledged petrol stations spread across the country through which it has earned an enviable reputation for quality and excellent customer service. National Oil has also entered into market segments which include LPG and fuel oil.

1.2 Scope of the Study
The scope of the study included the carrying out of environmental investigations in line with current legislations. This was done in line with the requirements of Environmental Management and Coordination Act (EMCA) 1999 and Environmental (Impact Assessment) and Audit regulations 2003. The study covered the physical extent of the project site and its immediate environs, implementation works of the proposed development (ground preparations, foundation,
walling, roofing, fixtures and fitting among other activities and installation of key utilities and other facilities required for the project to function optimally.

1.3 Specific Objectives of the Study
The key objectives of this study include:
i) To determine the compatibility of the proposed facility and evaluate the local environmental conditions.
ii) To identify and evaluate the significant environmental impacts of the proposed project.
iii) To assess the environmental costs and benefits of the proposed project to the local and national economy.
iv) To evaluate and select the best project alternative from the various options.
v) To incorporate environmental management plans and monitoring mechanisms during implementation and operation phases of the project.

1.4 Overall objective of the project
The proposed project has the overall objective of constructing a Petrol Station; in attempt to stimulate economic and social development of our country through meeting the high demand of petroleum products and also stabilizing the price of petroleum products in the country.

1.5 Terms of Reference (TOR)
The terms of reference for the preparation of an EIA Report are:
i) A critical look into project objectives
ii) The proposed location of the project site
iii) Description of project objectives.
iv) A concise description the national environmental legislative and regulatory framework, and any other relevant information related to the project.
v) Evaluation of the technology, procedures and processes to be used in the implementation of the project.
vi) Evaluation of materials to be used in the construction and implementation of the project and their extended sources.
vii) Description, evaluation and analysis of the foreseeable potential environmental effects of the project broadly classified into physical, ecological/biological and socio-economic aspects which can be classified as direct, indirect, cumulative, irreversible, short-term and long-term effects.
viii) Evaluation of the products, by-products and wastes to be generated by the project.
ix) To propose/recommend a specific environmentally sound and affordable liquid and solid waste management system.
x) Evaluation and analysis of alternatives including the proposed project, project alternative, project site, design and technologies.
xii) An Environmental Management Plan (EMP), proposing the measures for eliminating/minimizing or mitigating adverse impacts on the environment.
xii) Propose measures to prevent health and safety hazards and to ensure security in the working environment for the employees, residents and for the management in case of emergencies. This encompasses prevention and management of the foreseeable accidents and hazards during construction phase.

1.6 Consultancy Organization
The EIA project report was written by private consultants duly registered by National Environment Management Authority (NEMA) to undertake an activity of this nature. The study was carried out between 14th January and 19th January 2013. Over this period, a number of valuable data pertaining to the projects design, technology and legal framework were collected and analyzed.

1.7 Methodology
The study assessed and qualified the potential impacts of the proposed project. The baseline information collected was used to analyze the potential impacts of the proposed project. The EIA study team embarked on various methodologies such as literature review, field visits, and consultations with the neighbours among others in order to generate adequate baseline information which served as a benchmark for analyzing potential impacts and generating an Environmental Management Plan (EMP).

The fieldwork was extensive and included several activities. A reconnaissance visit was made to the project area by the EIA team. Based on this, the team set out key areas of observation. This was then followed by detailed visits of the project area and neighbouring facilities taking records of observations as well as interviewing community members.

Different stakeholders were interviewed to give their views on the expected impacts of the project. Literature review was also done. Their impacts on the environment were reviewed too. Environmental Management and Coordination Act (EMCA) 1999 and other relevant statutes that have a direct significance to the proposed project were reviewed. Other reports and reference materials on physical and biological data on the study area were also studied and reviewed.

1.8 Output of the Study
The output of this study is the production of this EIA project report with recommendations for submission to NEMA for purposes of seeking an EIA license.

1.9 Positive impacts
The positive benefits associated with the proposed project include the following:
   i) Provision of oil products
   ii) Improvement of the economy
   iii) Improving the quality, relevance, equity and access to better life
iv) Provision of indirect and direct employment opportunities during both construction and operation phases of the project.

1.10 Potential Negative Impacts Associated With the Proposed Project
There are several potential negative impacts associated with the proposed project. These are anticipated mostly during the construction phase and can easily be mitigated. They include the following:

i) Increased noise and vibrations during construction
ii) Impact during transportation of construction materials and products and traffic implications along Nairobi -Kangundo Road.
iii) Solid waste and wastewater management. There will be increased waste generation especially during construction phase.
iv) Air pollution as a result of dust particles emanating from excavation and construction activities
v) Impacts on human health and safety. The health and safety of workers may be an issue during the construction phase.

1.11 Potential Mitigation Measures
Mitigation and management measures to minimize and control the generation occurrence and magnitude of the negative impacts and to ensure compliance with the relevant environmental legislation and management standards have been integrated in the report. They include:

i) There shall be limited earthworks. Soil compaction and watering of loose soil shall be done on all disturbed areas during construction phase to minimize air pollution (by dust) and erosion by the agents of soil erosion.
ii) To cater for surface drainage, well-designed concrete drain channels have been proposed to harmonize management of the resulting storm water within the site.
iii) To reduce noise pollution, portable barriers to shield compressor and other small stationery equipment where necessary will have noise suppressor or silencers. Noise shield e.g. corrugated iron sheet structure to control noise propagation shall be provided. Workers will be sensitized on the need to switch off engines when not in use and all machinery will be well maintained through regular oiling.
iv) Sewerage (conservancy tank) systems shall be properly designed (using approved materials), installed and regularly maintained to effectively manage effluent.
v) Capacity building and training of personnel with respect to environment, health and safety shall be observed. Personnel protective equipment as per health safety regulations and medical checkups of workers as is required by the Occupational Health and Safety Act shall be observed.
vi) To reduce health and safety risks, effective emergency response plans will be observed both during construction and operation phase.
vii) During the construction phase, the contractor shall put in place effective and efficient waste disposal systems. Waste, including excavated soil and debris shall be properly disposed of by backfilling and landscaping. The contractor shall provide acceptable and standard sanitary convenience to the workers during construction.

1.12 Conclusion
The construction of the proposed Petrol Station at Kamulu will have very limited impacts on the environment. The magnitude of the job does not call for the use of heavy machinery. Hand tools will be used hence reducing level of impacts associated with the use of heavy machinery. The proponent has followed all the legal procedures necessary for the execution of a project of this nature and adequate mitigating measures have been put in place to obviate any negative impacts. The implementation of the project should however be subject to the observance of all the legal and regulatory frameworks governing activity of this nature. The recommended Environmental Management Plan (EMP) should also be observed throughout the entire life of the project.
CHAPTER TWO: PROJECT DESCRIPTION, DESIGN AND CONSTRUCTION

2.1 Nature of the Project
The proposed project is the construction of proposed Petrol Station at Kamulu, Ruai Area of Nairobi. This EIA project report is based on information and consultations with the project proponent, the Architects, Quantity Surveyors, Engineers, Valuers and financial Analysts and details contained in the Drawings of the proposed project (attached at the Annex). The project highlights include:-Canopy over the pumps, Sales office, a restaurant, a store, Underground fuel tanks, Compressor/generator, Tyre centre & car wash, Drive ways, walkways, acceleration and deceleration lanes, Interceptor Tank and washrooms. Below is the list of facilities to be included in the station plan;

Table 2-1: Summary of Site Facilities

<table>
<thead>
<tr>
<th>Facility</th>
<th>Number</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Restaurant</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Forecourt</td>
<td>1</td>
<td>Concrete slab and paving</td>
</tr>
<tr>
<td>Underground storage tanks (UST)</td>
<td>3</td>
<td>15000L for IK, 30000L for AGO and 30000L for PMS</td>
</tr>
<tr>
<td>Product lines</td>
<td>3</td>
<td>Submersible type</td>
</tr>
<tr>
<td>Product pumps</td>
<td>3</td>
<td>Submersible type</td>
</tr>
<tr>
<td>Vents</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Dispensers</td>
<td>3</td>
<td>PMS -1, AGO -1, IK -1</td>
</tr>
<tr>
<td>Isolation switch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Fire alarm</td>
<td></td>
<td>Available</td>
</tr>
<tr>
<td>Compressor/ Generator</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sump</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Pressure point (air and water)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Oil interceptor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Compressor/ Generator</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Toilets</td>
<td>2</td>
<td>Gents with urinal, ladies with sanitary bins</td>
</tr>
<tr>
<td>Changing rooms</td>
<td></td>
<td>Available</td>
</tr>
<tr>
<td>Security alarm</td>
<td></td>
<td>Available</td>
</tr>
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2.2 Justification of the Proposed Project
The project is meant to stimulate economic and social development of our country through meeting the high demand of petroleum products in the country and also to meet proponent’s economic desires. The project area is along a main road therefore suitable for such project hence there will be no land-use conflict. It is therefore hoped that once the project is implemented, The National Oil Corporation of Kenya goal to stimulate economic and social development of our
country and its own economic goals through meeting the high demand of oil products will be achieved.

2.3 Ownership and Location of the Project
The proposed project site is approximately 0.202 Ha and is registered under the Registered Land Act Cap 300, of the laws of Kenya. The Land reference number is Land Reference No. 11594 Registered Under National Oil Corporation of Kenya Limited. The tenure is freehold. The project site is located at Kamulu in Ruai Location, along Nairobi-Kangundo Road and neighbouring Highway Resort and opposite Connections Pub. It is a fenced privately owned land which currently not in use.

Plate 1: The site

2.4 Project Scope
The project will be developed on land that the proponent already owns. The Architectural plans have been submitted for approval by all the statutory authorities. Building & civil works plans have been submitted to the City Council of Nairobi for approval.

For full implementation of the project, the following pre-requisites will be met:
i) Acquisition of funding to complement the developer’s contribution.
ii) Appointment of established competent and capable contractors and consultants to undertake the development.

iii) Acquisition of NEMA approval.

After the pre-requisites are met the proponent will then commission the development as is planned.

2.5 Project Specifications

The following are specific descriptions of the project;

i) The project site is located in an area of relatively low density area of Kamulu.

ii) There is no sewer system and developers rely on septic tanks for sewer disposal.

iii) An experienced consultant has made the final design of the project and the constructions will follow details as given by the engineer on site.

iv) The structures will be founded on solid ground using reinforced concrete strips laid on concrete blinding. The laying of the foundation will follow details as given by the structural engineers on site.

v) The developments will be constructed using machine dressed stones, bound by mortar of concrete and sand.

vi) All drainage and sewerage pipes will have a diameter that is approved by the site engineer.

vii) Drainage channels will be provided leading from run-off generation areas such as car parking and all paved areas and will drain in the soak pit.

viii) Water supply will be connected to the developments from existing boreholes.

More/ fine details for the development and specifications for the features of the proposed project have been given in the copies of the architectural and site drawings attached in the Annex.

2.6 Project Construction

The proposed Petrol Service Station will comprise of the following:

i) Excavation of the site to a level that will create a platform upon which the service station can be constructed.

ii) Four Single compartments Underground Storage Tanks (UST) will have single-walled mild steel plate of 6mm thickness and joints to be butt welded for circumferential joints and lap welded longitudinally. No longitudinal joint shall be located at the bottom of the tanks. The dished ends of tank will be bent to 25mm radius and welded lap or butt type on both sides to full penetration. Tests will be done on completion of fabrication with air pressure to 5psi and certified leak proof. The underground fuel tank will meet KS standards and KEBs as a requirement. The following specifications will be stamped on the surface; Plate thicknesses, Date of manufacture and Tank serial number.

iii) There will be a reinforced concrete chamber which is water proofed. The underground tanks will be located on the forecourt and have manholes for product offloading and dipstick checks. Remote fill box will be typical incorporating spill containment to prevent accidental releases.
entering the environment. Single walled tank installation with excavation lined with geo-fabric will be done to prevent migration of native soil into the backfill material.

iv) The installation of fuel filler points. The filling points will be positioned such that they allow for easy maneuvering of the tankers and be contained within sealed sumps so that in the event of a spillage when connecting and disconnecting the pipes from the filler points, such spilled material would be contained within the sumps.

v) Three pump islands will be constructed with double hose pump per island will be able to dispense two different grades on either side. *(Recommended or as per Engineers’ specification)*

vi) Installation of piping for the distribution of the fuel from the fuel filling points to the USTs and from the UST’s to the fuel dispensing units. All subsurface piping will be contained within the secondary piping and laid in reverse graded trenches on non-cohesive bedding material so should product leak out of the pipes it will be contained within the secondary piping and drain back to the USTs.

vii) Construction of the service station on a hard standing layer which will include a canopied forecourt area above the fuel dispensing points.

viii) The project will be constructed based on applicable standards of Kenya and any other standards which may be incorporated.

The constructions will as well incorporate environmental guidelines, health and safety measures. The project inputs are;

i) Construction raw materials will include sand, cement, stones, gravel/ballast, metals, among others. All these will be obtained from licensed dealers and especially those that have complied with the environmental management guidelines and policies.

ii) Construction machines will include machinery such as trucks, concrete mixers and other relevant construction equipment. These will be used for the transportation of materials, mixing of materials and clearing of the vegetation and resulting construction debris. Most of the machinery will use petroleum products to provide energy.

iii) Most construction materials will be sourced locally but where the contractor deems necessary will import from other authorized countries especially the finishes.

iv) A construction labour force of both skilled and non-skilled workers will be involved.

The project will begin after the National Environmental Management Authority (NEMA) issues an approval to the proposed project and funds are released by the financiers. It is estimated to take approximately 7 months to complete.

**2.7 By Products and Disposal Methods**

In all construction projects, some waste or by products are usually produced on the project site. These wastes include; broken glasses, pieces of broken tiles, nails, pieces of broken wood and pieces of roofing materials. The contractor will emphasize on efficiency to minimize construction wastes. The removal and disposal of such refuse and other related wastes comes in
handy. The contractor will work hand in hand with private refuse handlers and the City Council of Nairobi to facilitate waste handling and disposal from the site. The wastes will be disposed off into the approved dumpsites.

2.8 Project input and activities
The development of the proposed Model Standard Petrol Station at Kamulu project will utilize but not be limited to the following inputs:

a) **Land** - Land is necessary for sitting the petrol station. The proponent has acquired land for the facility.

b) **Water** - The project area is well served by borehole water system.

c) **Labour** - during the construction and operation of the project. It is the intention of the proponent that this labour is sourced from within the local community. This will be a direct economic benefit to them and will go far in creating a friendly relationship between the project and the neighbouring community.

d) **Input during construction** - The materials that shall be used include building sand, aggregates, natural stones; hand cut construction stones, prepainted LT5 sheets. Others include concrete block for constructing selected internal and external pavements, precast units for drains, PVC pipes for sewer and water reticulation, cabro works, wire mesh, water tanks and steel gutters. Window casement and glasses, spades, pick axes, and jembes and a host of other tools will also be needed.

**Inputs during operation** - Materials used for oil product supply will be procured from the suppliers during the operation phase of the project. These include oil products and other facilities associated with fuel station operations.

2.9 Project Implementation Sequencing

i) **Pre-construction stage** - This involved the following:

   - Plan preparation and seeking of the appropriate approvals from the relevant authorities.
   - Appraisal of baseline condition to determine supply and demand for required infrastructural services.
   - EIA project report preparation.

ii) **Construction stage** - This will involve the following:

   - **Establishment of related works and all support infrastructures that are significant for the construction work**: This would involve the transportation of machinery and deployment of the workers to the construction site. The machinery would be used for ground breaking and for transportation of materials from the sources to the site. It is important to note that light machinery will be used at this stage. The major machineries that would be used include: Mixers, Welding machines
and transmission machines. The contractor would also mobilise human workforce to the site. Both casual (unskilled) and permanent (skilled) would be hired.

- **Site Clearance**: This will involve clearing of the site of any debris and foreign materials.
- **Acquisition and transportation of building materials** - The contractor shall source for materials for construction from the various available suppliers. Supply of materials would be a continuous activity throughout the project life since different materials will be needed at different phases of the construction. The materials that shall be used in the construction include among others building stones, sand, ballast, cement, timber, reinforced concrete frame, steel, bars, G.I pipes, PVC pipes, pavement blocks, concrete slabs, murram, hardcore, insulated electrical cables and timber among others.
- **Construction of the petrol station** - The engineering designs and site layout plans that have been approved shall be implemented. The setting would comply with the specifications set out by the client to the contractor under the supervision of qualified engineers. In accordance with the designs and the layout plans, the construction of the proposed project and associated infrastructure will begin immediately NEMA approves the project report. The contractor will then be supplied with all the approved documents including the EIA report.
- **Excavation and land filling works** - This is part of normal construction works
- **Transportation of the construction wastes from the site for landscaping**
- **Solid and liquid waste management** - Waste management infrastructure shall be set thus dustbin cubicles and shall be protected from rain and animals. These will be used both during construction and occupation stages.

iii) **Occupation stage** - This stage shall involve running and managing the facility as per the laid down rules and procedures.

iv) **Decommissioning Phase** - Decommissioning refers to the final disposal of the project and associated materials at the expiry of the project life span. This is dealt with in chapter ten of this project report.

**2.10 Wastes**

There will be liquid, solid and gaseous wastes from the project site. These will be from project activities during construction operation and decommissioning. There shall be effluents from civil works, workers and the storm water. It is envisaged that at the construction stage, effluent that shall be discharged will also be sprinkled on area of working to reduce dust generation by construction machinery. Other wastes from construction site will be mainly material residues of the construction material. These include pieces of concrete, heaps of sand and aggregates, bits and pieces of various pipe types, cans of paint, polythene sheets, paper packing materials, pieces of timber, pieces of iron (metals) among others scattered within the project site.
Wastes during operation will include used papers and effluent from toilet flushing. It is expected that the effluent shall be managed through connection to a conservancy tank. Wastes from decommissioning of the project will include salvaged equipment; water tanks, windows, doors and demolished stone blocks among others.

2.11 Air Emissions
Relative air emission is expected during construction when dust from construction activities and construction machinery will be emitted. It is recommended that watering be enforced to keep dust at minimal levels. The employees at the site shall also be provided with face masks to protect them from dust emissions.

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

2.13 Solid Waste Management
The technologies for the management of the solid wastes will incorporate the collection of the waste from the source, transportation of the waste to the place of processing, treatment and final disposal. The following waste management techniques shall be used in the different stages of the Project.

i) During construction - Wastes at this stage shall be managed as follows:
   - Express condition shall be put in the contract that before the contractor is issued with a completion certificate; he will clear the site of all debris and restore it to a state acceptable by the supervising architect and environmental consultant.
   - Materials from excavation of the ground and foundation works shall be reused for earthworks and landscaping.

ii) During operation - The following methods will be used to manage wastes:
   - **Used Paper**- Used paper shall be thrown in designated dustbins labelled ‘paper only’. The paper waste shall then be collected and kept in a central place pending disposal through a contractor.
   - **Empty Cans and Plastic Containers** - These will be collected and stored in a designated area pending disposal to interested parties for recycling.

iii) Decommissioning - During this stage, the following shall be observed:
   - Wastes generated as a result of facility decommissioning activities will be characterized in compliance with standard waste management procedures.
   - Disposal locations will be selected by the contractor and City Council of Nairobi based on the properties of the particular waste generated.
   - All buildings, machinery, equipment, structures and partitions that will not be used for other purposes shall be removed and reused or rather sold/given to scrap material dealers.
2.14 Effluent treatment
There shall be effluents from the civil works, workers and storm water drainage. It is envisaged that during construction stage, effluents that shall be discharged shall be sprinkled on the working areas to reduce dust generation by the construction machinery. Wastewater from the toilets together with the solids will be collected into a conservancy tank, which shall be constructed for this purpose. The following measures will be put in place to ensure that the conservancy system operates optimally:

- It will be inspected for scum and sludge depth once each year so that scum or sludge cannot escape from the conservancy tank into the drain field.
- The tank will be pumped once every three years.
- Water entering the tank will be minimised by using water wastage reduction means such as press only taps for taps and washbasins.
- The drain-field shall be properly landscaped and planted with dense grass cover and shallow rooted plants.

2.15 Project Budget and Duration
The proposed development will require large capital outlay to commission and thus the proponent has sourced enough funds. This is to ensure that the project completion is attained within the approved time. The proposed project is estimated to cost approximately (Kshs 30 Million) Thirty Million Kenya shillings. The project will take approximately six months to complete and to start operations. A License fee of Kshs 15,000 applies in this case.
CHAPTER THREE: DESCRIPTION OF PROJECT AREA AND ENVIRONMENTAL SETTING

3.1 Project Location

The proposed project site is located within the Kamulu area on land Plot No. L.R. 11594 (See copy of title in Appendix 1) situated off the Nairobi-Kangundo Road near the Highway Resort. The plot is accessed through a murram road to the left as one heads from Nairobi. It is currently not in use and is fenced off. The site is located at 1°17'S 36°49'E.

The project’s location in Kamulu is highly influenced by the City’s dynamics. Nairobi, Kenya’s Capital City is the most populous city in East Africa with an estimated urban population of between 3 and 4 million. The growth rate of Nairobi is currently 6.9% and it is estimated that the population will reach 5 million in 2015. Nairobi is currently the 4th largest city in Africa and is an international, regional, national and local hub for commerce, transport, regional cooperation and economic development. Nairobi employs 25% of Kenyans and 43% of the country’s urban workers; as it generates over 45% of GDP, it is a major contributor to Kenya’s economy.

There is a wide variety of standards of living in Nairobi. Most wealthy Kenyans live in Nairobi but the majority of Nairobians are poor. Over half of the population of Nairobi has been estimated to live in slums which cover just 5% of the city area. The growth of these slums is a result of urbanization, poor town planning and the unavailability of loans for low income earners. Many non slum-dwellers live in relatively good housing conditions. Large houses can be found in many neighborhoods, especially to the west of Nairobi. Historically, British immigrants have settled in Lang’ata and Karen. Other middle and high income estates include Parklands, Westlands, Hurlingham, Milimani and Nairobi Hill. To accommodate the growing middle class, many new apartments and housing developments are being built in and around the City.

Nairobi infrastructure has been overwhelmed by rapid population growth coupled with past weak frameworks for environmental regulation and implementation. With the cumulative deterioration of the environment over the years, the repercussions are being felt in many aspects, including traffic congestion, air pollution, poor waste management, and water shortages. Strategic
environmental planning and management is urgently needed, along with greater involvement of local environmental partnerships for waste management and stronger planning enforcement to arrest environmental degradation.

Figure 3.1: Project Location in Kenya Map

3.1.1 Settlement pattern
Spatial polarization of land uses is a common feature of urban development. Polarization may occur at inter- or intra-use levels; this we can refer to as polarization of the first- and second-order respectively. Inter-use order involves, for example, separation of residential and industrial uses. The main concerns with this order would be economic; in terms of accessibility, commuting, transport, sustainability, journey to work etc. Intra-use order involves further distinction and polarization of uses within one particular first-order use. For example, it is normal to subdivide industrial use further into light industrial and heavy industrial; commercial use may be subdivided into office and/or shopping facilities; residential may be subdivided into low, medium and high density. It is worth noting that polarization is a normal land use feature of urban planning and development.

Residential segregation falls within the intra-residential use polarization. Battersby (2004) noted that spatial segregation can be defined as the uneven distribution of predefined social groups in space (usually conceived of in terms of residential space).

In Nairobi, it is impossible to think of residential segregation without going back to the colonial past. Residential segregation took root during the onset of colonialism. By 1900, a racially segregated Nairobi had been set up comprising of the African, Asian and European areas. The effect of the ‘racial tri-partition’ of the Nairobi city resulted in the Europeans overwhelmingly inhabiting the North-western and Western areas of high rent and land values, the Asians predominating in the north-eastern parts while the Africans were condemned to living in the densely populated area to the east and south of the city (Salau, 1988). Indeed, to date, there still exist some elements of racial tri-partition. Secondly, the racial tri-partition has transformed into socio-spatial distinctions of formal and informal settlements.

Residential segregation of the colonial regimes were instituted and implemented through land policy thereby giving it a spatial dimension. The policies were encoded in and enforced by legal decrees. The spatial dimension of segregation went beyond the mere separation of residence. The containment policy that complimented the implementation of residential segregation resulted into gender segregation—where women and children were not allowed into the city and occupational segregation—where entry of the unemployed ‘idlers’ was restricted (Mabin, 2005). Apart from racial segregation, the colonial regime also attempted to separate Africans into ethnic enclaves; resulting into ethnic segregation (Christopher, 1994; McOlooo, 1998).

Racial segregation was sustained in Nairobi from these early times up to 1963 when Kenya attained independence. Racial segregation transformed into socio-economic and legal-tenural residential segregation upon attainment of independence.
Thus after independence, Kingoriah (1980) observes that land ownership and choice of residential areas in Nairobi by individuals were based largely upon the economic ability to acquire land and housing. The lowest income group, who after independence were migrating in large numbers into the city from the countryside, became squatters. Europeans remained in the high-income brackets and most of them live in the former European residential areas. African population of high-income group, mainly the better-educated and more successful businessmen, joined them in upper Nairobi. The middle income Africans joined the Asian and lived in Parklands, Eastleigh and Nairobi South. The low-income groups were confined to the sprawling Eastlands and the informal settlements. Virtually no European or Asian lived in the Eastlands area. Thus the residential areas got differentiated mainly in terms of income status also.

Nairobi exhibits a glaring discrepancy in its human settlement with both the poor and the rich housed in juxtaposed neighborhoods. Somehow, the shanties tend to thrive in the fringes, if not confines, of exclusive and up-market residential neighborhoods. It seems that every time a middle class or high income residential estate is being put up, an informal settlement is on the way up. An aerial view of the city of Nairobi reveals the mismatch in human settlement. Be it government owned, council built or private residential estate, virtually all the up market and middle class houses share boundaries with the slums. For example, the sprawling Kibera slum borders Lang’ata, Otiende, Ngummo, Golf Course and Southlands estates. Kangemi slums border the posh Westlands estate and the rich neighborhood of Mountain View estate. Mukuru slums border River Bank and South B estates whereas Kawangware and Dagoretti slums border Lavington estate with Mathare Valley slums next to Muthaiga estate. Rosellyn and Runda estates have the nearby high density mixed slum and low income housing characterized Ruaka area.

3.1.2 Infrastructure Development

Lack of services and infrastructure constrains Nairobi’s economic development. The governance system in Nairobi comprises of an elected council, an appointed administrative municipal service, a few civil society groups (residents’ associations), and the regulatory authority of Central Government. The leadership of the city does not generally promote civil society participation or create accountability frameworks for public scrutiny.

In general the character of development in Nairobi indicates a demand–led instead of an infrastructure –led type of development. The implementation of plans for development has been inadequate and ineffective such that developments needs far outpace infrastructure and are being carried out without a commensurate upgrading of the existing infrastructure.

**Water supply**: The Kamulu area is serviced by private boreholes. The water supply to the area is inadequate to meet current city demand and reticulation does not cover the whole area. Developers adopt coping strategies such as sinking of boreholes or allowing for underground reservoir tanks to tap intermittent water inflows.
Though the above measures are adequate for the planned low density area, if ground water resources of the area are not to be unsustainably stretched, future development of the area will depend on the improvement of the existing supply and the extension of reticulation to areas not already covered.

**Sanitation:** The area is served by the use of septic tanks.

**Solid waste management:** There is no public solid waste disposal system in the Kamulu area though Dandora Dumpsite is in close proximity. Based on the assumption that the CCN is unlikely to initiate a solid waste disposal system for the area, the proponent proposes to setup an area near the entrance gate where all solid waste will be collected, segregated into recyclable materials. An environmentally accredited private waste disposal company will then be contracted to collect the different segregated waste streams.

**Electricity supply:** The Kenya Power and Lighting Co. (KPLC) currently supplies Grid power to the Kamulu area though neighbors claim it is of low reliability (frequent interruptions and/or low voltage). The timelines for KPLC proposals to increase bulk power supply to the area are unclear and measures to mitigate this have to be put in place. A common back-up power supply generator is proposed for the common areas coupled with battery-inverter systems for each houses emergency power supply. The power supply will be augmented by solar water heating systems in each house for energy conservation.

**Roads and public transport:** Traffic jams have become a major phenomenon in Nairobi City and its environs especially during the rush hours (peak periods). The roads are usually congested with private and public service vehicles moving at a snail’s speed. Much time is lost on the roads and vehicles consume extra fuel leading to heavy losses to the economy. With rapid expansion of the Nairobi City’s peri-urban centers the majority of roads leading from the city have heavy traffic. This compromises traffic safety as carriageways of what have now become main-through roads are too narrow to accommodate increased traffic flows. However the Government is addressing this and has recently embarked on expansive city wide infrastructural development that includes widening of existing roads and construction of bypass roads. It is expected that with the completion of these infrastructural developments by 2012, smooth traffic flow will be ensured.

### 2.1.3 Land use in Kamulu Environ

Most land in the Kamulu area environs is in private hands and there is very little public land available for the development of public institutions and recreation. The continuing increase in land value is encouraging sub-division and changes of user from residential to commercial or institutional use are on the rise.
Plate 3.1: Developments in the Area

The planning approach taken by the physical development planners is based on the premise that the dominant land use in the area is middle-density residential. Other uses, including high density residential hotels, public purpose, educational or commercial institutions will only be permitted as required to support the dominant user. All new developments are expected to conform to environment standards that will reinforce dominant use ensure for the area and not only respect but enhances the area’s natural environment and scenic beauty.

3.2 Social-Economic Environment

Kenya Vision 2030 is the country’s new development blueprint covering the period 2008 to 2030. It aims to transform Kenya into a newly industrializing, “middle-income country providing a high quality life to all its citizens by the year 2030”. The Vision has been developed through an all-inclusive and participatory stakeholder consultative process, involving Kenyans from all parts of the country. It has also benefited from suggestions by some of the leading local and international experts on how the newly industrializing countries around the world have made the leap from poverty to widely-shared prosperity and equity. The national launch of the Kenya vision 2030 and its first five year implementation framework, the Medium Term Plan (MTP) 2008-2012 provided the frameworks and development anchorage for the preparation of the 8th series of District Development Plans (DDPs) for the 148 Districts as of October 2008. The DDPs
are instrumental for the actualization of the desired aspirations, contained in the key national development blue prints and affirmations to international ideals espoused in the Millennium Development Goals (MDGs) at the local level.

3.3 Insecurity

Insecurity is a key governance issue as it relates to individual’s safety and their property. It discourages investment because it increases the cost of conducting business. As noted before every affluent estate has a shanty settlement nearby and Kamulu is no exception with its adjoining informal settlements. The prevailing conditions in these informal settlements are a major security risk. Most of the new population causing Nairobi’s growth comprises workers migrating from rural areas seeking employment in the city. Wages in the unskilled city labor market are low and most of these immigrants cannot afford formal housing. This has resulted in mushrooming of very many informal settlements (slums) where living conditions are poor with high incidences of joblessness, poverty, poor general sanitation and insecurity.

Throughout the 1990s, Nairobi had struggled with rising crime, earning a reputation for being a dangerous city and the nickname "Nairobbery". The United Nations International Civil Service Commission rated Nairobi as among the most insecure cities in the world, classifying the city as "status C." The head of one development agency cited the "notoriously high levels of violent armed robberies, burglaries and car-jacking. Though most crime occurs around the pockets of poor neighborhoods especially at night, these neighborhoods also harbor criminals who target the rich. As a security precaution, most large houses have a watch guard, burglar grills, and dogs to patrol their grounds during the night.

Crime has since decreased in the city, due to increased security measures such as Rapid Response alarms provided by security firms and an improved police presence. However, the security committees realize the need to shift from event or incident based response to trend monitoring, with a view to shifting the focus to prevention through creation of meaningful employment opportunities.

3.4 Climate

At 1,661 meters (5,449 ft) above sea level, Nairobi enjoys a fairly moderate climate. The altitude makes for some chilly evenings, especially in the June/July season when the temperature can drop to 10 °C (50 °F). The sunniest and warmest parts of the year are from December to March, when temperatures average the mid-twenties during the day. The mean maximum temperature for this period is 24 °C (75 °F).

There are two rainy seasons but rainfall can be moderate. The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast with drizzle. As Nairobi is situated close to the equator, the differences between the seasons are minimal. The
seasons are referred to as the wet season and dry season. The timing of sunrise and sunset does not vary tremendously throughout the year, due to close proximity to the equator.

Table 2.2: Weather averages for Nairobi

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average high °C (°F)</td>
<td>24.5 (76)</td>
<td>25.6 (78)</td>
<td>25.6 (78)</td>
<td>24.1 (75)</td>
<td>22.6 (73)</td>
<td>21.5 (71)</td>
<td>20.6 (69)</td>
<td>21.4 (71)</td>
<td>23.7 (75)</td>
<td>24.7 (76)</td>
<td>23.1 (74)</td>
<td>23.4 (74)</td>
</tr>
<tr>
<td>Average low °C (°F)</td>
<td>11.5 (53)</td>
<td>11.6 (53)</td>
<td>13.1 (56)</td>
<td>14.0 (57)</td>
<td>13.2 (56)</td>
<td>11.0 (52)</td>
<td>10.1 (50)</td>
<td>10.2 (50)</td>
<td>10.5 (51)</td>
<td>12.5 (55)</td>
<td>13.1 (56)</td>
<td>12.6 (55)</td>
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<tr>
<td>Precipitation mm (inches)</td>
<td>64.1 (2.52)</td>
<td>56.5 (2.22)</td>
<td>92.8 (3.65)</td>
<td>219.4 (8.64)</td>
<td>176.6 (6.95)</td>
<td>35.0 (1.38)</td>
<td>17.5 (0.69)</td>
<td>23.5 (0.93)</td>
<td>28.3 (1.11)</td>
<td>55.3 (2.18)</td>
<td>154.2 (6.07)</td>
<td>101.0 (3.98)</td>
</tr>
</tbody>
</table>

Source: KMD, 2008-01-10

3.5 Topographic features and Geology

Nairobi is close to the eastern border of the Rift valley and is on a large depression filled with volcanic rocks and sediments of Cainozoic times, which lie on basement complex rocks. In earlier times volcanic activities dominated Nairobi area. The volcanic rocks deposited by the solidification of flowing lavas (Nairobi phonolites) have gentle slope flowing eastwards from the Rift valley. Below the phonolites are series of sediments (upper Athi), which is underlain by lower Athi series. Below the lower Athi are the Kapiti Phonolites lying on the oldest rock in the country – the basement rocks, old metamorphic rocks of sedimentary origin. The soils are described as poorly drained, dark grey to black half ripe clay in most of the province. There are few pockets of red soil to the west of Nairobi.

3.6 Vegetation Types

The rains in this area are unreliable. A few acacia trees, shrubs and grass were noted on site.

3.7 Current Land Use

The proposed site is on a fenced privately owned plot which is currently not in use.
3.8 Biological Environment

3.8.1 Flora

The indigenous flora include Acacia spp, Setaria, Chloris, Cynodon, Paspalum, Brachiaria, Hyparrhenia, Themeda, Echnochloa, Entolasia, Glycine, Lotononis and Alysicarpus.

3.8.2 Fauna

There was no fauna observed to be habitng on the plot save for the small insects e.g. beetles, bees, ants and butterflies. No large animals were observed nor spotted. Due to the construction activities, these fauna will be disturbed and displaced.
CHAPTER FOUR: KENYA’S POLICY, LEGISLATIVE AND REGULATORY FRAMEWORK

4.1 National Policy Framework

4.1.1 National Environmental Action Plan (NEAP)

According to the Kenya National Environment Action Plan (NEAP, 1994), the government recognizes negative impacts on ecosystems attributable to industrial, economic and social development programmes that disregard environmental sustainability. Following on this, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished and/or are in the process of development. Under the NEAP process EIA was strongly recommended to the key participants who included industrialists, business community and local authorities as a tool for ensuring sustainability in development programmes.

Among the key objectives of the Policy paper on Environment and Development (Sessional Paper No. 6 of 1999) are:

- To ensure that from the onset, all development policies, programmes and projects take environmental considerations into account.
- To ensure that an independent Environmental Impact Assessment (EIA) report is prepared for any industrial venture or other development before implementation.
- To come up with waste management standards that will conform to accepted health standards.

4.1.2 Government of Kenya Energy Policy and Plan of Action

Energy supply has been identified as one of the infrastructural enablers of the economic, social and political pillars of Kenya’s Vision 2030 development plan. Kenya’s energy policy is designed to provide adequate, quality; reliable and affordable energy in order to stimulate high and sustained economic growth needed to lead to higher incomes, increased employment and reduced poverty as per the projection of the national development plan.

The country’s energy policy in the medium term aims at meeting the energy demands of the country in a more efficient and cost-effective way. The policy is also intended to facilitate development, tapping and access of modern energy sources to all sectors of the country’s economy.
The proposed setting up of a petrol station in Kamulu is therefore a timely contribution towards ensuring achievement of Kenya’s energy supply policy objectives in accordance with the government of Kenya’s development plan as stipulated in Vision 2030 document.

4.1.3 Vision 2030 and Fuel Facilities

Efficient physical infrastructure for transport and communication is imperative for the desired Kenya’s socio-economic transformation and has been identified as a central pillar in Vision 2030. Energy supply has likewise been identified as one of the infrastructural enablers of economic, social and political pillars of Kenya’s Vision 2030.

Under the Vision 2030 Kenya’s Energy Policy is geared to enable provision of adequate, quality, reliable and affordable energy to stimulate high and sustained economic growth. The country’s energy MTP (2008 – 2012) aims at meeting the energy demands of the country by facilitating access to modern and quality energy to all sectors of the country’s economy.

In the Vision 2030 it has been noted that access to energy is an imperative for rapid and sustained economic growth and poverty reduction. In this regard the government encourages private investment in the energy sector in order to help achieve the stated development objectives.

The transport and communication goal as stipulated in Vision 2030 is to ensure that the country is firmly interconnected through an efficient network of transport and communication infrastructure; - roads, railways, ports, airports, waterways and telecommunication.

The Vision 2030 MTP (2008 – 2012) seeks to accelerate infrastructure development in the country with a focus on quality, aesthetics and functionality of the infrastructure services. Interventions in this area are based on the realization that effective and reliable infrastructure is critical in promoting the country’s competitiveness at the national, regional and global levels.

4.2 Legal and Regulatory Framework

Existing legal framework for the downstream petroleum sub-sector in Kenya is insufficient in as far as development of standards and technical guidelines for safe storage and transportation of products are concerned. Other than what NEMA is currently enforcing, sector-specific regulatory capacity is likewise low for the petroleum sector.

As an effort to develop a comprehensive modern law, covering all segments of the petroleum energy supply chain and distribution – necessary for the protection of health, safety and environment the Petroleum Bill 2002 was drafted but has since been combined with electricity regulation in The Energy Act 2006.
The Energy Act 2006, which provided for establishment of the Energy Regulatory Commission (ERC), was passed into law in December 2006. The functions of the commission includes among others regulation of the importation, exportation, generation, and transmission, distribution, supply and use of electrical energy, petroleum products and other forms of energy. It is this commission that has been tasked with development of the necessary regulatory standards for storage, transportation and dispensing of Jet fuel.

The Draft Pollution Prevention Guidelines (PPG) for the downstream petroleum sector have just been prepared by ERC and are yet to be discussed with stakeholders for refinement and submission of the proposals to the Minister for Energy for gazettement before they can take effect.

The Environmental Management and Coordination Act (EMCA) was enacted with the aim of ensuring that projects with potential to have negative impacts on the environment incorporate measures to mitigate those risks and therefore ensuring sustainable development.

Identification of the potential to cause harm to the environment is achieved during the environmental impact assessment (EIA) stage which is the first stage of any proposed development. The product of this EIA process is an EIA report that is submitted to NEMA- the environmental regulatory authority as an application for an environmental license. A proposed project can commence only after NEMA has issued a go ahead in form of an EIA license, after it is satisfied that the proposed project has adequately incorporated measures to mitigate potential adverse impacts and therefore safeguard safety, health, property and the general environmental wellbeing.

This Environmental Impact Assessment (EIA) of the proposed NOCK Petrol Station was carried out based on the requirement of Kenya’s environmental legislation and has considered all the existing sectoral legislation relevant for the proposed project.

EIA is a tool for incorporating environmental sustainability into projects and is used for the identification of significant environmental aspects and impacts (positive and negative) of proposed projects prior to implementation in order for adequate mitigation measures for addressing negative impacts to be incorporated in the project design before project implementation. Positive impacts are also identified and measures for enhancing them incorporated in the project design. Addressing the identified impacts before implementation ensures sustainable operation of the proposed project with respect to environmental resources and harmonious co-existence with other socio-economic activities in the neighborhood.

At the national level, Kenya has put into place necessary legislation that requires environmental impact assessment to be carried out on specified types of proposed operations and projects and
EIA reports to be submitted to the National Environmental Management Authority (NEMA) for approval and issuance of EIA license. To facilitate this process, regulations on EIA and environmental audits have been established under the Kenya Gazette Supplement No. 56 of 13th June 2003. Besides, a number of other national policies and legal statutes have been reviewed to enhance environmental sustainability in national development projects across all sectors. Some of the legal provisions are briefly presented in the following sub-sections:

4.2.1 The Environment Management and Co-ordination Act, 1999

Part II of the Environment Management & Co-ordination Act, 1999 states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. To achieve this, the Act in part VII section 58 directs that any proponent of any projects listed under schedule II should carry out an environmental impact assessment and prepare an appropriate assessment report for submission to NEMA, who in turn may issue a license as appropriate.

Schedule II of the same Act lists sites involving the management of hydrocarbons including storage of combustible or explosive fuels among the facilities that must undergo environmental impact assessment prior to their operation. The proposed storage of jet fuel falls under this schedule.
4.2.2 The Water Act, 2002

Part II, section 18, of the Water Act, 2002 provides for national monitoring and information systems on water resources. Following this, sub-section 3 allows the Water Resources Management Authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a facility operator and the information thereof furnished to WRMA.

Section 73 of the Act allows a person with license (licensee) to supply water to make regulations for purposes of protecting against degradation of water sources. Section 75 and sub-section 1 allows the licensee to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or upon land for preventing pollution of water sources within his/her jurisdiction.

The waste water regulation, 2006 states that; No person shall Abstract ground water or carry out any activity near any lakes, rivers, streams, springs and wells that are likely to have any adverse impact on the quality or quantity of the water without an EIA license issued.

4.2.3 Petroleum Act, Cap. 116

The legislation has noted several challenges that face the sector which include proliferation of substandard Petroleum Products dispensing and storage sites which pose environment health and safety risks; diversion of petroleum products destined for export into the local market by unscrupulous business people to evade tax and a dominance of the market by a few companies among others. The Government noted these challenges in its energy policy contained in Session Paper No. 4 of 2004 on Energy and recommended review of the Petroleum Act Cap 116 and other energy sector statutes and the introduction of a new energy sector legislation to cover petroleum, electricity and renewable energy. It also recommended the formation of a single energy sector regulator to regulate electricity, downstream petroleum, renewable energy and other forms of energy.

The act makes provisions for restricting and regulation for the importation, transport and storage of petroleum. A license to store petroleum in an installation shall authorize the keeping of the quantity and description of the petroleum product specified therein within the confines of the installation whether in tanks, storage sheds or otherwise in accordance with the specifications and plans attached to the license.

The Act provides for specifications in the granting of a license of the premises to be licensed giving particulars of the materials and construction of each building. The position of the premises in relation to adjoining property and distances from neighbouring buildings should be specified. The position and capacity of each tank, the position of all buildings, structures or other works within the installation, all lighting arrangements including position of electric cables,
switches and fuse boxes, drainage systems, water connections, fire hydrants and fire-fighting appliances should also be specified.

**4.2.4 Energy Act, 2006**
In 2006, the Energy Act No. 12 of 2006 was enacted. This led to the transformation of the then Electricity Regulatory Board to the Energy Regulatory Commission (ERC) to also regulate petroleum and renewable energy sectors in addition to electricity. The Act states in Section 5(a)(ii) that the objects and functions of ERC include regulating the importation, exportation, transportation, refining, storage and sale of petroleum and petroleum products. Therefore one of the functions of the ERC is licensing of petroleum import, export, transport, storage, refining and sale. Construction Permits are also to be issued by ERC for all petroleum related facilities in order to check proliferation of substandard sites. All petroleum operators are required to comply with provisions for Environment Health and Safety. Petroleum products should also meet the relevant Kenya Standards.

The Minister may on the recommendation of the Commission make regulations-

a) Defining the kind of petroleum to which the regulations shall apply, and dividing the petroleum into classes or categories and making different provisions with regard to such classes or categories;

b) Governing the design, construction and operation of pipelines, refineries, bulk liquefied petroleum gas facilities, retail dispensing sites, storage depots and providing for the protection of property and the environment and the safety of the public in the construction and operation thereof

**4.2.5 The Occupational, Health and Safety Act, 2007**
The Act 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; and Protect persons other than persons work against risks to safety and health arising out of, or in connection with, the activities of persons at work.

*a). Safety*
Fencing of the premises and dangerous work stations should be done. Workers must be trained on personal safety and how to handle equipments and machines. They should be provided with Personal Protective Equipment which should be worn at all times. Special precaution against gassing should be laid down for duties in confined spaces where people are liable to be overcome by hazardous fumes. Air receivers and fittings must be of sound quality and should be regularly maintained. There should be a fire risk and disaster preparedness plan clearly spelt out and implemented. Adequate fire extinguishers should be installed at every pump, in the office, escape route clearly marked and an assembly point provided and marked.
b). Health
The premises must be kept clean; dusting done daily and separate washrooms (Gents & Ladies) kept clean and in good working conditions and necessary facilities provided. The workstations must be adequately ventilated, with enough light to ensure workers are not subjected to any form of hazards while at work.

c). Welfare
Every occupier shall provide and maintain so as to be readily accessible, a first-aid box or cupboard of the prescribed standard. The occupier of a workplace shall cause a thorough safety and health audit of his workplace to be carried out at least once in every period of twelve months by a safety and health advisor, who shall issue a report of such an audit containing the prescribed particulars to the occupier on payment of a prescribed fee and shall send a copy of the report to the Director.

4.2.6 The Physical Planning Act, Cap. 286
The Physical Planning Act has provisions to control development and use of land in particular areas, especially where a project may involve subdivisions or amalgamation of land parcels, or located in an area otherwise reserved for other uses. It aims at guiding the development in the whole country irrespective of the land tenure limitations.
Section 30 (1) of the Act stipulates that no person shall carry out development within the area of a local authority without a development permission granted by the local authority under section 33.
Section 29 of this Act provides for development control. It empowers the local authority to prohibit or control the use and development of land and buildings in the interests of proper and orderly development of its area.
Section 36 states that a local authority may if deem necessary require a submission of EIA report together with development application if they feel the project has some injurious effects on the environment.

4.2.7 Local Government Act, Cap. 265
The sections of the Local Government Act that are relevant to this project include making by-laws in respect of suppression of nuisances, imposing fees for any license or permit issued in respect of trade or charges for any services. Local authorities are given power to control or prohibit all developments which, by reason of smoke, fumes, chemicals, gases, dust, smell, noise, vibration or other cause, may be or become a source of danger, discomfort or annoyance to the neighbourhoods, and to prescribe the conditions subject to which such developments shall be carried on.
4.2.8 Public Health Act (Revised 1986)
Under this Act, every local authority or health authority is mandated to take all lawful, necessary and reasonable practicable measures to prevent all injurious conditions in premises, construction condition or manner of use of any trade premises. Nuisances under this Act include 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 street or watercourse, or any accumulation or deposit of refuse or other offensive matter. Every municipal council and every urban area council may make by-laws as to buildings and sanitation.

4.2.9 The Environment (Impact Assessment and Audit) Regulations, 2003
On June 13th 2003, the Minister of Environment, Natural Resources and Wildlife promulgated the Environment (Impact Assessment and Audit) regulations 2003 (EIA/EA Regulations) under section 147 of the EMCA. These regulations provide the framework for carrying out EIAs and EAs in Kenya.

4.2.10 The Way Leave Act
The areas zoned for communication lines, sewer lines, power lines, water pipes etc are known as way leaves. The Way Leave Act prohibits development of any kind in these designated areas. Thus any developer is bound by this Act to see to it that no development takes place in these areas. The proposed project will not encroach on any way leave and will leave the required space for such services.

4.2.11 Building Code 2000
This by-law recognizes the Local authorities as the leading planning agencies. It compels the potential developer to submit development application for the approval. The local authorities are hence empowered to approve or disapprove any plans if they do or don’t comply with the law respectively. Any developer who intends to erect a building as herein proposed must give the respective local authority a notice of inspection before the erection of the structure. On completion of the structure, a notice of completion shall be issued by the local authority to facilitate final inspection and approval. No person therefore shall occupy a building whose certificate of completion has not been issued by the local authority.
Section 214 of the by law requires that any public building where the floor is more than 20 feet above the ground level should be provided with firefighting equipment that may include one or more of the following hydrants, hose reels and fire appliances, external conations portable fire appliances, water storage tanks, dry risers, sprinkler, drencher and water spray spring protector system.
4.2.12 Weights and Measures Act, Cap. 513.
The above named Act mandates the Weights and Measures Department to annually certify the mechanical pumps and dispensers in order to ensure that they are properly calibrated to dispense the right amounts of the petroleum products. During the certification exercise, the measuring mechanisms inside the pumps are sealed with a seal-mark of quality assurance. The Weights and Measures Department issues a Certificate of Verification for all the mechanical pumps which is usually valid for 1 year.

4.2.13 Work Injury Benefits Act, 2007
This provides for compensation to employees for work related injuries and diseases contracted in the course of employment. The proponent must comply with the provisions of this legislation with regard to the above Act at the proposed premises.

4.2.14 The Land Planning Act (Chapter 286)
Section 29 states that each local authority shall have powers to control the use and development of land and buildings in the interest of proper and orderly development of its area. This includes prohibition or control of subdivision of land or plots into smaller units. The section also empowers the local authority to formulate by-laws to regulate zoning in respect to use and density of development.
CHAPTER FIVE: ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1 EIA Methodology
The methodology used in the study consisted of the following:

i) A site reconnaissance and visual survey to determine the baseline information of the project area.

ii) Comparative study of the project with existing land uses in the neighbourhood.

iii) Analysis of the project documents

iv) Discussion with the proponent and his consultants

v) Assessment of the site to detail the various existing and likely impacts.

vi) Assessment of health and safety issues

vii) Seeking public views through interviews

viii) Proposal of mitigation measures to minimize any negative impacts.

ix) Preparation and submission of the project report.

5.2 Description of the existing and anticipated impacts

i) Existing Impacts
As at the time of the study, the following impacts existed within the project area;

- Noise from public service vehicles from within the Kamulu town.

ii) Anticipated Impacts
The impacts of the proposed alteration project on the environmental elements are both positive and negative. The magnitude of each impact is described in terms of being significant, minor or permanent, short-term or long term, specific (localized) or widespread, reversible or irreversible. Most of the impacts have been addressed in the proactive design of the project and other mitigations can only be guaranteed through active and responsible management committed to the propositions of the environmental management plan.

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

<table>
<thead>
<tr>
<th>Key</th>
<th>Type of impact</th>
<th>Key</th>
<th>Type of impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>++</td>
<td>Major positive impact.</td>
<td>+</td>
<td>Minor positive impact</td>
</tr>
<tr>
<td>--</td>
<td>Major negative impact.</td>
<td>-</td>
<td>Minor negative impact</td>
</tr>
<tr>
<td>O</td>
<td>Negligible/zero impact.</td>
<td>No</td>
<td>No change</td>
</tr>
<tr>
<td>Sp</td>
<td>Specific/localized</td>
<td>W</td>
<td>Widespread</td>
</tr>
<tr>
<td>R</td>
<td>Reversible</td>
<td>Ir</td>
<td>Irreversible</td>
</tr>
<tr>
<td>Sh</td>
<td>Short term</td>
<td>L</td>
<td>Long term</td>
</tr>
<tr>
<td>T</td>
<td>Temporary</td>
<td>P</td>
<td>Permanent</td>
</tr>
</tbody>
</table>

On the basis of information gathered during both the desktop and field study, the potential environmental impacts of the proposed project are as tabulated below.
### Table 5.2: Potential environmental impacts

<table>
<thead>
<tr>
<th>Impacts on due to</th>
<th>Construction</th>
<th>Occupation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in Land use Extent.</td>
<td>-</td>
<td>-/o</td>
<td>The proposed construction will not have a significant change in the land use of the area since the area has been approved for such purposes.</td>
</tr>
<tr>
<td>Pollution:</td>
<td>-t r</td>
<td>o</td>
<td>During construction, dust and exhaust emission from the construction activities, noise from concrete mixers and workers will generate noise and vibration that may have negative effect to the neighbourhood. Petroleum oils and grease used in vehicles and construction machinery may spill or leak on/into the ground but these will be very negligible. Sound and up to date pollution control measures will be put in place.</td>
</tr>
<tr>
<td>Air/dust</td>
<td>- t r</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>- Sh</td>
<td>o</td>
<td></td>
</tr>
<tr>
<td>Oil waste.</td>
<td>o</td>
<td>o</td>
<td></td>
</tr>
<tr>
<td>Site drainage</td>
<td>o</td>
<td>o</td>
<td>Soil erosion is not a problem at the site</td>
</tr>
<tr>
<td>Water Resources</td>
<td>-Sh</td>
<td>o</td>
<td>Water shall be used during the construction thus straining the supply. There will also be some increase in water use during occupation. The water is however metered and there will be no loss of revenue.</td>
</tr>
<tr>
<td>Public Health</td>
<td>-o</td>
<td>NC</td>
<td>During the construction process, health threats will only be limited to the workers on site. During operation there</td>
</tr>
<tr>
<td>Site of Traditional, Historical or Cultural Significance</td>
<td>o</td>
<td>o</td>
<td>There are no sites of cultural, historical or religious significance within the project boundary.</td>
</tr>
<tr>
<td>Disturbance of public</td>
<td>-Sh</td>
<td>NC</td>
<td>Disturbance to the public would minimally occur due to noise and dust during construction. After construction, change in noise levels compared to the current situation be negligible.</td>
</tr>
<tr>
<td>Construction materials</td>
<td>-</td>
<td>o</td>
<td>Building stones will be required for the construction. Other materials will include piping, tiles, wood etc. All these will be sourced from suppliers who deal in them. Undesirable, hazardous or unauthorized materials should not be used.</td>
</tr>
</tbody>
</table>
5.3 Issues of Concern and Mitigation

5.3.1 Occupational Health and Safety (OHS)
National Oil Corporation of Kenya is dedicated to protecting the safety and health of its employees, contractors and the communities where it operates, as well as a conscientious regard for the environmental impact of its activities and products. During construction and operation occupation hazards and incidences may occur, and the immediate neighbours and workforce involved would be more subjected to these hazards.

Mitigation Measures
- All workers and visitors should be provided with appropriate safety/ protective equipment and gear while on site.
- Carrying out annual environmental and safety audits in all petrol stations.
- Safety kits and emergency facilities should be provided incase of any accidents and incidents common to projects of such a nature. These should be placed in strategic locations on site.
- Delivery and storage of materials at appropriate locations.
- Standards and legal requirements should be adhered to. These include: Building codes, Occupational Safety & Health Act, the Public Health Act, as well as other recognized best practices and procedures.
- The project proponent and contractor should take appropriate insurance cover for the various project activities and personnel.
- The workforce should be further trained on safety measures.

5.3.2 Increased Water Demand
Water is a major concern especially in construction sites. The proposed development may cause some strain to the existing water source since construction activities are known to be heavy water consumers. Occupation of the developments will bring about an increase in water consumption. The proponent will apply for connection with water supply from existing boreholes or sink their own. In case of water shortage, there will be reserves at the storage tanks which will be constructed to store water.

Mitigation
- Avoid wasting the water supplied to the site.
- The contractors should use water bowsers to bring in water for construction activities especially during periods of high water demand subject to authorization by existing water Regulatory Board.
- Encourage water reuse/recycling during both construction and operational phases.
- Roof catchments should be provided with rainwater harvesting systems to enhance collection and storage of rain water. Such water can be used to water flower gardens and all kind of cleaning required on site.
- Install water meters for the offices to ensure accountability and responsibility.
- There will be water tanks to take care of water shortages.
5.3.3 Underground Fuel Tanks
The single compartment underground fuel tanks will have a single-walled mild steel plate of 6mm thickness and joints to be butt welded for circumferential joints and lap welded longitudinally.

Mitigation
- No longitudinally joint shall be located at the bottom of the tanks.
- The dished ends of the tanks will be bent to 25mm radius and welded lap or butt type on both sides to full penetration.
- Tests will be done on completion of fabrication with air pressure to 5psi and certified leak proof.
- Provide reinforced chamber that is water proof
- The tanks should be located at the forecourt and have manholes for offloading and dipstick checks.
- Remote fill box will be typical incorporating spill containment to prevent accidental releases into the environment.
- Single walled tank installation with excavation lined with geo-fabric to be done to prevent migration of native soil into the backfill material.
- The tanks will meet KS standards and KEBS as a requirement and the following specifications stamped on the surface.
  ✓ Plate of thickness
  ✓ Date of manufacture
  ✓ Tank serial number and Test results

5.3.4 Construction Waste
In construction projects, there are usually some wastes on the site. Removal and disposal of such refuse and other related wastes comes in handy. The waste should be disposed into the approved dumpsites.

Mitigation Measures
- The contractor or proponent should work hand in hand with licensed private refuse handlers and the City Council of Nairobi to facilitate waste handling and disposal from the site.
- The waste materials should be properly segregated and separated to encourage recycling of some of them with the approval of the site engineer.

5.3.5 Increased Power Demand
There will be high power consumption especially during occupation phase. The developments will connect to the existing power line and this might strain the resource. However the office occupants will be encouraged to conserve as much energy as possible and energy conserving appliances should be used. Energy conservation involves proper use of electrical appliances, lighting systems and other electrical gadgets used for different purposes.

Mitigation
- All electrical appliances should be switched off when not in use.
- Put off all lights when not in use.
• Use a design that is environmentally sound to avoid use of electricity for air conditioning
• Use energy conserving electric lamps for general lighting.
• Utilize natural light inside buildings to avoid using electricity for lighting during the day.

5.3.6 Pollution
The construction activities on the site will result to increased dust and gas emissions. Such dust and gases have direct negative impact to the quality of air and hence animal/human health. Hooting of the involved vehicles and workers will generate noise and vibrations which may have effect to the neighbourhoods. Petroleum oils and grease as used in vehicles and construction machinery may spill or leak on/into the ground.

Mitigation Measures
• Sound pollution control measures should be applied/ adapted
• Regular and prompt maintenance of construction machinery and equipment. This will minimize generation of hazardous gases and other suspended particulate matter.
• Areas generating dust particles should be regularly sprinkled with water to reduce dust blowing out over the area and should be enclosed where possible to mitigate the effects of wind on them.
• Maintenance should be carried out in a well designed and protected area and where oil/grease is completely restrained from reaching the ground.
• All oils/grease and materials should be stored in a site’s store which is usually located in the contractor’s yard.

5.3.7 Soil Degradation
This can occur during excavations for foundation laying. The excavated materials can be carried by water or water causing erosion.

Mitigation Measures
• Excavated materials should be removed promptly from the site o avoid erosion
• Avoid unnecessary movement of soil materials from the site
• Control construction activities especially during rainy any windy conditions
• Sprinkling of water to reduce dust
• Landscaping after completion of the project and introduce appropriate vegetation.

5.3.8 Flora/Fauna
There is a little vegetation on the site at moment which will be cleared to pave way for the project construction. However, noise/dust pollution from construction activities might disturb fauna. Such small animal/bird life will have to find new nesting homes.

Mitigation Measures
• New vegetation will be introduced and managed on completion of the development to restore or improve the appearance of the site and also reduce soil erosion.
• Landscaping should be done within the site to improve site appearance after project completion.
5.3.9 Hydrology, drainage and water quality
Water may get contaminated by oil / fuel leaks. A lot of care need to be taken to ensure that clean water for domestic purposes is safe and not contaminated.

Mitigation
- A well drained area should be identified for parking, servicing and maintenance of the construction plant and equipment. In this case, appropriate disposal procedures for oils and lubricants should be observed.
- Drainage channels should be provided during construction to minimize any possible water logging. In this case, a segregated drainage system should be provided where the water that is contaminated with oils is not allowed to drain into the open storm drains. Instead, it should be directed into the oil-water separator from where it should be treated before it is released to the rest of the drainage system.
- A 3-chamber interceptor tank which is made up of reinforced concrete walls and floor shall be constructed and its inner walls shall be plastered with water proof cement. (Each chamber shall have a manhole with a reinforced concrete cover.)
- The used oil tank will have a concrete wall which will be able to contain the net products of used oil. Its plinth shall be sloped towards the Oil-Water separator for treatment.

5.3.10 Disturbance of the Public/Noise
Noise is unwanted/undesirable sound that can affect job performance, safety, and health. Psychological effects of noise include annoyance and disruption of concentration. Physical effects include loss of hearing, pain, nausea, and interference with communications when the exposure is severe.
Construction activities will be generating noise and hence affecting other operations in the neighbourhood. Such noise will mainly emanate from the construction machinery and equipment which include trucks and other vehicles accessing the site not forgetting noise that would emanate from the workers on site and from the demolition activities.

Mitigation Measures
- Construction works should be carried out only during the specified time of 0800 hrs to 1700 hrs.
- Machineries should be maintained regularly to reduce noise resulting from friction.
- There should not be unnecessary hornning of the involved machinery.
- Provision of bill boards at the construction site notifying of the construction activity and timings.

5.3.11 Sewage and Effluents
- Effluent/ sewage resulting from sanitary facilities and wastewater from the proposed developments is of significant concern with respect to the environment. It should always drain effectively into the available sewerage treatment system via well designed and laid pipe networks.
- Options are being explored to install a “pollution solution” system. The Pollution Solution system is a compact oil separator which separates oil from wash down water collected from the under canopy area of a service station in two different tanks, and
allows the wastewater to be discharged to sewer, while separating the solid material and/or contaminants in a separate tank for collection.

**Mitigation**
- Ensure no undue interference with the laid drainage system.
- All drain pipes passing under the building, driveway or parking should be of heavy duty PVC pipe tube encase in 150mm concrete surround. All manholes on drive ways and parking areas should have heavy duty covers set and sealed airtight as approved by specialists.
- All waste pipes should have cleaning roding eyes accessible from outside and free to every part of the system for inspection, cleaning and repair.
- Sanitary facilities should be kept clean always through regular cleaning.
- Ensuring the sewerage treatment plant is not overloaded to increase efficiency and minimise or eliminate incidences of untreated sewer spills to the environment
- Install a “pollution solution” system., which is a compact oil separator which separates oil from wash down water collected from the under canopy area of a service station in two different tanks, and allows the wastewater to be discharged to sewer, while separating the solid material and/or contaminants in a separate tank for collection.

### 5.3.12 Air Quality
The construction activities on the site will result to increased dust and gaseous emissions. Some construction machinery and trucks, including small vehicles generate hazardous exhaust fumes such as Carbon Oxides (CO$_x$), Sulphur Oxides (SO$_x$) and Nitrogen Oxides (NO$_x$). Dust particles as caused by wind and vehicles suspends in the air mostly during dry spells. Such dust and gases have direct negative impact to the quality of air hence affects animal/human health.

**Mitigation**
- Provide personal protective equipments, materials and clothing such as nose masks and goggles to workers during demolition and construction phases.
- Regular and prompt maintenance of construction machinery and equipment. This will minimize generation of hazardous gases and other suspended particulate matter.
- Control over areas generating dust particles. Such areas should be regularly cleaned or sprinkled with water to reduce dust.
- Use environmentally friendly fuels such as unleaded gasoline.

### 5.3.13 Fire Risks
Petrol stations have a greater fire risk than most establishments because of the highly combustible products handled. A lot of care must be taken while offloading, refuelling and while undertaking day to day activities. Fire fighting preparedness therefore becomes a must for so as to ensure the risk of fire is minimised and in case of fire the response is swift to prevent any damages or loss of lives.

**Mitigation**
- The underground storage tanks shall be fabricated out of 6mm thick mild steel plates in accordance with
- KS 200 (BS 2594) which is the standard design for Flammable and Combustible Liquids.
The installation of underground storage tanks shall be supervised by an engineer who specializes in Underground Petrol Storage Systems and shall be done in accordance with the API 1615: Installation of Underground Petroleum Storage Systems.

- One 9kg Co2 fire extinguisher shall be stationed at each pumping/dispensing area.
- A fire extinguisher shall be placed at the service bay and in the office building.
- A bucket full of dry sand shall be placed at each pump.
- Water hydrants should be installed.
- All the electrical connections shall be connected to one central emergency stop switch; in addition, they shall be designed by a registered engineer.

### 5.3.14 Solid Waste
This will be as a result of construction activities. Such waste materials include stones, wood, broken glasses and tiles, containers, metal rods, pieces of iron sheets/tiles and sharp objects such as nails. During occupation, solid wastes will be generated by the office occupants.

#### Mitigation
- The contractor or the proponent should work hand in hand with private refuse handlers and the City Council of Nairobi to facilitate waste handling, and disposal from the site. The resulting debris will be collected, transported and disposed off at suitably approved dumpsites.
- The materials should be properly segregated and separated to encourage recycling of some of them.
- Provision of dustbin cubicles at the gate as the central collection point.
- Waste receptacles will be placed at strategic points to discourage littering.

### 5.3.15 Increased Traffic
A petrol Station comes with increased traffic to the petrol station especially for refilling purposes, car wash, tyre pressure checks and such related services. Though this site will not offer all the above mentioned services, traffic control must be emphasized to ensure no accidents and maintain pedestrian and motorists’ safety. This will be done through:

#### Mitigation
- Provision of parking spaces
- Pedestrian walkways to be provided
- Control movement of vehicles and pedestrians within the petrol station

### 5.3.16 Change in Land Use
The plot is currently on commercial/residential. With construction of the petrol station the User will be within the existing zoning policy.

#### Mitigation
- Adhere to zoning policy/specifications as is required by City Council of Nairobi

### 5.3.17 Disaster Preparedness
During construction there can be cases of injuries or occupation hazards. On occupation, there will be also increased need for fire protection.
Mitigation

- Provide accessible and clear escape routes that are marked
- Install enough fire fighting equipments within reach.
- Train workers and office caretakers on fire fighting and first Aid and personal safety
- Carry out fire and emergency drills to assess disaster preparedness
- Provide personal protection equipment during construction

5.3.18 Compressor
The proponent will install one compressor for tyre inflation since there is potential demand for compressed air. There will be a permanent ventilated store for the compressor and generator. Explosions could also occur due to high pressure within the receiver. During inflation, tyre bursts or ring detachment may occur and cause damage to property or lose of life.

Mitigation

- Statutory examination of the air receiver should be done by a qualified personnel once every 24 months as per Occupational Health and Safety Act, 2007
- Provide two 9 Kg dry powder fire extinguishers in the store
- Draining of the air receiver daily and visually examining as well as regular servicing

5.3.19 Lubricant Shop
The following items will be displayed at the lubricant shop: lubricants, battery water and acid, brake fluids and greases. There could be spills from leaking containers or when being used. This can lead to contamination of water, soil and vegetation.

Mitigation

- The floor of the shop will be constructed using water proof concrete, thereby making it impervious to oils and greases
- Provide one 9 Kg dry powder fire extinguisher
- Train staff on how to handle the lubricants and respond to accidental leaks

5.3.20 Oil Interceptor
This will be constructed along the drainage system to trap sediments and grease/oils in the premises. Grease, oil spills and detergents could lead to contamination of surface water sources and soils.

Mitigation

- Oil skimming should be done frequently to prevent carryover of contaminants to the open storm drains
- Analysis of discharge from the interceptor to be conducted one every 6 months
- Heavy duty manhole covers provided and in place at all times unless skimming is in progress to prevent fall of persons
5.3.21 Soil and Geology
Even small leaks from underground tanks and supply lines can overtime cause extensive contamination of soil and ground water. This would require a lot of resources to clean up. These risks can be reduced by effective Management Plan

Mitigation

- Environmental baseline data of the soils and geology was documented to provide a baseline scenario against which possible impacts are to be assessed (Refer to Point No 3.1 (iii) on Page 16-17)
- Ensure there is no oil spills, leaks

5.3.22 Project decommissioning
Decommissioning phase will involve; notification of intent to all relevant agencies and liaising with the project Consultants that is engineers, architects and environmentalists in a bid to ascertain guidelines on possible impacts and mitigation measures.

Description of the project’s decommissioning activities

1. Demolition works: Upon decommissioning, the project components including buildings, pavements, drainage systems, parking areas and perimeter fence a lot of solid waste will be demolished. The wastes should be reused or if not reusable, disposed of appropriately by a licensed waste disposal company.

2. Dismantling of equipment and fixtures: All equipment including electrical installations, furniture, finishing fixtures partitions, pipe-work and sinks among others will be dismantled and removed from the site on decommissioning of the project; Priority will be given to reuse of these equipment in other projects; This will be achieved through auctioning of the equipment to other contractors or reused in another site.

3. Site restoration: Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the topsoil and re-vegetation using indigenous plant species.
CHAPTER SIX: PROJECT ALTERNATIVES

6.1 The proposed alternatives
This EIA project report has been prepared for submission to NEMA based on sound desktop and field studies made by the EIA team. The findings and recommendations are based on the proposed site materials and the proposed technologies to be used in implementation of the proposed project.

6.2 Alternatives to site
There is no viable alternative to this site owing to the scarcity of appropriate development land in Kamulu area.

6.3 Alternative to technology
The proponent should consider installing solar panels so that solar energy is also used as an alternative.

6.4 No project alternatives
This means that the status quo remains and the proponent will have to contend with the land being idle. This may lead to under utilization of the land and the proponent missing out on the good returns from the petroleum sector.

6.5 Comparison of alternatives
The proposed project is the best alternative since it will lessen the petroleum products shortage being experienced in the country, lead to revenue for the proponent and the government, improvement in service delivery and will create employment opportunities for more people.
CHAPTER SEVEN: ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

The environmental management plan involves risk management strategies that should be undertaken by the project proponent and the project manager to mitigate environmental degeneration. They are approaches to monitor, control, reclaim and restore the environment back to its appropriate state. EMPs for projects thus provide logical frameworks within which the identified issues of environmental concern can be mitigated, monitored and evaluated.

Environmental monitoring involves measurement of relevant parameters, at a level of details accurate enough, to distinguish the anticipated changes. Monitoring aims at determining the effectiveness of actions to improve environmental quality. The environmental management and monitoring plans have been developed and outlined to bring home the key findings of the Environmental Impact Assessment of the project in mention, recommending necessary mitigation actions, defining roles, monitor able indicators and the estimated cost.

The EMPs outlined in tables hereafter address the potential negative impacts and mitigation measures as well as roles, costs and monitor able indicators that can help to determine the effectiveness of actions to upgrade the quality of environment; as regards the proposed project. The EMPs have considered construction, occupation and decommissioning phases.
## ENVIRONMENTAL, HEALTH AND SAFETY MANAGEMENT AND MONITORING PLAN

### Table 7-1: CONSTRUCTION PHASE

<table>
<thead>
<tr>
<th>Environmental/ Social Impact</th>
<th>Proposed mitigation measures</th>
<th>Responsibility</th>
<th>Monitoring plan/indicator</th>
<th>Cost (Ksh pa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pollution</td>
<td>● Control speed and operation of construction vehicles.</td>
<td>Contractor</td>
<td>● Amount of dust produced. ● Level of landscaping carried out</td>
<td>100,000</td>
</tr>
<tr>
<td></td>
<td>● Prohibit idling of vehicles.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Spray water on excavated areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Maintenance of construction plant and equipment.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Sensitize construction workers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● All bare areas should be landscaped after construction.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Workers should be provided with dust masks if working sensitive areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise pollution</td>
<td>● Maintain plant equipment.</td>
<td>Contractor</td>
<td>Amount of noise</td>
<td>50,000</td>
</tr>
<tr>
<td></td>
<td>● Construction should be carried out only during daytime i.e. 0800 – 1700 HRS.</td>
<td>Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Workers to wear ear muffs if working in</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Traffic density
- Proper signage put in place to notify neighbours of the activity and presence of heavy vehicles and to direct traffic.
- Presence of boards directing patrons to the site.
- Strict adherence to traffic rules.

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear well maintained sign boards along the roads</td>
<td></td>
</tr>
</tbody>
</table>

#### 30,000

### Ecological considerations (flora & fauna)
- The flora and fauna should be restored after construction by landscaping and maintaining the introduced plants.

<table>
<thead>
<tr>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural ecology in areas not in use</td>
</tr>
</tbody>
</table>

#### 300,000

### Soil erosion & compaction
- Provide soils conservation structures on the areas prone to soil erosion to reduce impact of erosion.
- There should be designated pathways and driveways for

<table>
<thead>
<tr>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paved area and Landscaped areas.</td>
</tr>
</tbody>
</table>

#### 100,000
<table>
<thead>
<tr>
<th>Solid waste</th>
<th>Contractor Management</th>
<th>50,000</th>
</tr>
</thead>
</table>
| - Construction debris should be collected by a licensed private contracted waste collection company | ● Amount of waste on site  
● Presence of well maintained receptacles and central collection point |        |
<p>| - Excavation waste should be re-used or backfilled.                     |                       |        |
| - Waste generated should be collected by a privately contracted waste collection company and the contractor should ensure the construction of a central waste collection point with bulk storage facilities. |                       |        |
| - The site should have waste receptacles with bulk storage facilities at convenient points to prevent littering during |                       |        |</p>
<table>
<thead>
<tr>
<th>Occupation</th>
<th>Contractor</th>
<th>No oil spills or leaks on site</th>
<th>400,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil spills and leaks</td>
<td>● Machinery should be well maintained to prevent oil leaks. ● Contractor should have a designated area where maintenance is carried out and that is protected from rain water. ● All oil products should be stored in a site store and handled carefully.</td>
<td>Contractor</td>
<td>Management</td>
</tr>
<tr>
<td>Security</td>
<td>● Control of secondary businesses. ● Round the clock security for the facility. ● Adequate lighting and an alarm system installed at strategic points. ● Bushes around and within the site cleared to avoid hiding areas for thieves.</td>
<td>Contractor and Management</td>
<td>● Number of businesses around the site. ● Level of crime in the area</td>
</tr>
<tr>
<td>First Aid</td>
<td>● A well stocked first aid kit shall be maintained by a qualified personnel</td>
<td>Management</td>
<td>Contents of the first aid kit</td>
</tr>
</tbody>
</table>
### Vegetation Loss
- Designate access pedestrian routes and parking zones that are cabro paved
- Provide signs marked do not Walk/Park on the grass
- The flora and fauna should be restored after construction by landscaping and maintaining the introduced plants.

| Contractor and Management | ● Warning signs on site  
● Landscaped lawns | 100,000 |
|---------------------------|-------------------------|---------|

### Occupational Health and Safety
- Provide Personal Protective Equipment
- Train workers on personal safety and how to handle equipments and machines
- A well stocked first aid kit shall be maintained by a qualified personnel
- Report any accidents / incidences and treat and compensate affected workers
- Provide sufficient and suitable sanitary conveniences which should be kept clean

| Contractor and Management | ● Workers using Protective Equipment  
● Presence of Well stocked First Aid Box  
● Separate and clean washrooms (Gents &Ladies) | 100,000 |
### Table 7-2: OPERATION PHASE

<table>
<thead>
<tr>
<th>Environmental/ Social Impact</th>
<th>Proposed mitigation measures</th>
<th>Responsibility</th>
<th>Monitoring plan/indicator</th>
<th>Cost (Ksh pa)</th>
</tr>
</thead>
</table>
| Noise pollution              | ● Maintain plant equipment.  
                                | ● Construction should be carried out only during daytime.  
                                | ● Workers to wear ear muffs if working in noisy section.  
                                | ● Management to ensure that noise from the residents is kept within reasonable levels. | Contractor and Management | ● Amount of noise | 50,000 |
| Underground fuel storage and handling | ● 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 | Contractor  
                                                  | ● Management | Fuel and Oil spills  
<pre><code>                                              | Monitoring well | 500,000 |
</code></pre>
<p>| Traffic density | Ensuring no spills during refilling and/or when offloading the fuel, Proper signage put in place to notify neighbours of the activity and presence of heavy vehicles and to direct traffic, Presence of boards directing patrons to the site, Strict adherence to traffic rules. | Management | Clear well maintained sign boards along the roads | 30,000 |
| Ecological considerations (flora &amp; fauna) | The flora and fauna should be restored after construction by landscaping and maintaining the introduced plants. | Management | Natural ecology in areas not in use | 300,000 |
| Production of compressed air | Provide powder fire extinguisher, Regular inspection of safety valves by qualified personnel. | Management | Explosions, Fire outbreaks | 200,000 |
| Solid waste | Construction debris should be collected by a licensed private contracted | Management | Amount of waste on site, Presence of well maintained receptacles and central collection point | 50,000 |</p>
<table>
<thead>
<tr>
<th>Waste Collection Company</th>
<th>Excavation waste should be re-used or backfilled.</th>
<th>Waste generated should be collected by a privately contracted waste collection company and the contractor should ensure the construction of a central waste collection point with bulk storage facilities.</th>
<th>The site should have waste receptacles with bulk storage facilities at convenient points to prevent littering during occupation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Spills and Leaks</td>
<td>Machinery should be well maintained to prevent oil leaks.</td>
<td>Contractor should have a designated area where maintenance is carried out and that is protected from rain water.</td>
<td>Contractor</td>
</tr>
<tr>
<td></td>
<td>All oil products should be stored in a site store and handled carefully.</td>
<td>Security</td>
<td>Contractor and Management</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------------------------------------------------</td>
<td>----------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Security</td>
<td>Control of secondary businesses.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Round the clock security for the facility.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adequate lighting and an alarm system installed at strategic points.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bushes around and within the site cleared to avoid hiding areas for thieves.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire preparedness</td>
<td>Fire fighting drills carried out regularly.</td>
<td>Fire fighting emergency response plan.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ensure all fire fighting equipment is regularly maintained, serviced and inspected.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire hazard signs and directions to emergency exit, route to follow and assembly point in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>Fire fighting emergency response plan.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ensure all fire fighting equipment is regularly maintained, serviced and inspected.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire hazard signs and directions to emergency exit, route to follow and assembly point in</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire Signs put up in strategic places.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Availability of fire fighting equipment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of fire drills carried.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proof of inspection on fire fighting equipment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire Signs put up in strategic places.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Availability of fire fighting equipment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Health and safety</td>
<td>Management</td>
<td>Separate washrooms (Gents &amp; Ladies)</td>
<td>300,000</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------</td>
<td>--------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>• Train workers on personal safety and disaster preparedness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• A well stocked first aid kit shall be maintained by a qualified personnel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Report any accidents / incidences and treat and compensate affected workers</td>
<td></td>
<td>Copies of Annual Audit Reports</td>
<td></td>
</tr>
<tr>
<td>• Provide sufficient and suitable sanitary conveniences which should be kept clean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Conduct Annual Health and Safety Audits</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water consumption</th>
<th>Management and contractor</th>
<th>Presence of water meter</th>
<th>50,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Avoid unnecessary toilet flushing</td>
<td></td>
<td>Presence of automatic water taps</td>
<td></td>
</tr>
<tr>
<td>• Promptly detect leaking taps and repair them</td>
<td></td>
<td>Water bills</td>
<td></td>
</tr>
<tr>
<td>• Turn off taps when not in use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Install water conserving taps that</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>turn of immediately when water is not in use</td>
<td>Install a discharge water meter in the premises to check on total water use and for billing purposes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity use</td>
<td>Erect a meter in the premises to check on total kilowatts used and for billing purposes</td>
<td>Management and contractor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apply for connection from Kenya Power</td>
<td>Presence of an KPLC meter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Switch off light that are not in use</td>
<td>Electricity bills</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of energy conserving bulbs/tubes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of natural light for lighting purposes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use natural ventilation from windows and doors and avoid using Air Con that use electricity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provide a standby generator in the premises in cases power goes out</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Switch off lights in Management and contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Details</td>
<td>Responsible Party</td>
<td>Issue Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-------------------------</td>
<td>-------------------------------------------</td>
</tr>
</tbody>
</table>
| Cleaning of the Oil interceptor | - Use special tool to do skimming  
- Install spill control kit next to the interceptor during skimming | Management              | Contamination of ground and surface water  
Presence of Oil spills                     | 100,000 |
| Washrooms                | - Provide sufficient and suitable sanitary conveniences the washrooms should be kept clean and in good working conditions  
- Provide a water tank for the washrooms incase the piped water supply is not available | Management              | Separate washrooms (Gents & Ladies)        | 300,000 |
| Wastewater disposal      | - Waste water should empty to the septic tank via well laid sewage pipes  
- Conduct inspections for sewer pipe blockages or damages and fix them  
- Empty septic tank whenever its full by a licensed exhauster services | Management and contractor | Effluent presence on open drains           | 500,000 |
Table 7-3: DECOMMISSIONING PHASE
Decommissioning is an important phase in the project cycle and comes last to wind up the operational activities of a particular project. It refers to the final disposal of the project and associated materials at the expiry of the project lifespan. If such a stage is reached, the proponent needs to remove all materials resulting from the demolition/decommissioning from the site. The following should be undertaken to restore the environment:

- Remove all underground facilities from the site
- The site should be well landscaped by flattening the mounds of soil and
- Planting indigenous trees and flowers
- All the equipment should be removed from the site
- Fence and signpost unsafe areas until natural stabilization occurs
- Backfill surface openings if practical

The table 7.3 below shows the proposed decommissioning plan:

<table>
<thead>
<tr>
<th>Environmental/ Social Impact</th>
<th>Proposed mitigation measures</th>
<th>Responsibility</th>
<th>Monitoring plan/indicator</th>
<th>Cost (Ksh/pa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise &amp; Air pollution</td>
<td>Maintain plant equipment. Demolition works to be carried out only during daytime. Workers working in noisy section to wear ear muffs Workers should be provided with dust masks Spraying dusty areas Install dust trappers around the site</td>
<td>Contractor and Management</td>
<td>Amount of noise</td>
<td>50,000</td>
</tr>
<tr>
<td>Disturbed</td>
<td>Undertake a</td>
<td>Contractor</td>
<td>A restored site</td>
<td>500,000</td>
</tr>
</tbody>
</table>
### Physical Environment

- Complete environmental restoration programme
  - Landscaping and introducing appropriate vegetation

<table>
<thead>
<tr>
<th>Fuel tanks</th>
<th>Contractor</th>
<th>Fuel spills</th>
<th>Amount on site</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Empty and disused tanks on site</td>
<td>100,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Solid Waste</th>
<th>Management</th>
<th>Amount of waste on site</th>
<th>50,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Presence of well maintained receptacles and central collection point</td>
<td></td>
</tr>
</tbody>
</table>
The contractor should ensure the construction of a central waste collection point with bulk storage facilities.
- The site should have waste receptacles with bulk storage facilities at convenient points to prevent littering during occupation.

### Occupational Health and Safety

- Provide Personal Protective Equipment
- Train workers on personal safety and how to handle equipments and machines
- A well stocked first aid kit shall be maintained by a qualified personnel
- Report any accidents / incidences and treat and compensate affected workers
- Provide sufficient and suitable sanitary conveniences which should be kept clean

<table>
<thead>
<tr>
<th>Occupational Health and Safety</th>
<th>Contractor and management</th>
<th>Workers using Protective Equipment</th>
<th>Presence of a First Aid Box</th>
<th>50,000</th>
</tr>
</thead>
</table>

### Loss of income

- The safety of the Project Manager and
| workers should surpass all other objectives in the decommissioning project. |
| contractor |
| - Adapt a project – completion policy; identifying key issues to be considered. |
| - Compensate and suitably recommend the workers to help in seeking opportunities elsewhere. |
CHAPTER EIGHT: PUBLIC CONSULTATION

8.1 Public participation
Public participation basically involves engaging members of the public to express their views. Public participation tries to ensure that due consideration will be given to public values, concerns and preferences when decisions are made. Public participation in this project was facilitated through interviews with the project proponent and neighbours of the facility from 18\textsuperscript{th}-19\textsuperscript{th} January 2013. There was no objection to the proposed project by any member of the neighbouring community. They however reiterated that more emphasis should be put towards ensuring that the proposed project and its infrastructure would not negatively interfere with the environmental integrity of the surrounding areas. Most of those interviewed welcomed the development of this project in the area. A sample of the neighbour’s comments, occupation, contacts and signatures has been attached to this report.
CHAPTER NINE: ENVIRONMENT, HEALTH AND SAFETY (EHS)

9.1 EHS Management and Administration
The EHS is a broader and holistic aspect of protecting the worker, the workplace, the tools/equipments and the biotic environment. It is an essential tool in determining the EIA study. The objective of the EHS on the proposed project is to develop rules that will regulate environmentally instigated diseases and occupational safety measures during construction and the operation phases of the proposed project by:
   i) Avoidance of injuries
   ii) Provision of safe and healthy working environment for workers comfort so as to enhance maximum output.
   iii) Control of losses and damages to plants, machines, equipment and other products.
   iv) Enhance environmental sustainability through developing sound conservation measures.

9.2 Policy, Administrative and Legislative Framework
It is the primary responsibility of the contractor to promote a safe and healthy environment at the workplace and within the neighbourhood in which the proposed project will be constructed by implementing effective systems to prevent occupational diseases and ill-health, and to prevent damage to property. The EHS Management Plan when completed will be used as a tool and a checklist by the contracted engineers in planning and development of the construction of this alteration project.

9.3 Organization and implementation of the EHS Management Plan
The contractor shall use the EHS plan at the proposed project site both during construction and operation. The engineer will use it during construction phase with the assistance of an EHS consultant who shall enforce its provision throughout the life of the project.

9.4 The Guiding Principles to be adopted by the contractor
The company will be guided by the following principle:
   i) It will be a conscious organization committed to the promotion and maintenance of high standards of health and safety for its employees, the neighbouring population and the public at large.
   ii) Ensuring that EHS activities are implemented to protect the environment and prevent pollution.
   iii) Management shall demonstrate commitment and exercise constant vigilance in order to provide employees, neighbours of the project and the environment, with the greatest safeguards relating to EHS.
   iv) Employees will be expected to take personal responsibility for their safety, safety of colleagues and of the general public as it relates to the EHS management plan.
9.5 EHS management strategy to be adopted by the contractor
The following strategies will be adopted to achieve the above objectives:
  i) Create an Environment Health and Safety Management committee and incorporate EHS as an
effective structure at various levels and units to manage and oversee EHS programs in all
construction and operation phases of the project
  ii) Maintain an effective reporting procedure for all accidents.
  iii) Provide appropriate tools and protective devices for the success of the project.
  iv) Encourage, motivate, reward and support employees to take personal initiatives and
commitment on EHS.

9.6 Safety Agenda for both the proponent and contractor
There will be a permanent EHS agenda during construction.
  i) Contractors: - The EHS management plan code of practice shall be applicable to the
contractors working in the premises, and shall be read and signed. It shall be incorporated into
the contract to perform work.
  This should also remind the contractor of his/her;
    ● Legal requirements
    ● Statutory obligations
    ● Obligation to lay-down a system for reporting accidents
    ● Responsibility to ensure that his employees are supplied with personal protective
equipment and where applicable as per the EHS management plan for the whole project.
    ● Responsibilities as it relates to contracting an EHS consultant in liaison with the
proponent
    ● Obligation to ensure that he obtains detail of jobs and areas where permit-to-work must
be issued
  ii) All residents’ and workers’ responsibility: - Know the location of all safety equipment, and
learn to use them efficiently

9.7 Safety requirement at the project site during construction and operation period
  i) The contractor: - The contractor will ensure that:
    ● Safe means of entry and exit exist at the proposed project site.
    ● Ensure adequate briefing of job at hand on the safe system of work before
commencement of work
    ● The EHS coordinator must be in attendance at all times throughout the duration of the
project.
    ● The EHS consultant must maintain constant assessment of the risk involved as the work
progresses
    ● A safety harness must be worn before entry into all confined spaces
    ● An EHS consultant must be posted at the entrance at the project site to monitor progress
and safety of the persons working at the site.
ii) **The Traffic / Drivers:** - Within the construction premises, the following traffic rules will be observed:
   - Observe speed limits and all other signs and obey traffic rules.
   - Use the vehicle for the purpose to which it is intended only.

iii) **Fire hazard at the construction site:** - Workers at the site shall ensure that:
   - Oxy-acetylene cylinders are not contaminated with grease or oil.
   - Oxy-acetylene cylinders are not subjected to direct sunlight or heat.
   - Oxy-acetylene cylinders are not to be used or stored standing in a vertical position.
   - When in use, ensure the inclination should never be over 30° from the vertical.

### 9.8 Welding at the construction site

It is the responsibility of the contractor during construction to:

i) Ensure that welding clamp is fixed such that no current passes through any moving parts

ii) Ensure that all welding clamps are in good operating condition and conduct current without arcing at the point of contact.

iii) Ensure that welding clamps are free from any contact with explosive vapors i.e. Oil spillage, Fuel tanks, Coal dusts and miscellaneous combustible material (e.g. Cotton rags filter bags, rubber belting, and wood shavings).

iv) Ensure that any slag or molten metal arising from welding activities does not start up fires by:
   - Clearing combustible material to a distance of at least 3 meters away form the working area or covering area with metal or asbestos sheet.
   - Appropriate fire extinguisher is to be kept available for immediate use at all times

### 9.9 Emergency procedure during construction and operation

i) An emergency situation means:
   - Unforeseen happening resulting in serious or fatal injury to employed persons or the neighbouring communities
   - Fire or explosion.
   - Natural catastrophe

ii) In the event of such an emergency during construction, the workers shall:
   - Alert other persons exposed to danger.
   - Inform the EHS coordinator.
   - Do a quick assessment on the nature of emergency.
   - Call for ambulance.
   - When emergency is over the EHS coordinator shall notify the workers by putting a message: “ALL CLEAR”

iii) In the event of such an emergency during operation the workers shall: -
   - Alert other persons exposed to danger.
   - Ring the nearest police station of any machine.
CHAPTER TEN: CONCLUSIONS AND RECOMMENDATIONS

The proposed project design has integrated mitigation measures with a view to ensuring compliance with all the applicable laws and procedures. The proposed project will be implemented to the approvals by among others, the City Council of Nairobi, Physical Planning Department and NEMA. During project implementation and occupation, Sustainable Environmental Management (SEM) will be ensured through avoiding inadequate/inappropriate use of natural resources, conserving nature sensitively and guaranteeing a respectful and fair treatment of all people working on the project, general public at the vicinity and inhabitants of the project.

In relation to the proposed mitigation measures that will be incorporated during construction phase, the development’s input to the society; and cognition that the project is economically and environmentally sound, establishments are considered beneficial and important. It is our considerable opinion that the proposed development is a timely venture that will subscribe to proponent’s timely investment and also the government’s intention to subsidize fuel in Kenya.

It is thus our recommendation that the project be allowed to go ahead with the implementation provided the outlined mitigation measures are adhered to. Major concerns should nevertheless be focused towards minimizing the occurrence of impacts that would degrade the general environment. This will however be overcome through close follow-up and implementation of the recommended Environmental Management and Monitoring Plans (EMPs).

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

- The proponent should therefore follow the guidelines as set by the relevant departments to safeguard and envisage environmental management principles during construction and operation/occupation phases of the proposed project.
- It is important that warning/ informative sign (bill boards) be erected at the site. These should indicate the operation hours and when works are likely to be started and completed. The signs should be positioned in a way to be easily viewed by the public and mostly motorists.
- All solid waste materials and debris resulting from construction activities should be disposed off at approved dumpsites.
- All construction materials e.g. pipes, pipe fittings, sand just to mention a few should be sourced/procured from bonafide/legalized dealers.
- During construction all loose soils should be compacted to prevent any erosion.
- Other appropriate soil erosion control measures can be adapted. Any stockpiles of earth should be enclosed, covered or sprinkled with water during dry or windy conditions to minimize generation of dust particles into the air.
- Once earthworks have been done, restoration of the worked areas should be carried out immediately by backfilling, landscaping/levelling and planting of suitable tree species.
Proper and regular maintenance of construction machinery and equipment will reduce emission of hazardous fumes and noise resulting from friction of metal bodies. Maintenance should be conducted in a designated area and in a manner not to interfere with the environment.

- A fully equipped first aid kit should be provided within the site.
- Workers should get food that is hygienically prepared. The source of such food should be legalized or closely controlled.
- The contractor should have workmen’s compensation cover and is required to comply with workmen’s compensation Act as well as other relevant ordinances, regulations and Union Agreements.
- The contractor should provide adequate security during the construction period.
REFERENCES
18. Kenya gazette supplement Acts, Local Authority Act (Cap. 265) Government Printer, Nairobi