

**ENVIRONMENTAL IMPACT ASSESSMENT
FULL STUDY REPORT
FOR
FILLING STATION ON PLOT LR. NO WEST MUGIRANGO/SIAMANI/5818,
AT KONATE IN NYAMIRA COUNTY**



This Environmental Impact Assessment (EIA) Full study report is submitted to the National Environment Management Authority (NEMA) in conformity with the requirements of the Environmental Management and Coordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003

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EXECUTIVE SUMMARY

This full study report provides relevant information and an environmental consideration on the proponent's (Gerick Kenya Limited) intention to seek approval from National environment management authority (NEMA); for the development of a filling station on Plot No. West Mugirango/Siamani/5818, Konate in Nyamira County. The property measures 0.5 acres in size and is established immediately North-West of a cliff.

For a long time the world over, policy makers directed all the efforts in economic development without due regard to the resource base on which the economic development depends on. As a result, there has been unprecedented environmental degradation due to lack of environmental conservation resulting to unsustainable development. More recently investors and developers, spurred on by regulators world over, have recognized the need for change in order to safeguard the environment.

In reference to the above, *environmental concerns* have now been integrated in the planning and implementation processes of any project's project (as specified in schedule 2 of EMCA, 1999) in Kenya. The key objective is to mitigate conflicts with the environment at the vicinity during implementation and operational phases. In addition, it is now mandatory for Environmental Impact Assessments (EIAs) to be undertaken on projects of such nature and magnitude; to enhance *Sustainable Environmental Management* as well as controlling and revitalizing the much-degraded *environment*. The environmental management is coordinated by the National Environment Management Authority (NEMA) in Kenya.

Pursuant to the prevailing legal requirements as envisaged in the Environmental Management and Coordination Act (EMCA), 1999 and to ensure sustainable environmental management, *the project proponent* commissioned the undertaking of the EIA full study report for the *project's project*; and incorporated substantial environmental aspects as advised by NEMA. Environmental lead expert who is registered by NEMA conducted the environmental study. It was undertaken in fulfilment of requirements of the EMCA and Environmental (Impact Assessment and Audit) Regulations, 2003.

Summary detail on negative impacts and project mitigation measures

IMPACT	MITIGATION MEASURE
Increased noise and vibration levels	<ul style="list-style-type: none"> – Barricading the area (erecting a boundary wall – Construction activities to be conducted during the day. – Provision of appropriate Personal Protective equipment to protect workers from occupational noise – Regular maintenance of plants and equipment – Shutting down of engine vehicles when not in use to reduce on noise levels – Conducting of noise measurements from different positions within and outside the workplace to establish prevailing noise levels and recommending appropriate mitigation measures.
Increased air pollution as a result of dust particles emanating from earth works and construction activities	<ul style="list-style-type: none"> – Use of dump method to mitigate on dust by sprinkling water on areas to be excavated. – Soil compaction
Pressure on existing infrastructure i.e. roads, power, water among others	<ul style="list-style-type: none"> – Erection of warning and informative signs. i.e. notices, bill boards at the site during the construction phase and traffic control along the connecting road.
Increased waste materials(both solid and liquid)	<ul style="list-style-type: none"> – Proper designing of drainage channels and regular maintenance of the same.
Contamination of the ground with oil and grease substances	<ul style="list-style-type: none"> – Maintenance should be carried out at designated service bays to avoid contamination of environment by resultant oil and greases.
Oil leaks and spills	<ul style="list-style-type: none"> – Regular inspection of underground tanks for leakages – Construction of a three pit oil interceptor tanks to separate oil from sludge. – Double walling of underground tanks to guard against leaks – Protecting the underground tanks with corrosion prevention materials – Prioritizing the upgrade of equipment and installation of existing facilities of a network after a defined age. – Careful siting of the project to ensure that it lies in an environment that is far from environmental receptors including sewers, tunnels, vaults, surface water reservoirs etc.
Destruction of soil structure	<ul style="list-style-type: none"> – Ensure use of manual labour and hand tools where appropriate. – Ensure the contractor takes the shortest time possible.
Soil and Ground Water contamination	<ul style="list-style-type: none"> – Regular hydraulic pressure testing of the underground tanks. – Non destructive testing, for example, ultrasound testing.

<p>Generation of contaminated waste water and storm water</p>	<ul style="list-style-type: none"> - Minimization of volume of storm water generated from vehicle fueling stations and UST containment areas through installation of roofs or other types of covers - Implementation of secondary containment procedures that avoid accidental or intentional releases of contaminated containment fluids - Segregation of clean drainage and potentially contaminated drainage, treating the latter through oil/water separators. Oil water separators may include baffle type or coalescing plate type. They should be properly designed, operated, and maintained to achieve the desired water treatment results.
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Category	Positive impacts
Economic impact	<ul style="list-style-type: none"> - Creation of job opportunities - Promotion of development activities - Creation of market - Provision of quality fuel at a customer friendly price
Natural environment	<ul style="list-style-type: none"> - Conservation of environment through planting of trees. - Improving aesthetic by planting flowers and landscaping
Social impact	<ul style="list-style-type: none"> - Improvement of the living standard of workers through employment. - Promotion of community development through corporate social responsibility - Promoting social development since the area is very remote

Conclusion

In relation to the project mitigation and environmental management measures that will be incorporated during construction and operation phases; and the developments' input to the proponent and the general society, the project's project is considered beneficial and important. Major concerns should nevertheless be focused towards minimizing the occurrence of impacts that would degrade the general environment. This can however be overcome through close follow-up and implementation of the recommended Environmental Management and Monitoring Plans.

ACRONYMS

EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
ERP	Emergency Response Plan
HA	Hectare
KM	Kilometre
LR	Land Reference
NEAPC	National Environment Action Plan Committee
NEC	National Environment Council
NEMA	National Environment Management Authority
NO _x	Nitrogen Oxides
OHS	Occupational Health and Safety
PCC	Public Complaints Committee
PPE	Personal Protective Equipment
PV	Permanent Ventilation
RC	Reinforced Concrete
SEM	Sustainable Environmental Management
SERC	Standard and Enforcement Review Committee
SO _x	Sulphur Oxides
TOR	Terms Of Reference
VOC	Volatile organic compounds
WCC	Waste Collection Centre
Φ	Diameter
DOHSS	Directorate of Occupational Health and Safety Services
KPLC	Kenya Power & Lighting Company
UST	Underground Storage Tanks

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INTRODUCTION

The filling station is based on Plot No. West Mugirango/Siamani/5818 at Konate Centre in Nyamira County on GPS Coordinates latitude 0°35'9.14"S and longitude 34°56'44.645"E. The project area of approximately 0.5 acres is along the busy Kisii-Nyamira highway near Konate centre on 2031m above the sea level.

The aim of this EIA full study report is to examine both positive and negative impacts that the project undertaking is likely to have on both physical and socio economic environment. Early identification of possible impacts will promote environmental sustainability in that anthropogenic factors will not interfere with natural environment but will blend with it creating harmony. This study is an important planning tool for the project proponent since it will state any significant project impacts and clearly define mitigation measures to avoid or curb adverse impacts.

Terms of Reference

The terms of reference for the preparation of this EIA Report are:

- A critical look into project objectives and location of the site.
- A concise description of the baseline information, national environmental legislative and regulatory framework, and any other relevant information related to the project.
- Evaluation of the technology, procedures and processes to be used, in the implementation of the project.
- Evaluation of materials to be used in the construction and implementation of the project and their extended sources.
- 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.
- Evaluation of the products, by-products and wastes to be generated by the project.
- To propose/recommend a specific environmentally sound and affordable liquid and solid waste management system.
- Evaluation and analysis of alternatives including the project's project, project alternative, project site, design and technologies.
- An Environmental Management Plan (EMP), proposing the measures for eliminating/minimizing or mitigating adverse impacts on the environment.
- 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 both the construction and occupational phases.

This full study report provides relevant information and environmental considerations on the project proponent's intention to seek approval from NEMA for the construction of the filling station.

This Environmental Impact Assessment report considered the following aspects and others that proved significant during the study.

- Description of the project's project including baseline information.
- A review of the policy, legal and institutional framework.
- Social implications of the development within the locality and region.
- Determination of the effects on Landscape and land use.
- Assessment of the potential Environmental Impacts of the project on the project area.
- Proposition of mitigation measures to be undertaken during and after implementation of the project; and development of an Environmental Management Plan with mechanisms for monitoring and evaluating the compliance and environmental performance.
- Proposition of project alternatives.

Methodology

- Screening in which the project is identified as among those requiring Environmental Impact Assessment under schedule 2 of EMCA, 1999.
- Physical inspection of the site and its environs.
- Desk top studies, consultations, questionnaires and interviews with the proponent, his/her consultants, neighbours among others.
- Preliminary assessment (reconnaissance survey) of the general property. Through this, development was therefore identified as being among those that need environmental impact assessment; as provided under schedule 2 of Environmental Management and Coordination Act (EMCA), 1999. During the field investigations, information on Biophysical and Socio-Economic environment of the project filling station area and its environs were collected.
- The environmental scoping was then done relative to the construction operations and activities. This provided significant environmental issues to be considered during the assessment. To ensure comprehensiveness on the assessment, desktop studies and interviews were held. This involved the proponent and the consultants.
- Relevant studies and reports on the construction including design works and other related sources of information were critically reviewed.

Project location and description

The filling station is based on Plot No. West Mugirango/Siamani/5818 at Konate Centre in Nyamira County on GPS Coordinates latitude 0°35'0.747"S and longitude 34°56'0.155"E. The project area of approximately 0.5 acres is along the busy Kisii-Nyamira highway near Konate centre on 2031m above the sea level.



Source: Google maps

The project involves the establishment of a petrol Station. The petrol station will have four pumps, two tanks for Automotive Gas Oil and Premium Motor Spirit.

In the construction works;

- The foundation depth was determined on site on a minimum of 700mm below reduced ground level.
- All service pipes were of a minimum 450mm below reduced ground level. All the constructions were in line with the Kenya Bureau of Standards code of practice.
- Water meters will be to a minimum of 300mm above ground level.

- All soil vent pipe, waste drain pipes passing under the project's project were encased in 150mm concrete surround.
- All reinforced concrete works are to be to the exact structural Engineer's details and specifications.
- All mechanical works will be done by a qualified Mechanical Engineer.
- All fuel tanks will be checked and tested by a Chemical Engineer.
- All plumping works and water rectification to be done by a qualified plumber.
- All inspection chambers will be accessible from outside and will be left clean.

In general, the design of the project has and/will optimize the best use of the available technology to prevent or minimize potentially significant environmental impacts associated with the project and to incorporate efficient operational controls.

The project site is situated at the base of a steep cliff, where at the top of the cliff are residential areas. Additionally, to the right of the project site is a small valley with a fresh water stream or spring. Moreover, to the left lies a residential house.

Some of the neighbouring activities (residential house and a fresh water spring)



Source: site survey

POLICY FRAMEWORK

The law has made provisions for the establishment of the National Environment Management Authority (NEMA), which has the statutory mandate to supervise and co-ordinate all environmental activities. The Environmental Management and Co-ordination Act, 1999, and the Environmental Impact Assessment and Audit Regulations, 2003, are the legislation that governs Environmental Impact Assessment (EIA) studies.

Policies and legislation highlighting the legal and administrative requirements pertinent to this study are presented below.

National Environmental Action Plan (NEAP) 1994

According to the Kenya National Environmental Action Plan (NEAP, 1994) the Government recognized the negative impacts on ecosystems emanating from industrial, economic and social development programmes that disregarded 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 introduced and among the key participants identified were the industrialists, business community and local authorities.

The Brundtland Commission of (1987)

The Brundtland Commission addresses the environmental aspects of development. It has emphasized on sustainable development that produces no lasting damage to the biosphere and to particular ecosystems. In addition to environmental sustainability is the economic and social sustainability. Economic sustainable development is development for which progress towards environmental and social sustainability occurs within available financial resource.

National Policy on Water Resources Management and Development 1999

While the National Policy on Water Resources Management and Development (1999) enhances a systematic development of water facilities in all sectors for the promotion of the country's socio-economic progress, it also recognizes the by-products of these processes as wastewater. It, therefore, calls for the development of appropriate sanitation systems to protect people's health and water resources from pollution.

Projects therefore, should be accompanied by corresponding waste management systems to handle the wastewater and other wastes emanating there from. The same policy requires that such projects should undergo comprehensive EIAs. An EIA for the project has been done and identified that the project design should be incorporated with systems (for sewer and drainage) to manage wastewater.

Policy Guidelines on Environment and Development

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 immediate Environmental Impact Assessment (EIA) report is prepared for any industrial venture or other development before implementation,
- To come up with effluent treatment standards that will conform to acceptable health guidelines.

Under this paper, broad categories of development issues have been covered that require sustainable approach. These issues include the waste management and human settlement sectors. The policy recommends the need for enhanced re-use/recyclable of residues including wastewater, use of low non-waste technologies, increased public awareness rising and appreciation of clean environment. It also encourages participation of stakeholders in the management of wastes within their localities. Regarding human settlement, the paper encourages better planning in both rural and urban areas and provision of basic needs such as water, drainage and waste disposal facilities among others.

LEGAL FRAMEWORK

Energy Act, 2006

This Act was passed at the end of 2006 and contains several provisions for the ESM of petroleum sub-sector. This Act replaced the old and outdated Petroleum Act, Cap 116 which contained few provisions for sustainable management of natural resources. Amongst other things the Act contains some of the following provisions for the ESM of the petroleum sub-sector:

- Construction permits required to be sought by Proponents before commencing construction works on a petroleum facility. Proponents to submit a copy of the EIA Study to NEMA for review and approval. Compliance with requirements of EMCA is mandatory before being issued with permits.
- Proponents to comply with EHS standards issued by the ERC or any other lead agency.
- Local authorities to provide designated safe parking areas for petroleum tank trucks.
- The Minister for Energy may promulgate EHS rules for operationalizing the Act.

Under Part (IV) of the Energy Act, 2006 it is well stipulated that every person with the intent of participating in business of importing, storing, refining, exporting, wholesaling, retail, storage or transport of petroleum products shall only do so under a valid license.

It further stipulates the conditions under which handling, storing and transporting of petroleum is to be done they include:

- A licensee should not sell petroleum to another person for purpose of re-sale in Kenya unless that person has a valid retail license.
- A person shall not use a vehicle for transporting petroleum unless there is in force, in respect of that vehicle, a valid petroleum permit
- Driver should be certified for the purpose of transporting petroleum

Environment Management and Coordination Act (EMCA), 1999

The Environmental Management and Co-ordination Act (EMCA) 1999 is an act of parliament to provide for the establishment of an appropriate legal and institutional framework for the management of the environment and for related matters.

Part II of the EMCA 1999, states that every person is entitled to a clean and healthy environment and has the duty to safeguard the same. It is worth noting that the entitlement to a clean and healthy environment carries a correlative duty. Hence, there is not only the entitlement to a clean and healthy environment, but also the duty to ensure that the environment is not degraded in order to facilitate one's own as well as other persons' enjoyment of the environment.

National Environment Management Authority is a body established under the Act. NEMA has the legal authority to exercise general supervision and co-ordination over all matters relating to the environment, and is the principal instrument of the Government charged with the implementation of all policies relating to the environment.

According to Section 58 of the act, an environmental impact assessment study needs to be carried out on all projects specified in the second schedule of the act that are likely to have a significant impact on the environment. This project's project is considered to fall under the second schedule of the Act. All EIA reports

are submitted together with a submission fee payable to NEMA and equivalent to 0.05 % of the project's project cost. The regulation states as follows:

- **Section 58(1)**

Notwithstanding any approval, permit or license granted under this ACT or any other law in force in Kenya, being a proponent of a project, shall, before financing , commencing, proceeding with, executing or conducting or causing to be financed, proceeded with, carried out, executed or conducted by another person any undertaking specified in the second schedule of this Act , submit a study report to the Authority, in the prescribed form, giving the prescribed information and which shall be accompanied by the prescribed fee.

- **Section 58 (2)**

The proponent of a project shall undertake or cause to be undertaken at his own expense an environmental Impact assessment and prepare a report thereof where the Authority, being satisfied, after studying the report submitted under section 1 , that the intended project may or is likely to have or will have a significant impact on the environment, so directs.

- Environmental Audit and Monitoring – The Environmental Management and Coordination Act requires that environmental audits for existing projects be carried out at the instance of the National Environment Management Authority (NEMA) as the Authority may deem necessary to ensure that no negative environmental impacts arise from a project once established and if any, the impacts are mitigated as necessary.
- Effluent discharge – Section 72 (1) of the EMCA prohibits the discharge of poisonous, toxic, noxious or obstructing matters, radioactive waste or other pollutants or into the aquatic environment.
- Disposal of pesticides and other harmful substances – Section 93(1) of EMCA prohibits the discharge of any waste substance , chemical, oil or mixture containing oil into any waters or any other segment of the environment contract to the provisions of the Act and regulations there under.

The Water Act 2002

The purpose of the Water Act is to provide for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water, to provide for the regulation and management of water supply and sewerage services. Except for waters that are wholly situated in a private landowner's domain, the Act vests the rights over all surface and ground water in the state. This is only subject to the rights which users may acquire under license from time to time.

The Act provides for a WRMA whose functions include, *inter alia*, develop principles and procedures for allocation of water resources, monitor national water resource management strategy, determine applications for permits for water use, regulate and protect water resources quality from adverse impacts, manage and protect water catchments, etc. In addition, under the Water (Catchments Board) Rules, the country is divided into six Catchments Boards, Tana Catchments Board, Rift Valley Catchments Board, Athi Catchments Board, Ewaso Nyiro Catchments Board, Lake Victoria (North) Catchments Board, and Lake Victoria (South) Catchments Board. But these boundaries are subject to variation depending on available hydrological information. Under the Act, the Minister may declare an area to be a conservation area and direct that special measures be taken for the conservation of ground water therein. Every person who has

been using ground water in an area declared to be a conservation area and who desires to continue with the use must obtain a permit within six months of the order.

Protection of water supply is clearly a critical issue under the Act. Once the Minister has appointed a water undertaker to be responsible for control and distribution in a given area, there is a corresponding commitment to ensure the security of the supply. Accordingly, whenever the Minister is satisfied that special measures are necessary for the protection of a catchments area from which water is obtained; he may declare such an area to be protected area. By order, the Minister may regulate or prohibit activities within that area which may be contrite to the requisite conservation goals.

Part II, section 18 of the act provides for national monitoring and information systems on water resources. Following on this, sub-section 3 allows the Water Resource Management Authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specified information, documents, samples or materials on water resources may be kept by a water user and the information thereof furnished to the authority.

Section 94 of the act makes it an offence to through or convey or cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive or unwholesome matter or thing into or near to water resources in such a manner as to cause, or be likely to cause, pollution of the water resource.

Public Health Act

Part IX Section 115 of the Act states that no person or institution shall cause nuisance or condition liable to be injurious or dangerous to human health Section 116 requires that local Authorities take all lawful necessary and reasonable practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to injuries or dangerous to human health.

Physical Planning Act, 1999

The said Act section 29 empowers the local Authorities to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same section allows for prohibition or control of the use and development of an area.

Section 30 state that any person who carries out development without development permission will be required to restore the land to its original condition. It also states that no other licensing authority shall grant license for commercial or industrial use or occupation of any building without a development permission granted by the respective local Authority.

Building Code 2000

Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the local Authority for permit to connect to the sewer line and all the wastewater must be discharged in to sewers. The code also prohibits construction of structures or building on sewer lines.

The Weights and Measures Act Cap 513

This is the principal Act dealing with weights and measures in Kenya, it defines the standards and units to be used and the regulations to be adhered to. Section 20 makes it an offence for any person to use or possess or control for use for trade a weighing or measuring instrument not constructed to indicate in terms of weight

or measure as authorized by the Act. The next section (section 21) prohibits use for trade any weight, measure, weighing or measuring instrument which is false or unjust.

It further requires that the weights, measures, weighing or measuring instrument used for trade be examined, verified, stamped or re-stamped at least once in every year- section 27(1) and a certificate of verification be issued -section 27(7). It is under the provisions of this Act that the dispensing pumps at filling stations must be examined and verified for their accuracy at least once in a year.

Failure to do so is an offence under the Act. Section 153 of the Act requires that every dispensing pump be marked with the identity or grade of the product that it is meant to deliver, and if it be the price-computing type shall display the 'price per litre' on every display panel. Under section 173(1) the pump shall be provided with one or more plugs, seals or sealing material to protect all stops or other adjustable parts affecting the quantity delivered.

Occupational Safety and Health Act, 2007

This is an Act of Parliament to provide for the safety, health and welfare of all workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. It applies to all workplaces where any person is at work, whether temporarily or permanently. During the construction and operational phase, the works contractor must adhere to the requirements of this Act.

(i) Safety and Health Committees Rules 2004

These rules state that any employer/proponent/occupier who employs more than twenty persons must establish a committee to address the health, safety and welfare of workers. The employer must also cause to be carried out a health and safety audit of all his operations on an annual basis by a registered health and safety advisor who should forward such a report to the Director of Occupational Health and Safety Services.

(ii) First Aid Rules 1977

These have details on first aid requirements in terms of facilities and capacity building among non medical workers.

(iii) Hazardous Substances Rules 2007

These regulate the handling, transportation and use of certain listed chemicals which may have negative effects on the body when one is exposed.

(iv) Noise Prevention and Control Rules of 2005

These rules have set minimum maximum exposure limits beyond which workers and members of the public should not be exposed to noise without adequate means of protection. The rules also have limits for exposure out of workplaces. The rules have several recommendations on a comprehensive noise control program for workplaces that includes a requirement for medical examination of workers who are exposed to noise. The rules have also set the minimum noise levels that should emanate from a facility to public/neighbouring areas by day or by night

Building Operations and Works of Engineering Construction Rules (BOWEC) 1984

The rules guide health and safety matters in all building/construction and civil engineering works. These rules state clearly that it is the duty of the proponent to ensure health, safety and welfare of workers and authorized visitors to the site before commencement of operations, the proponent should notify the Director of Occupational Health and Safety Services of the intention so that from then on the Director advises and follows up on the necessary conditions to safeguard the health, safety and welfare of workers on site.

The rules also state that qualified and experienced persons must be appointed to act as safety supervisors by the proponent. These should supervise the enforcement of standards to achieve the objectives mentioned above.

The rules have specific sections on excavations, transport, demolitions, formwork and scaffolds, lifting and lifting equipment and other safety measures.

Medical Examination Rules 2005

The rules offer a guide on the need and target of workers who have to undergo regular medical examination to identify the symptoms of hazardous exposures on the body. This is with a sole purpose of monitoring exposure for remedial action.

Traffic Act (Cap 403)

The act it prohibits obstruction of traffic, either by persons or facilities constructed in such a way as to interfere with the flow of traffic on roads or road reserves. The law also regulates the quality of exhaust emissions from such mobile vehicles.

Occupier's Liability Act Cap. 34

The act regulates the duty that an occupier of premises owes to his visitors in respect of dangers due to the state of the premises or to things done or omitted to be done on them. It requires that the occupier warn the visitors of the likelihood of dangers within his premises to enable the visitor to be reasonably safe.

REGULATORY FRAMEWORK

Environmental Impact Assessment and Environmental Audit regulations, 2003

The regulations apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V and the Second Schedule of the Act.

The regulation state as follows:

4. (1) No proponent shall implement a project –

(a) Likely to have a negative environmental impact; or

(b) For which an environmental impact assessment is required under the Act or these Regulations; unless an environmental impact assessment has been concluded and approved in accordance with these Regulations.

(2) No licensing authority under any law in force in Kenya shall issue a license for any project for which an environmental impact assessment is required under the Act unless the applicant produces to the licensing authority a license of environmental impact assessment issued by the Authority under these Regulations.

(3) No licensing authority under any law in force in Kenya shall issue a trading, commercial or development permit or license for any micro project activity likely to have cumulative significant negative environmental impact before it ensures that a strategic environmental plan encompassing mitigation measures and approved by the Authority is in place.

Development of EIA Guidelines

The petroleum sub-sector in Kenya comprises established oil companies, national oil companies, new entrants, independent oil companies and indigenous oil companies. These companies require practical and pragmatic environmental guidelines to ensure compliance with requirements of existing and emerging legislation. This guideline was developed by the Petroleum Sector Environment Committee (PSEC) for the petroleum sub sector in Kenya. The PSEC is a committee comprising of the Oil Industry EHS Managers, NEMA, Petroleum Desk Officers and PIEA approved EIA Firms of Experts. The guideline will be reviewed from time to time by the PSEC to ensure that it is kept current in its application in Kenya.

Purpose

The purpose of this guideline was to assist those involved with the petroleum sub-sector in Kenya – project proponents, EIA practitioners, members of the public and lead agencies to understand and follow the specific requirements of petroleum sector EIA studies. The guideline was written in alignment with Legal Notice 101: Environment (Impact Assessment and Audit) Regulations 2003. Subsequently the Guideline will enable those involved with the petroleum sub-sector to know the levels at, and the basis on which decisions on EIA applications are made. It is hoped that this in turn will facilitate greater consideration and integration of environmental concerns in petroleum related projects, policies, plans and programs.

Scope

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

- Exploration and production (E&P) of crude oil
- Refineries
- Pipelines
- Terminal and depots
- LPG facilities
- Lubricant Oil Blending Plants

- Petroleum Jelly Plants
- Petrol Service Stations and Filling Stations
- Bulk Consumer and Industrial (C&I) Installations
- Asphalt plants

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

EMCA (Waste Management) Regulations 2006

These are described in Legal Notice No. 121 of the Kenya Gazette Supplement No. 69 of September 2006. These Regulations apply to all categories of waste as provided in the Regulations. These include:

- Industrial wastes
- Hazardous and toxic wastes
- Pesticides and toxic substances
- Biomedical wastes
- Radioactive substances.

These Regulations outline requirements for handling, storing, transporting, and treatment / disposal of all waste categories as provided therein.

EMCA (Water Quality) Regulations 2006

These are described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006. These Regulations apply to drinking water, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife and water used for any other purposes. This includes the following.

- Protection of sources of water for domestic use
- Water for industrial use and effluent discharge
- Water for agricultural use.

These Regulations outline:

- Quality standards for sources of domestic water.
- Quality monitoring for sources of domestic water.
- Standards for effluent discharge into the environment.
- Monitoring guide for discharge into the environment.
- Standards for effluent discharge into public sewers.
- Monitoring for discharge of treated effluent into the environment.

Conservation of Biological Diversity (CBD) Regulations 2006

These regulations are described in Legal Notice No. 160 of the Kenya Gazette Supplement No. 84 of December 2006. These Regulations apply to conservation of biodiversity which includes Conservation of threatened species, Inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties.

Fossil Fuel Emission Control Regulations 2006

These regulations are described in Legal Notice No. 131 of the Kenya Gazette Supplement no. 74, October 2006.

The regulations include internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalyts, licensing to treat fuel, cost of clearing pollution and partnerships to control fossil fuel emissions. The fossil fuels considered are petrol, diesel, fuel oils and kerosene.

Noise and Excessive Vibration Pollution Control Regulations, 2009

Section 14 (1) stipulates that where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose requirements on how the work is to be carried out including but not limited to requirements regarding –

- (a) Machinery that may be used, and
- (b) The permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations.

(2) The relevant lead agency shall ensure that mines and quarries where explosives and machinery used are located in designated areas and not less than two kilometers away from human settlements.

(3) Any person carrying out construction, demolition, mining or quarrying work shall ensure that the vibration levels do not exceed 0.5 centimeters per second beyond any source property boundary or 30 metres from any moving source. On Permissible noise levels, Section 5 say **No** person shall make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property. On Hawkers, peddlers, touts street preachers

Section 10 (1): say that no person shall-

- (a) Preach, tout, advertise, promote or sell any goods
- (b) Engage in any commercial activity, in such manner as to emit noise by shouting within the Central Business District of any town, a residential area, a silent zone, or any other area declared as a silent zone by the Authority,

Provided that the provisions of this Regulation shall not be construed to prohibit the selling by shouting of merchandise, food and beverages at licensed sporting events, parades, fairs, circuses and other similar licensed public entertainment events.

Section 15: Any person intending to carry out construction, demolition, mining or quarrying work shall, during the Environmental Impact Assessment studies-

- Identify natural resources, land uses or activities which may be affected by noise or excessive vibrations from the construction, demolition, mining or quarrying.
- Determine the measures which are needed in the plans and specifications to minimize or eliminate adverse construction, demolition, mining or quarrying noise or vibration impacts.
- Incorporate the needed abatement measures in the plans and specifications.

Section 16 (1) Where a sound source is planned, installed or intended to be installed or modified by any person in such a manner that such source shall create or is likely to emit noise or excessive vibrations, or otherwise fail to comply with the provisions of these Regulations, such person shall apply for a license to the Authority.

The Kenya Bureau of Standards (KEBS)

This is the statutory body responsible for standards, quality assurance and inspection of all goods used in Kenya including petroleum standards.

The **functions** of KEBS include:

- To promote standardization in industry and commerce.
- To make arrangements to provide facilities for the testing and calibration of precision instruments, gauges and scientific apparatus, for determination of their degree of accuracy by comparison with standards approved by the minister or on the recommendation of the council, or for the issue of certificates in regard thereto.
- To make arrangements or provide facilities for the examination and testing of commodities and any material or substance from or with which and the manner in which they may be manufactured, produced, processed or treated.
- To control, in accordance with the provisions of this act, the use of standardization marks and distinctive marks.
- To prepare, frame, modify or amend specifications and codes of practice.
- To encourage or undertake educational work in connection with standardization.
- To assist the government or any local authority or other public body or any other person in the preparation and framing of any specifications or codes of practice.
- To provide for co-operation with the government or the representatives of any industry or with any local authority or, other public body or any other person, with a view to securing the adoption and practical application of standards.
- To provide for testing on behalf of the government, of locally manufactured and imported goods at the ports of entry or country of origin with a view to determining whether such goods comply with the provision of this act or any other law dealing with standards of quality or description.
- To provide for testing of goods destined for export for purposes of export certification.
- Doing or performing all such other things or acts necessary for the proper performance of its functions under this act which may lawfully be done by a body corporate.

The KEBS has a number of standards for petroleum including:

KS 1938-1: 2005

Handling, storage and distribution of liquefied petroleum gas in domestic, commercial and industrial installations - Code of practice - Part 1: Liquefied petroleum gas installations involving gas storage containers of individual water capacity not exceeding 500 L and a combined water capacity not exceeding 3 000 L per installation. This standard gives requirements for the materials, the methods of construction and the installation of equipment used in liquefied petroleum gas applications for domestic and commercial installations that involve gas storage containers of individual water capacity not exceeding 500 L and of a combined water capacity not exceeding 3 000 L.

KS 1938-2: 2005

Handling, storage and distribution of liquefied petroleum gas in domestic, commercial and industrial installations - Code of practice - Part 2: Transportation of LPG in bulk by road. Contains recommendations for the design, construction, inspection, fittings and filling ratio of tanks used in the transportation of LPG in bulk by road.

KS OIMLR 118: 1995

Testing procedures and test report format for pattern evaluation of fuel dispensers for motor vehicles. Concerns the metrological controls to which fuel dispensers for motor vehicles shall be submitted in order to verify that their characteristics comply with the requirements.

KS1969:2006

The standard covers provisions for the installation of underground storage tanks of individual capacity not exceeding 85 000L pumps/dispensers and pipe works at service and consumer installations. Part 1 (III) of the standard states that an environmental impact assessment should be done before any construction and installation of underground tanks for service and filling stations, commercial and consumer installations.

KS2506:2014

The scope of this section under KEBS specifies the requirements for petroleum fuel outlets both retail and consumer sites classifying them into tiers based on risk and functionality. Additionally, this section focuses on capacity (describing it as the total water capacity of the storage vessel), hazard (which is described as a threat of rupture or other failure of a storage vessel to surroundings within a radius of (nominally) 0.5 km of the storage vessel), and risk as the likelihood of a storage vessel being exposed to damage, radiant heat and similar dangers. It classifies the petroleum dispensing facilities both retail and consumer outlets into four tiers and one special group as shown in the **table in the next page**. The proponent in this case should therefore adhere to the specifications stipulated in this section in regards to the filling station, which is yet to be completed.

Classification	Land size (m ²)	Station frontage (m)	Station components
Tier 1	500	Station frontage (min): 22 Entrance: 6 Exit: 6	<ul style="list-style-type: none"> ▪ One or two nozzles per product offering for sale automotive gas oil (diesel), premium motor spirit (petrol) and illuminating kerosene ▪ A single tank for each of the products shall have a maximum

		Min depth (measure from end of the road reserve: 24	<p>capacity of 10 m³ for urban areas and 15 m³ for rural areas.</p> <ul style="list-style-type: none"> ▪ Auxiliary services such as car wash and service bay shall not be allowed in this service station. ▪ An office at the discretion of the owner, as long as it does not reduce safety distances available.
Tier 2	1500	Station frontage (min): 32 Entrance: 6 Exit: 6 Min depth (measure from end of the road reserve: 46	<ul style="list-style-type: none"> ▪ 2 - 6 nozzles per product offering for sale automotive gas oil (diesel), premium motor spirit (petrol) and illuminating kerosene. ▪ A maximum of 2 tanks for each product. ▪ A combined maximum storage capacity of 50m³ of each product. ▪ Auxiliary services such as car wash and or lubrication bays. ▪ An office of maximum 60 m² of foot space.
Tier 3	2200	Station frontage (min): 32 Entrance: 6 Exit: 6 Min depth (measure from end of the road reserve: 69	<ul style="list-style-type: none"> ▪ Two to eight nozzles per product offering for sale automotive gas oil (diesel), premium motor spirit (petrol) and illuminating kerosene. ▪ A maximum of three tanks for each product. ▪ A combined maximum storage capacity of 80 m³ of each product. ▪ Auxiliary services such as car wash and or lubrication bays. ▪ An office of maximum 120 m² of foot space. ▪ The office block may contain a convenience store, eating facility, banking hall and a maximum of 3 floors of a multilevel office block in lieu of an office block.
Tier 4	1920	Station frontage (min): 32 Entrance: 6 Exit: 6 Min depth (measure from end of the road reserve: 60	<ul style="list-style-type: none"> ▪ Two to six nozzles per product offering for sale automotive gas oil (diesel), premium motor spirit (petrol), illuminating kerosene and LP Auto gas ▪ A maximum of three tanks for each product. ▪ A combined maximum storage capacity of 50 m³ of each product. ▪ LPG storage tanks shall be of maximum water capacity of 9000 litres (4.5 tons). ▪ LPG storage tanks shall be mounded or underground and shall be installed in accordance to KS 1969. Above ground and skid mounted tanks for LPG shall not be allowed in the station however, they could be installed elsewhere as long as they conform to KS 1938 series. ▪ LPG offloading points with a minimum area of 6m² and located away from pedestrian and vehicular movements. ▪ Appropriate color codes and warning signs used. ▪ Auxiliary services such as car wash and or lubrication bays. ▪ An office of maximum 60 m² of foot space. ▪ The office block may contain a convenience store, eating facility, banking hall and a maximum of 3 floors of a multilevel office block in lieu of an office block.

International Finance Corporation (IFC) on Petroleum Retail Sites

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. For complex projects, use of multiple industry-sector guidelines may be necessary. The table below summarizes the specifications stipulated by IFC in regards to a petrol station.

	General Aspect	Specific Aspect	Specifications
International Finance Corporation (Environmental, Health, and Safety Guidelines RETAIL PETROLEUM NETWORKS)	Environment	Leaks and spills	<p>Tanks and Piping</p> <ul style="list-style-type: none"> ▪ New Facilities and Upgrades Underground storage tanks (USTs) or aboveground storage tanks (ASTs), whether constructed of steel or fiberglass-reinforced plastic, should be designed and built according to recognized industry standards. ▪ USTs and ASTs should have secondary containment systems to prevent the uncontrolled release of fuel. Secondary containment may consist of: Double wall construction for USTs and the bottoms of ASTs, equipped with an interstitial monitoring devise connected to a continuous leak detection system Use of vaults or membranes in single wall USTs Use of secondary containment structures for ASTs as described in the General EHS Guidelines. ▪ Use of composite tanks, leak detection systems should be able to detect the presence of liquid or petroleum vapor within the interstitial space. ▪ Use of corrosion protection in steel tanks and piping. Corrosion protection may consist of coating with a suitable dielectric material or by cathodic protection.

		<ul style="list-style-type: none"> ▪ Tanks should be equipped with devices that prevent spills and overfills, such as overflow alarms, automatic shut-off devices and catch basins around fill pipes. Fill pipes on ASTs should be located within the tank's secondary containment structures.
	<p>Wastewater</p>	<p>Storm water</p> <ul style="list-style-type: none"> ▪ Minimization of volume of storm water generated from vehicle fueling stations and AST containment areas through installation of roofs or other types of covers. ▪ Implementation of secondary containment procedures that avoid accidental or intentional releases of contaminated containment fluids ▪ Segregation of clean drainage and potentially contaminated drainage, treating the latter through oil / water separators. Oil water separators may include baffle type or coalescing plate type. They should be properly designed, operated, and maintained to achieve the desired water treatment results. <p>Automobile Washing</p> <ul style="list-style-type: none"> ▪ Automatic vehicle washes, high pressure hand washes, and steam cleaners may produce large volumes of wastewater, possibly at high temperatures, which may contain cleaning agents, oil, and road dirt, sometimes in the form of stable emulsions. ▪ Due to these characteristics, automobile washing effluents should not be discharged through oil / water separation systems, instead applying the following additional considerations: Use of recycling systems (closed-loops) to reduce the volumes of water used and discharged.

	Waste management	<p>Automobile Repair and Site Maintenance</p> <ul style="list-style-type: none"> ▪ Waste lubricating oils and waste solvents should be stored in properly designed containers and specially designated areas as with other hazardous materials. <p>Site Upgrade and Decommissioning</p> <ul style="list-style-type: none"> ▪ Contaminated soils and water may be encountered around fuel dispensers, piping, and tanks during excavation for repairs, upgrades or decommissioning. ▪ Depending on the type and concentration of contaminants present, small quantities of soils or liquids may need to be managed as a hazardous waste as described in the General EHS Guidelines. ▪ Larger quantities of affected soils and other environmental media, including sediment and groundwater, may require management according to contaminated land guidance as provided in the General EHS Guidelines.
	Emissions to air	<ul style="list-style-type: none"> ▪ The main sources of emissions to air include evaporative losses of volatile organic compounds (VOCs) of fuel product from storage, particularly during bulk deliveries, and during dispensing operations. ▪ General recommendations to prevent and control the emission of VOCs from storage and working losses which apply to most bulk fuel storage tanks, piping and pump systems, include the following: Potential for visual impacts from reflection of light off tanks should be considered. ▪ Where vapor emissions may contribute or result in ambient air quality levels above health based standards, considering the installation of secondary emissions controls

Occupational Health and Safety	Chemical hazards	<ul style="list-style-type: none"> ▪ Occupational exposures may be most likely related to dermal contact with fuels and inhalation of fuel vapors among fuel dispensing and tanker delivery workers, as well as workers involved in maintenance activities, especially those which involve potential contact with contaminated soils and the resulting vapors.
	Fire and explosions	<ul style="list-style-type: none"> ▪ Retail petroleum sites should be designed, constructed, and operated according to international standards¹⁸ for the prevention and control of fire and explosion hazards. ▪ Implementing safety procedures for unloading of product from tanker trucks. ▪ Prevention of potential ignition sources such as: <ul style="list-style-type: none"> – Proper grounding to avoid static electricity buildup and lightning hazards (including formal procedures for the use and maintenance of grounding connections). – Use of intrinsically safe electrical installations and non-sparking tools. – Implementation of permit systems and formal procedures for conducting any hot work during maintenance activities. – Providing clear signage for customers about the prohibition of smoking or use of electronic equipment e.g. use of mobile phones. – Prohibiting the placement of informal food vending (including some with the use of open flames) within a pre-established distance from fuel dispensing equipment. – Establishing procedures for the proper filling and management of LPG bottles

	Confined spaces	<ul style="list-style-type: none">▪ Confined spaces in retail petroleum sites may include storage tanks (during repairs and maintenance work), storage tank excavation areas (during underground utility repairs, tank replacements, and site decommissioning), some secondary containment areas, and storm water / wastewater management infrastructure.▪ Facilities should develop and implement confined space entry procedures as described in the General EHS Guidelines.
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INSTITUTIONAL FRAMEWORK

Institutions under EMCA 1999

The Government established the following institutions to implement the EMCA 1999.

(i) National Environmental Council

The National Environmental Council (NEC) is responsible for policy formulation and directions for the purposes of the Act. The NEC also sets national goals and objectives and determines policies and priorities for the protection of the environment.

(ii) National Environment Management Authority

The responsibility of the National Environment Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of government in the implementation of all policies relating to the environment.

In addition to NEMA, the Act provides for the establishment and enforcement of environmental quality standards to be set by a technical committee of NEMA known as the Standards and Enforcement Review Committee.

(ii) Provincial and District Environmental Committees

The Provincial and District Environmental Committees also contribute to decentralized environmental management and enable the participation of local communities.

(iii) Public Complaints Committee

The Act also established a Public Complaints Committee, which provides the administrative mechanism for addressing environmental harm. The committee has the mandate to investigate complaints relating to environmental damage and degradation. Its members include representatives from the Law Society of Kenya, NGOs and the business community.

(iv) Standards and enforcement Committee

Part VIII of the Act deals with environmental quality standards. It establishes a Standards and Enforcement Review Committee (SERC) whose functions include the establishment of standards for all environmental media. Standards have been established as regulations to the Act as presented above. Standards for the following are still scheduled for release: Air quality, chemicals, land use and economic instruments.

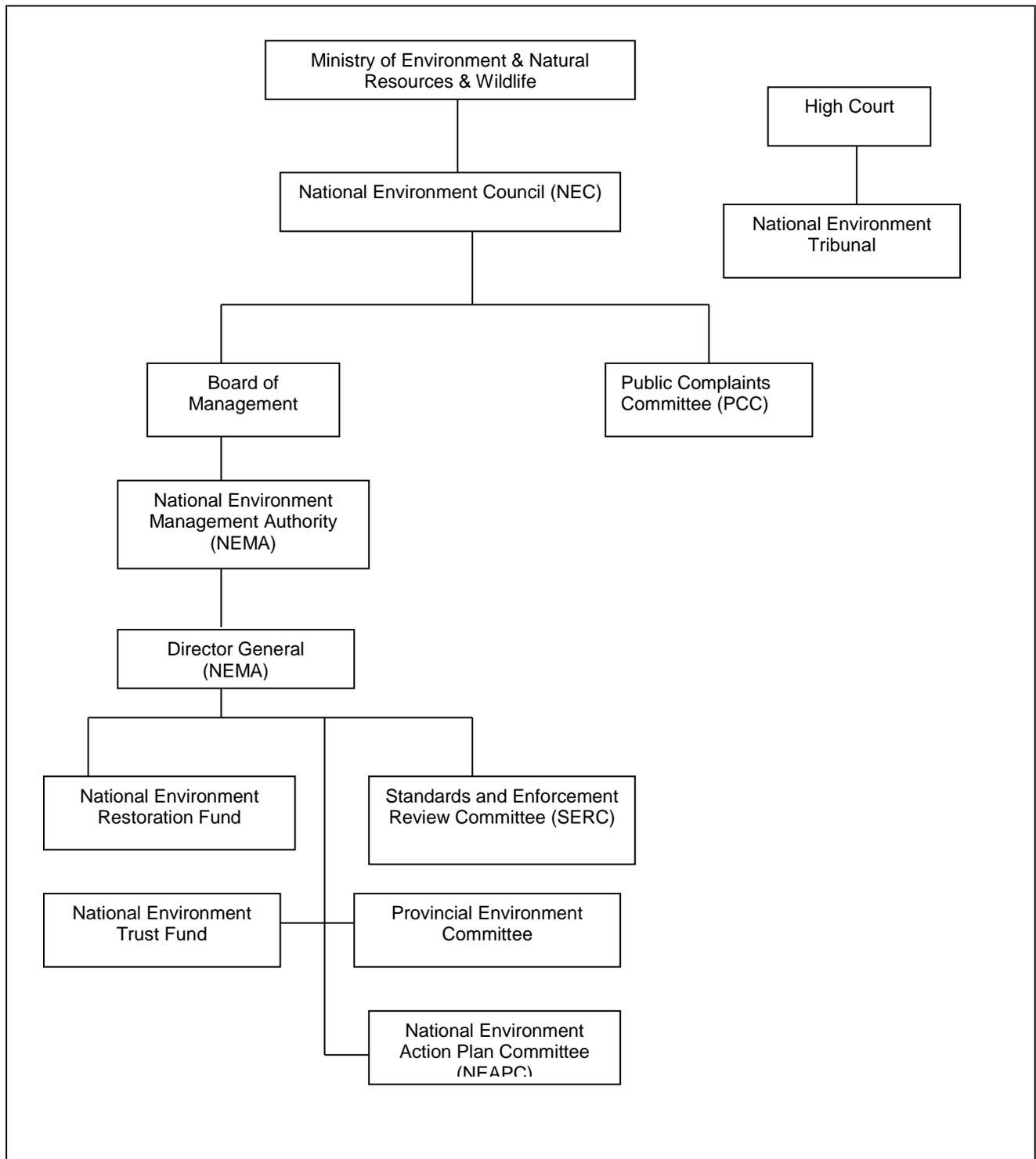
Water Resources Management Authority

The Water Resources Management Authority (WRMA) is of particular relevance to the project. Its mandate covers some sectoral issues which are applicable to environmental management, such as use of water resources, human settlement and administration of activities in the scheme.

Part III of the Water Act 2002 defines the powers and functions of WRMA which include:

- Developing principles, guidelines and procedures for the allocation of water resources
- Monitoring the national water resources management strategy
- Receiving and determining applications for permits for water use
- Monitoring and enforcing conditions attached to permits for water use
- Regulating and protecting water resources quality from adverse impacts
- Managing and protecting water catchments

The Institutional Framework of the EMCA



INTERNATIONAL CONVENTIONS AND TREATIES

Kenya has ratified or acceded to numerous international treaties and conventions. Those that have implications on the project are described below:

Convention on Biological Diversity (CBD) 1993

The CBD adopts a broad approach to conservation. It requires Parties to the Convention to adopt national strategies, plans and programmes for, the conservation of biological diversity, and to integrate the conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, programmes and policies. The project's project is expected to conserve biodiversity, especially the rare and endangered species in the project area and its environs in compliance with the Environmental Management and Co-ordination (Conservation of Biological Diversity) Regulations, 2006.

United Nations Framework Convention on Climate Change 1992

UNCCC sets an ultimate objective of stabilizing greenhouse gases concentration in the atmosphere; at a level that would prevent dangerous anthropogenic (human-induced) interference, with the climatic system. Development projects in Kenya such as the project's project are expected to take climate change considerations into account, to the extent possible, in their relevant social, economic and environmental policies and actions.

United Nations Convention to Combat Desertification 1994

UNCCD addresses the problem of the degradation of land by desertification and the impact of drought, particularly in arid, semi-arid and dry semi-humid areas. This convention is domesticated in EMCA 1999 via Section 46 where District Environment Committees are required to identify areas that require re-forestation or afforestation as well as to mobilize the locals to carry out these activities.

PROJECT OVERVIEW AND BASELINE INFORMATION

Data information gathering procedure

The study information was gathered through discussions with the proponent, site visits and environmental status of the immediate neighborhood. The physical observation taken into consideration was the geological status, drainage system, water supply; waste disposal in the area, settlement patterns as well the typical socio economic activities around the project area.

The datasheet was adopted from the International Environmental Protocol, tailored to address issues listed in the Regulations on EIA/audits under the Kenya Gazette Supplement No. 56 of 13th June 2003.

Geographic coordinates

The project filling station is based on Plot No. West Mugirango/Siamani/5818 at Konate Centre in Nyamira County on GPS Coordinates latitude 0°35'0.747"S and longitude 34°56'0.155"E. The project area of approximately 0.5 acres is along the busy Kisii-Nyamira highway near Konate centre on 2031m above the sea level.

Project site map



Source: Google maps

Flora

Several flora are sited near the project site this include acacia tree, various grass species, indigenous shrubs, there are no trees on the project site since the site is already developed. However the proponent plans to plant trees, flowers and the grass at the site after the completion of the project.

Flora at the project site

Source: site survey

Fauna

No animals were observed at the project's project site probably due to the dry nature of the ground and inability to support plant life. The area has no site of economic importance thus no destruction anticipated.

Climate and rainfall

The county has a bimodal pattern of annual rainfall that is well distributed, reliable and adequate for a wide range of crops. Annual rainfall ranges between 1200 mm-2100 mm per annum. The long and short rain seasons start from December to June and July to November respectively, with no distinct dry spell separating them.

The maximum day and minimum night temperatures are normally between 28.7 C and 10.1 C respectively, resulting to an average normal temperature of 19.4 C which is favorable for both agricultural and livestock production.

Soils

The major types of soil found in the county are red volcanic (Nitosols) which are deep, fertile and well drained accounting for 75 per cent while the remaining 25 per cent are those found in the valley bottoms and swampy areas suitable for brick making. Though the red volcanic soils are good for farming, they make construction and road maintenance expensive. From the soil samples taken and analyzed by the Ministry of Mining, the results showed that the soil in that area contains 58.69% SiO₂ (being large percent) and 0.13% MnO (being the least percent) as per the sample report attached dated 27th May, 2016.

Social economic conditions

Infrastructure

The town is well served, with good communication and transport network such as the Kisii-Nyamira Road. This Network facilitates transportation of diverse products from the area and other parts of the larger Nyamira and Kisii County. A total of 298 km of all roads within the county is earth surface; 200 km are gravel surface, 100km is mixed surface while only 80 km are bitumen surface. The county average distance of settlement to the nearest road is only 6 km. Several unclassified roads are being maintained by various agencies including the Constituency Roads Committees. The county is characterized by a hilly terrain and

heavy rains that are distributed throughout the years making road maintenance and construction difficult and costly.

Due to such rapid urban growth, provision of basic infrastructure for all has become an important concern in the area. Basic infrastructural services that have deteriorated due to such rapid increase in population include: Solid Waste Management (SWM) system; drainage; roads; mass transportation; electric installations. Greater environmental pollution and other problems have been the result of under-provision of such basic services.

A section of Nyamira-Kisii Road



Source: site survey

Population

The total population for Nyamira County has been projected to 632,046 in 2012 of which 303,252 are males while 328,783 are females with reference to the 2009 Population and Housing Census. The population is expected to increase to 667,716 and 692, 641 in 2015 and 2017 respectively. The inter census population growth rate is estimated at 1.83 percent which is below the national growth rate of 3 percent.

Economic Activities

The main activity in Ikonge, Nyamira County are mainly agricultural and dairy farming which does well due to the favourable climatic conditions experience in the area. The project site at Konate centre is also characterized by small scale business facilities across the road from it. These small businesses are made up of small kiosks selling an assortment of merchandise to the general public of the specified area.

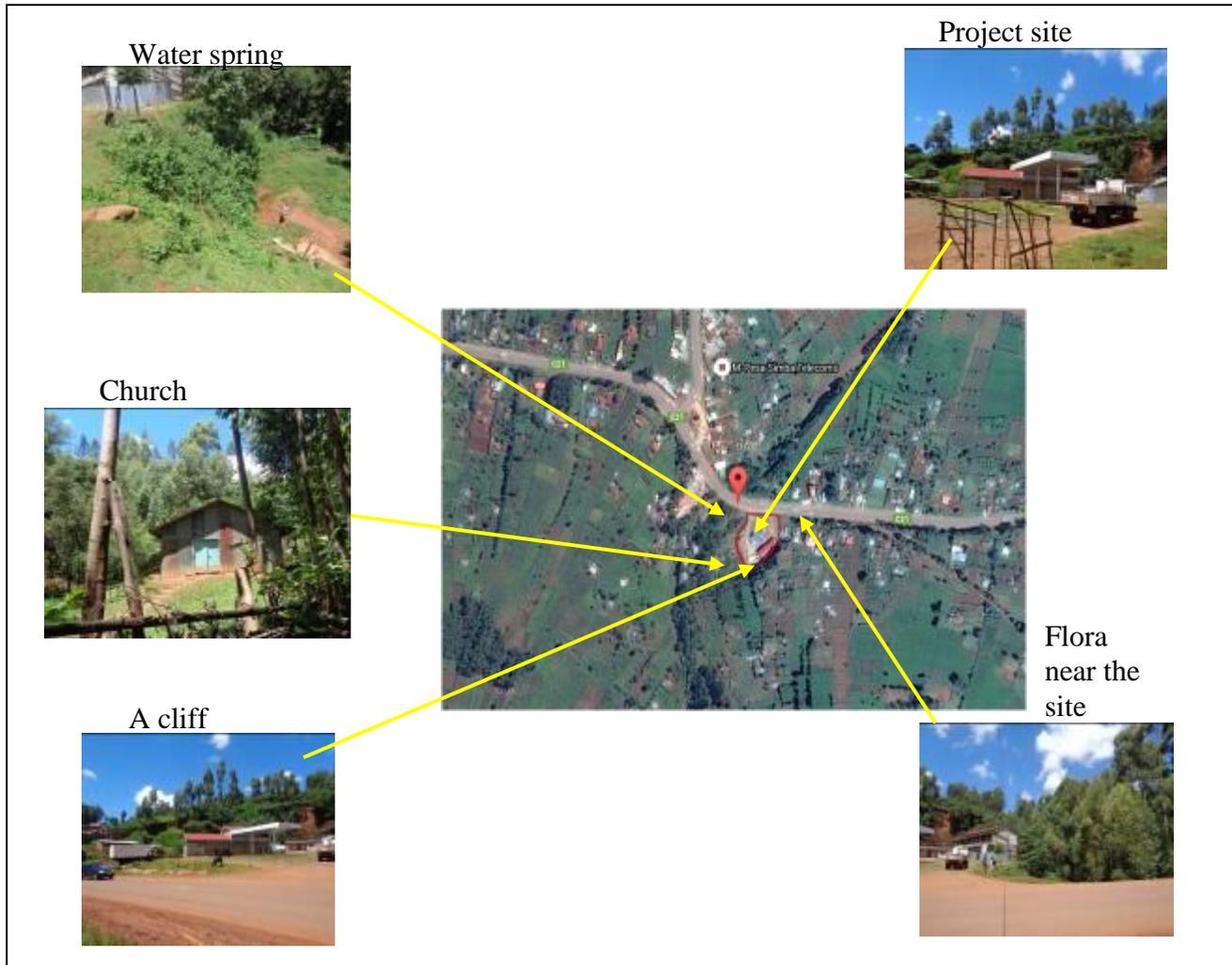
PROJECT DESCRIPTION

Project location

The project filling station is based on Plot No. West Mugirango/Siamani/5818 at Konate Centre in Nyamira County on GPS Coordinates latitude 0°35'0.747"S and longitude 34°56'0.155"E. The project area of approximately 0.5 acres is along the busy Kisii-Nyamira highway near Konate centre on 2031m above the sea level.

The project site is situated at the base of a steep cliff, where at the top of the cliff are residential areas. Additionally, to the right of the project site is a small valley with a fresh water stream or spring. Moreover, to the left lies residential house.

Project site and its neighbourhood



Source: Site survey and Google map

Project Design

The full study report is based on information and consultations with the proponent; the architects, details contained in the architectural plans and drawings (of the project) and approvals from relevant statutory departments.

The project petrol station will comprise of the following:

- Forecourt paving: 50mm thick quarry dust blinding on hardcore and fixing of 80mm thick precast concrete block paving on 50mm thick sand bed.
- An impermeable concrete surface under the canopy
- A u-shaped drainage tunnel with a steel grill top
- Underground fuel tanks (5m³ diesel tank, 5m³ kerosene, 5m³ super petrol)
- Breather points
- A Heavy duty covered man hole for each of the underground tanks
- Station manager office and station sales office
- A store
- Sanitary facilities both for ladies and gents
- A septic tank
- Compressor and generator section
- A steel canopy
- Ribbed concrete finish under the steel canopy
- Two pump isles
- 4 digital fuel pumps
- Associated piping work
- Entrance and exit

(Refer to attached drawings of the project's project in the annex)

Photos showing the interceptor tank and man holes at the site



Source: site survey

INFRASTRUCTURE

Roads and Accessibility

The project's project is situated along Nyamira-Kisii Road. The road is a single carriage way which is tarmaced. The road is very vital since it facilitate movement of good from Nyamira County to other neighboring counties. It is through this road that the traffic (both human and vehicles) will access the project's project site and from which the acceleration and deceleration lanes will be constructed for the service station.

Section of the road servicing the station



Source: site survey

Water supply

The area is not supplied with water, however water is bought from water vendors also the proponent will have water storage tanks where water is stored. This is because the total area of roof catchments for the two main buildings is 554m² and expected to generate 317m³ of water from the two main buildings.

Installed water storage tanks at the site



Source: Site survey

Sewer system

Currently there are no sewer lines serving the project site, to adequately handle all the effluent. The project proponent will however, put up a septic tank to which all the effluent will be directed. The proponent will however be required to adhere to all the relevant legislation regarding to putting up of a septic tank.

Surface Drainage

Most of the rainwater will mainly be absorbed into the soil during the construction phase. Appropriate drainage systems have been provided for in the designs and will be put in place to handle the run-off/storm water from the site during operation of the project. The proponent will construct a perimeter wall at the cliff near the station to divert surface run-off during rainy season; as a measure to prevent contamination of the spring (as per the hydrological assessment report attached at the appendices).

Where the proponent will construct the wall



Source: Site survey

Waste Management

The project proponent and the contractor will develop modalities to ensure safe disposal of the generated solid waste. The adoption of integrated solid waste management system will be encouraged during construction and operation phases. In addition, the project's contractor and the proponent will work closely with NEMA for the guidance on the modes and site of the waste disposal. Some materials may be disposed through the process of incineration.

During the operational phase, all wastes will be collected by Nyamira's department of Environment and through private waste collectors. The proponent is advised to put up oil water interceptor tank on one side of the plot which will take care of all runoff from the project site during operation phase before discharge of the same to an approved drainage channel that will be constructed in line with the Physical Planning Act.

Energy

Construction machinery will require fuel during construction. This will be sourced from legalized dealers. Electrical power will come in handy in driving some of the selected construction machinery. It will also be needed on operation of the completed project. The power (electricity) will be drawn from the power grid lines made available by Kenya power Company. Stand-by generator will be provided to cater for periods when there are supply interruptions.

Electricity grid lines*Source: Site Survey*

Communication

The area is well covered by communication facilities by the main telephone service providers including: Safaricom, Airtel and Orange. All these will facilitate communication during the implementation and on operation phase of the project.

Security

There service station upon completion will have acceleration and deceleration lanes directly to the Nyamira - Kisii Road. The station will be manned 24 hours by qualified security personnel and will be operational for twenty four hours a day. The proponent should also install security lights to beef up security at the site both during construction and during the operational phase of the project.

Project Budget and projected duration

The construction is estimated to cost approximately **Nine million, eight hundred and twenty five thousand, nine hundred and seventy and seventy cents (Kshs 9,825,970.70) Kenya shillings**. The project will take approximately Six (6) months to complete; from the day the construction works commence.

NEMA Statutory fees

The environmental impact assessment and audit (amendment) regulations, 2009 require the proponent to pay 0.1% of the total cost of the project, being the cost of processing the EIA report and issuance of EIA license.

CONSTRUCTION SAFETY

Introduction

The following sections provide general guidelines and procedures for construction safety during project implementation process.

General Construction Guidelines

Construction work can be particularly hazardous. Personal Protective Equipment (PPEs), fire safety, electrical safety, and other precautions are essential for safe construction work.

The following these guidelines should be adhered to when visiting or working at construction sites:

- Do not walk, stand, or work under suspended loads. If you raise a load, be sure to crib, block, or otherwise secure the load as soon as possible.
- Avoid placing unusual strain on equipment or materials.
- Be prepared for unexpected hazards. **BE ALERT!**

Barriers and Guards

Contractors and project managers should use barriers and guards as necessary to protect employees, and visitors from physical hazards. If any person identifies a mechanical hazard that is not sufficiently protected, he/she should notify the attending foremen, the Health and Safety Advisor or the DOSHS office immediately.

NOTE: Barriers, guards, and warning signs are required to ensure safety against existing hazards.

Types of Barriers and Guards

- Physical barriers and solid separators (dust barriers, hazard barriers, temporary walkways, etc.)

NOTE:

- Signs that state **DANGER, WARNING, or CAUTION** are also important when barriers or guards are necessary.
- Remember to make signs legible, visible, and brief.

Areas that Need Barriers or Guards

Any area that poses a physical threat to workers and/or pedestrians requires barriers or guards. Areas that typically require permanent or temporary protection include the following:

- Stairways
- Open Manholes
- Elevated platforms
- Areas with moving machinery
- Excavation sites
- Construction sites
- Temporary wall or floor openings
- Doors opening into construction

METHODOLOGY

Methodology

The preparation of an Environmental Impact Assessment study report is a multidisciplinary process that requires use of various approaches and data collection methods and wide consultations with various experts concerned with the project design. In this particular survey, public participation and consultation was widely used and the bottom- top approach of participation applied. Both scientific and social data collection methods were used and they included the following:

Questionnaires

Questionnaires were administered to the locals randomly to seek their opinion on the development. The questions to the respondents, contained in the questionnaire, were asked and responses recorded by the interviewer.

(Find attached field questionnaires at appendices)

Observations

Field observations formed an integral part of the study as the experts gathered considerable information through observations. This involved site visits and recording the situation on the ground. Observations were also used as a tool for validating the facts that were gathered through interviews and questionnaires.

Photography

Photos were taken to show the actual site of the development.

Secondary data

Various literatures were used in aiding the successful completion of the report. They include:

- The Constitution of Kenya (2010)
- Kenya gazette supplement acts 2000, environmental Management and Coordination Act No. 8 of 1999.
- Kenya gazette supplement Acts, Physical Planning Act, 1999.
- Kenya gazette supplement No. 56. Environmental impact assessment and audit regulations 2003.
- Kenya gazette supplement Acts Local Authority Act (cap 265).
- United Nations, 2000, Millennium Development Goals
- Environmental Management and Co-ordination (Waste Management) Regulations, 2006 Legal Notice No.12
- The Public Health Act, Cap 242
- Forest Act 2005
- Occupational Safety and Health Act (OSHA) No. 15 of 2007
- Noise and Excessive Vibrations Pollution Control Regulations 2009.
- Way leave Act.
- Local Government Act.
- Physical Planning Handbook.
- By-Laws of the Municipal Council of Nairobi
- Legal Notice No. 120 of 2006, Water Quality Regulations

- Legal Notice No. 121 of 2006, Waste Management Regulations
- Legal Notice No. 61 of 2009, Noise and Excessive Vibrations, Regulations

The Water Act, 2002

- The Forest Act No. 17 of 2005
- The Electricity Power Act No. 11 of 1997
- The Building Code 2000

PUBLIC CONSULTATION

Objectives of Public Consultation

The objectives of public consultations for an EIA exercise are to ensure that:

- All stakeholders and interested parties are fully informed of the project and have the opportunity to raise their concerns.
- Any issues resulting from this process are addressed in the EIA and incorporated into the design and implementation of the project.
- Consultation is done on sensitive issues and mitigation measures are established for management of any impacts that may arise during construction and operation phases of the project.

Legal Requirements

Government Policy on Public Consultation

The overall objective of the government is to involve communities in policy formulation and implementation at the local level. More specifically, the Community Action Planning Programme objective is to put in place a durable system of intra-community co-operation through collective action, which creates communal discussion forums for the implementation of development activities.

EIA and Audit Regulations

Section 17 of the Environmental (Impact Assessment and Audit) Regulations 2003, states that an EIA should, “seek the views of persons who may be affected by the project.”

Analysis of the public consultation

The overall conclusion from the interviews and analysis of public consultation led to determination of the following:

- The project is located in the government’s idle land and is unlikely to have adverse effects to the environment if managed properly.
- The project was acceptable to most of the respondents.
- The project will uplift the market value and economic viability of the premises around the site
- The upcoming project will benefit the members of the community at large through boosting of the area economically and creation of jobs.
- If the EMP (Environmental Management Plan) is adhered to, all the potential negative impacts will be addressed conclusively.

DESCRIPTION OF THE EXISTING AND ANTICIPATED IMPACTS**EXISTING IMPACTS**

There were no notable negative environmental impacts on site, at the time of this assessment.

ANTICIPATED IMPACTS

Impacts can be positive or negative, direct or indirect. The magnitude of each impact is described in terms of being significant, minor or negligible, temporary or permanent, long-term or short-term, specific (localized) or widespread, reversible or irreversible. Some impact mitigation has already been addressed in the proactive design and other mitigations can only be guaranteed through active, responsible management, helped by following the guidelines in the project Environmental Management Plan.

These qualities are indicated in the assessment tables as follows:

Key	Type of Impact	Key	Type of Impact
++	Major positive impact	+	Minor positive impact
--	Major negative impact	-	Minor negative impact
0	Negligible/ zero impact	NC	No change
sp	Specific/ localized	w	Widespread
r	Reversible	ir	Irreversible
sh	Short term	L	Long term
t	Temporary	p	Permanent

On the basis of information gathered during the field study, potential environmental impacts of the project are tabulated below.

Table 1: Anticipated Environmental Impacts

Impacts on or due to the implementation of the project.	Construction	Operation	Remarks
Changes in hydrology	-	+	There will be negative impacts on the hydrology of the area due to excavation processes during the construction phase of the project. In order to mitigate this, water conservation measures will be required. There will be an improvement of drainage in project area during the operational phase.
Pollution: Air/ dust Noise	- t ir - t ir	-/0 -	During construction, dust and exhaust emissions from involved machinery will affect air quality in the area. Construction activities, hooting of the involved vehicles will generate noise and (vibration) which may have negative but temporary effects to the immediate neighbourhoods.

			Sound pollution control measures should be applied/ adapted.
Site drainage	-/t	+	<p>There will be accumulation of waste water in pits and holes created after excavation. Due consideration should be taken on the surface drainage systems of the entire project and roof catchments.</p> <p>After construction, the drainage at the site will be greatly improved by the implementation of a good drainage system.</p>
Soil erosion	- t r	0	<p>Due to digging and excavation works, the soil structure will be tampered with. This will make the soil loose and vulnerable to soil erosion. Incorporating appropriate soil conservation measures and proper drainage facilities during construction would mitigate the impacts.</p> <p>The project site will be fortified with a concrete surface that will protect the bare soil underneath from soil erosion.</p>
Water resources	- sh	+	<p>The site will get water from water vendors since the town does not have piped water.</p> <p>Water requirement during the initial construction phase will be met by getting it from water vendors.</p>
Vegetation/ Flora	- L, sp ir	+	<p>The site does not have vegetation since it already developed.</p> <p>Landscaping will be done within the site to improve site appearance.</p> <p>During operation, any impact on vegetation/ flora will be negligible.</p>
Health and Safety	- t ir	NC	<p>During construction, increased dust, noise and air pollution levels could impact on health and safety, particularly in the direct impact zone.</p> <p>During the operation of the project health and safety conditions will be linked more on handling of petroleum products. These will be effectively mitigated on through the use of appropriate PPEs at all times and proper handling of the petroleum products.</p>
Disturbance of the public	- t ir sp	0	<p>Disturbance to the public/neighbours would occur due to noise and dust during construction and traffic movement.</p> <p>After construction, noise levels compared to the current situation will be negligible.</p>

Visual intrusion	- t/p	+/- p	<p>During construction, visual intrusion is attributed to construction works including construction traffic.</p> <p>After construction of the project the situation will be permanent. In line with this, the project project should be blend in a way to merge with the existing environment and approvals by the local council.</p> <p>Visual impacts can be mitigated through controlling the operating hours of construction traffic, clearing debris after construction and landscaping the site.</p>
Construction materials	-	0	<p>Building stones will be required for the construction of the project. Other materials will include steel, concrete etc. All these should be sourced from credible commercial suppliers who are sensitive to the general environment.</p> <p>Undesirable, hazardous or unauthorized materials should not be used</p>
Construction waste	- sh sp	0	<p>Construction waste will be minimal. Proper disposal of waste generated is necessary; the waste should be disposed into approved dumpsites, by licensed waste handlers.</p>
Clean on completion	- sp	0	<p>The contractor should ensure that when works are completed, the site is left clean and tidy.</p>
Positive impacts	++, t	++, L	<p>Construction activities will create jobs for skilled and non-skilled workers.</p> <p>Job opportunities for skilled and non skilled personnel during operation phase of the station.</p>

Direct and Indirect Effects

Employment and Income

The facility will create employment opportunities both during construction and operation phases, thus generating wealth and livelihoods. Besides direct employment, other forms of employment are likely to result from the multiplier effects, such as increased urbanization, industrialization and local markets for providing goods and services during both the implementation and operational phases.

Cumulative and Irreversible Effects

Impacts of Construction Activities

During the construction phase, sources of negative environmental impacts will emanate from the site preparation activities including excavation of soils, and other geological formations, levelling of landscape and the subsequent construction activities.

The above activities will have varying negative impacts on the biophysical environment. Immediate negative impacts will include the subsequent disturbance of the exposed topsoil which could lead to soil erosion and siltation. The combined effect of site preparation and construction activities on the site can lead to potential soil erosion problems. Development on the transformed site may lead to continued soil loss especially during construction period when the ground is exposed. Soil wash out by the rains can lead to considerable ecological consequences. This is however not expected at the site.

In addition, there may be negative impacts related to visual intrusion, pollution, and negative socio-economic effects (including safety and health hazards) among other negative impacts if safe construction procedures are not followed.

Economic effects: Short-Term and Long –Term Effects

Utility of the site

The development shall increase the value of the plot in which the project will be situated because it will entail construction of the operation space for the plot and hence exercising the full value of the area.

Products, By-Products and Waste generated from the Project

Products, By-products and Waste generated during Project Construction

During the construction phase of the project, it is envisaged that the following products, by-products and waste will be generated:

- Dust emissions arising from excavation works of the project site as well as emissions arising out of various construction activities, for example, VOCs from construction machinery and equipment,
- Timber, polythene sheeting and nails arising from the formwork that will be used to contain various concreting activities, empty cement bags, wet gunny bags (used for curing concrete) etc.
- Fugitive oil spills arising out of improperly serviced trucks and construction equipment.
- Human effluent emanating from construction workers on the site.

Products, By-Products and Waste generated during Operations.

Once the site is in operational fuel will be bought from other distributors from Kisumu or Eldoret, then it will be transported to Gerick filling station via road, after that the fuel will be off loaded to station fuel storage tanks where it will be stored awaiting sale. As a result of this process several negative impacts can occur.

During transportation

- Explosion of the tanker- ensure the material used to manufacture the fuel tank is of good standard install fire extinguishers in all tankers used to transport fuel
- Road accident- to mitigate these impact tankers drivers should be well trained and the management should make sure tankers driver adhere to traffic rules.

During offloading

- Fumes- provide gas masks for people offloading the fuel.
- Fire- implement Fire Risk Reduction Rules 2007

During dispensing

- Fire- ensure customer switch off their engine while refuelling

Other impact during operational are as follow

Once the site is operational; products, by-products and waste generated shall mainly be waste papers and petroleum wastes that will be produced from the operations of the station. The occupier is therefore expected to design and institute appropriate measures for the collection and disposal of the various wastes produced by the operations of the workplace and also ensure that all oil/petroleum related wastes are adequately disposed.

The consumers of petroleum products in and around Konate centre in Ikonge will greatly benefit from the construction of the service station. The construction of the service station will increase the availability of petroleum products and ease congestion created by the existing service stations distributed along the Nyamira-Kisii Road.

The construction of the service station will further increase the competitiveness of fuel prices to the benefit of consumers in the area. The creation of steady and competitive petroleum products supply will also reduce over reliance on wood fuel products (fuel, wood and charcoal) as kerosene will be marketed through the service station thus reducing degradation of the environment due to deforestation.

ISSUES OF CONCERN AND MITIGATION MEASURES

This part includes impacts during implementation/construction phase, operation phase and decommissioning phase on the following issues: *Soil degradation, air quality, noise, oil wastes, water resources, solid and liquid waste management, drainage, terrestrial ecology, visual and landscape, traffic, public comfort, Occupational Health and Safety (OHS) and energy.* Most of these key issues were identified during the scoping exercise and are clearly elaborated as follow:

(a) Noise and Vibration

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 communication when the exposure is severe.

Relatively high noise levels are expected in the area during the construction phase. Noise control measures should be implemented in the construction area if the noise levels exceed **90dB (A)** for a continuous 8 hours exposure as per the requirements of the Noise Prevention Control and Prevention Rules, 2005 a subsidiary legislation to the Occupational Safety & Health Act, 2007. In addition, protection against the effect of the noise exposure among the workers should be effected.

Ambient noise measurements were taken as a baseline based on which future noise measurements shall be taken to ascertain whether the construction and operation of the petrol station contributes to noise pollution.

The noise levels at the project area are as below:

Potential Mitigation Measures

- Construction work should be carried out during the specified time i.e. from 0730 hrs to 1700hrs; noise generated during the day is not quite disturbing as compared to it being generated at night hours
- Sensitize construction vehicles' drivers and machinery operators to switch off engines of vehicles when not in use.
- Workers should be provided with relevant personal protective equipment (PPE)/ materials such as earmuffs and earplugs; when operating noisy machinery and when in noisy environment. These provide a physical barrier that reduces inner ear noise levels and prevent hearing loss from occurring
- Suppressors or silencers on equipment or noise shields; for instance, corrugated iron sheet structures.
- Machineries should be maintained regularly to reduce noise resulting from friction.
- Provision of billboards at the construction site notifying of the construction activity and timings.
- Manual labour is recommended in the construction phase, to reduce the noise emitted by construction machinery.
- Annual noise measurements should be conducted as required under the Noise Prevention and Control Rules 2005 and Noise and Vibration Regulations of 2006.

(b) Soil Erosion

Soil movement is common in construction projects. This mostly happens during the laying of foundations (earthworks) for the project and site clearing. Most top loose material is excavated and transported elsewhere. The excavated soil will be used in the landscaping and levelling of the site during construction. Comprehensive soil erosion measures are thus important during the construction and operation phases:

Potential Mitigation Measures

- Provision of soil conservation structures on erosion prone areas to control occurrence of soil movement.
- Avoid unnecessary movement of soil materials from the site.
- Good management of the runoff/storm water to reduce its impact on loose soil
- Control construction activities especially during rainy / wet conditions
- Landscaping: Re-surface open areas on completion of the project and introduce appropriate vegetation where applicable.
- Provide appropriate drainage systems to manage surface runoff.

(c) Increased Water Demand

Water is a universal resource and its demand is high. The increase in demand for water will occur during the construction phase since some of the activities will require use of large quantities of water. Water for use during operation will be sourced from water vendors as mentioned earlier in this report. Water conservation measures will be required during operation to minimize wastage of water.

Potential Mitigation Measures

- Encourage water reuse/recycling mostly during construction phase.
- Provide notices and information signs i.e. '**keep/leave the tap closed**', etc. This will awaken the civic consciousness of stakeholders with regards to water usage and management.
- Install water-conserving taps that turn-off automatically when water is not in use.

(d) Air Quality

The construction activities on the site will result to increased dust and gas emissions. Construction machinery and trucks generate hazardous exhaust fumes such as Carbon Oxides (CO_x), Sulphur Oxides (SO_x) and Nitrogen Oxides (NO_x). Dust particles caused by vibrations of machines and vehicle movement suspends in the air mostly during dry spells.

Potential Mitigation Measures

- Provide appropriate Personal Protective Equipment (PPEs) such as nose masks to the affected workers on site during construction phase
- Regular and prompt maintenance of construction machinery and equipment. This will minimize generation of noxious gases and other suspended particulate matter
- Control of areas generating dust particles. Such areas should be regularly cleaned or sprinkled with water to reduce dust. The areas can be enclosed to mitigate effects of wind

- Workers should be trained to understand the hazards that may be generated in such work environments
- Workers should be encouraged to go for regular health check-ups to ascertain their health standards

(e) Oil Leaks and Spills

Oil/grease spills are noted to be prevalent in construction sites; dealing with petroleum products. Such products contain detrimental elements to the environment since they contain traces of heavy metals such as; mercury, lead and sulphur among others. Though this may not be common at the site during construction, it is wise to control and observe the little that could occur especially during maintenance of the involved machinery.

Among the most significant environmental issues from retail petroleum sites is the accidental release of stored or handled fuels due to leaks from storage tanks, piping systems, and fittings under fuel dispensers. Releases may also result from surface spills and overfills during delivery and fueling. Tank and piping system failures may result from aging (e.g. corrosion of steel components) or from structural stress due to improper installation. The impacts from such releases depends on numerous factors including the amount of materials released, local geologic conditions, and proximity to environmental receptors such as subsurface utilities or building structures (in which organic vapor may accumulate) or water resources (e.g. groundwater wells or surface water reservoirs used for portable water purposes).

Potential Mitigation Measures

- All construction machinery should be keenly observed not to leak oils on the ground. This can be done through regular maintenance of the machinery.
- Any maintenance work should be carried out in a designated area (protected service bays) and where oil spills are completely restrained from reaching the ground. Such areas should be cemented and enclosed to avoid storm water from carrying away oil into the soil.
- Car wash areas and other places handling oil activities within the site should be well managed and the drains from these areas controlled. Oil interceptors should be installed along the drainage channels leading from such areas.
- Develop a spill prevention and control plan to counter and manage emergencies that may occur/arise in the event of accidental spills.
- Underground Storage Tanks (USTs) whether constructed from steel or fiberglass-reinforced plastic, should be designed and built according to recognized industry standards.
- USTs should have secondary containment systems to prevent the uncontrolled release of fuel. Secondary containment systems may consist of:
 - Double wall construction for Underground Storage Tanks (USTs) and the bottom of Above ground Storage Tanks (ASTs), equipped with an interstitial monitoring devise
 - Connection to a continuous leak detection system
 - Use of vaults or membranes in single wall Underground Storage Tanks (USTs)

- Use of composite tanks
- Leak detection systems should be able to detect the presence of liquid or petroleum vapor within the interstitial space.
- Use of corrosion protection in steel tanks and piping. Corrosion protection may consist of coating with a suitable dielectric material or by cathodic protection.
- Tanks should be equipped with devices that prevent spills and overfills, such as overfill alarms, automatic shut-off devices and catch basins around fill pipes. Fill pipes on the above ground Storage Tanks (ASTs) should be located within the tank's secondary containment structures.
- UST piping, fittings, and connections should be designed and built according to recognized industry standards
 - Buried piping joints and fittings made of metal should be kept to a minimum and, when necessary, should be welded rather than threaded. The use of polyethylene piping and continuous, flexible composite piping from specially developed thermoplastic composites with no joints should be considered
 - Pressure piping systems should include secondary containment with plastic
- Tank and piping installation procedures should be consistent with recognized industry standards and equipment manufacturer recommendations. Installation procedures designed to reduce the likelihood of tank and piping structural failure include:
 - Proper care and handling of tank and piping materials prior to installation
 - Preparation of foundations with the use of backfill that support tank and piping securely and evenly to prevent movement, uneven settlement, or concentrated loading, especially for fiber-glass-reinforced plastic USTs and flexible composite piping.
 - Overlying concrete or pavement should be designed to handle dynamic loads to prevent stress on buried tank and piping.
- Monitoring of UST tanks and piping for leaks through the use of periodic tightness testing combined with inventory reconciliation consisting of an analysis of daily inventory compared to delivered quantities and volumes dispensed.
- Prioritizing the upgrade of equipment and installation for existing facilities of a network according to local regulatory standards (which may require the upgrade or replacement of tanks and other infrastructure after they reach a certain age) or according to the potential likelihood of a release and the potential severity of the consequences in the event of a release. Examples of risk-based criteria applicable to USTs include:
 - Evidence of system leaks such as loss of product from inventory or reports of gasoline / fuel vapors in underground utilities or nearby buildings.
 - Age and type of construction of existing tank and piping infrastructure.
 - Soil characteristics that may contribute to the corrosion of underground systems.

- Location in, or in close proximity to, underground mining areas.
- Proximity to environmental receptors such as underground infrastructure (e.g. underground public utilities such as sewers, tunnels / vaults for electric or telephone utilities, or building basements), private or public water supply wells, surface water reservoirs, aquatic habitats for critically endangered or endangered species, or other potential points of human or ecological exposure to gasoline / fuel related contaminants.
- Dispensers should be securely mounted and be protected against damage from vehicles.
- Suction systems should include a leak-proof drip tray beneath the dispenser.
- Pressure systems should be equipped with leak-proof sumps instead of, or in addition to a drip tray beneath the dispenser.
- No-return or check valves, fitted within the dispenser housing, should be installed on each line of a suction system.
- Use of “breakaway” hose connections which provide emergency shutdown of flow should the fueling connection be broken through movement.
- Nozzles fitted with automatic shut off and attitude devices.
- Fuel dispensing areas should be paved and be equipped with drainage into an oil / water separator able to contain accidental spills which may be occur during vehicle fueling.
- Fuel pipes should have suitable fittings to ensure a secure, leak-proof connection with the hoses from delivery trucks. Such fittings should have provision for a locking device that prevents unauthorized access;
- Where fuel pipes are installed above ground, the height should be below the minimum height of the delivery tanker’s bottom loading adaptor to ensure proper draining of the hose contents into the storage tank.
- All storage tanks should undergo periodic inspection for corrosion and structural integrity and be subject to regular maintenance and replacement of equipment (e.g. pipes, seals, connectors, and valves)
- Bulk deliveries should be conducted by properly trained personnel according to pre- established formal procedures to prevent accidental releases and fire / explosion hazards. Procedures should include all aspects of the delivery or loading operation from arrival to departure, including wheel blocking to avoid vehicle movement, connection of grounding systems, verification of proper hose connection and disconnection, adherence to no- smoking and no-naked light policies for visiting drivers, among other considerations

- Facilities should develop a formal spill prevention and control plan that addresses significant scenarios and magnitude of releases. The plan should be supported by the necessary resources and training. Spill response equipment should be conveniently available to address all types of spills, including small spills.
- Facilities should also have a formal procedure developed by network operators and managers to respond to the discovery of leaks in USTs, including means for confirming the presence of the release; investigating potential impacts to environmental media; and, based on the result of the assessment or on confirmation of the significance of the release, implementing corrective actions to repair or replace damaged or leaking equipment and address risks of the resulting impacts to soil and water resources. Service station staff should be trained in these procedures.
- Groundwater monitoring should be included as part of a spill / leak detection strategy. This should typically consist of at least three monitoring points to also establish the direction of groundwater flow.

(f) Lead and Sulphur

The fallout from leaded petrol exhaust fumes not only pollutes the air we breathe with microscopic lead particles (amongst other pollutants), it is also responsible for adding to the lead content of household dust, soil and ceiling void dust in our homes.

There are two problems associated with lead in petroleum products. First, the lead that's released from car exhausts is dispersed into the environment, and has been linked to a number of health problems. In particular, studies indicated that children living near motorways seemed to have lower IQs than those living in areas with less lead pollution, suggesting that the lead was somehow linked to a lowering of brain function and intelligence in children.

The second problem is that car exhausts contain environmentally unfriendly gases, such as carbon dioxide and nitrogen oxides. A catalytic converter can help to remove these gases, but it cannot be used on leaded petrol since the lead 'poisons' the catalyst.

Sulphur on the other hand is present to a greater or lesser extent in all crude oils. When crude oil is distilled into petrol and diesel fuel blending components, some sulphur finds its way into those components. The amount of sulphur allowed in petrol and diesel is limited because of the undesirable effects it causes during combustion, such as its odour, its corrosiveness, and its tendency to produce acidic by-products. Sulphur in petrol and diesel is blamed for degrading the efficiency of catalytic converters in cars, which reduce noxious emissions of carbon dioxide from both old and new vehicles.

Potential Mitigation measures

- All fuel should be sourced from trusted sources that have employed the necessary steps to eliminate lead and reduce sulphur content.
- Selling of unleaded petrol.
- Selling of 0.05% sulphur diesel.

(g) Solid waste

Huge quantities of solid wastes are normally generated from construction activities. Such wastes include stones, wood, broken glasses, containers, rods of metal, pieces of iron sheets etc. There is need for proper management (proper disposal) of the solid wastes expected from the site during construction phase. However during operation by-products and waste generated shall mainly be office waste and oil wastes that will be produced from the operations of the station. The proponent will be expected to design and institute appropriate measures for the collection and disposal of the various wastes produced by their operations.

Potential Mitigation Measures

- The contractor or proponent should work hand in hand with private refuse handlers, NEMA and the Nyamira County Council to facilitate sound waste handling and disposal from site.
- All solid wastes should be taken for disposal to the approved dumpsites and by licensed waste handlers.
- The wastes should be properly segregated and separated to encourage recycling of some useful waste materials i.e. some demolished and excavated materials will be used as backfills.
- Proper dustbins should be provided.

(h) Ecological impacts

The site has no vegetation of conservation value hence the project will have no impact of ecology.

Potential Mitigation Measures

- Landscaping: Plant vegetation in all practical open areas on project completion.
- Manage the introduced vegetation on completion of the development to restore or improve the site.

(i) Occupational Health and Safety (OHS)

During construction there will be increased dust, air and noise pollution. These are considered as negative impacts as they significantly lower the quality of environment.

Potential Mitigation Measures

- Capacity building and training of staff/workers with respect to Occupational Health, Safety and Environment. Provide safety measures for personnel, Personal Protective equipments (PPE) - safety gear as per Health and Safety and Welfare – Special Provisions and Rules Regulations; conduct medical examination of workers as required by the Medical Examinations Rules of 2005 under the Occupational Safety and Health Act, 2007, for occupations covered under Schedule II of the act. Construction works fall under this schedule II and therefore all workers should undergo the medical examinations.
- A first aid kit should be provided within the site and should be fully equipped (as per Rule 2 of the First Aid Rules, 1977) at all times and managed by qualified and trained first aider(s).
- The contractor/proponent should initiate and develop effective Emergency Response Plans-ERPs to cater for various eventualities such as fire outbreaks, oil spills and other incidences that are likely to occur.

- Proper documented possible action plans (ERPs) need to be put in place in case of any incidences occurring.
- Where the workforce exceeds 20, the contractor should facilitate formation of a Safety and Health Committee, in accordance with the Health and Safety Committees Rules, 2004. The safety and health committee should be adequately trained on Occupational Safety and Health in line with Rule 12 of the Health and Safety Committee Rules, 2004 and be appraised on their functions as stipulated under Sec. 6 of the Health and Safety Committee Rules, 2004.
- The contractor should obtain a certificate of registration of Building or Construction from DOHSS.
- Appropriate abstracts should be displayed at strategic location including, the Workplaces Act, and Building Operations and Works of Engineering Construction (BOWEC), Rules, 1984.

(j) Public disturbance

Construction disturbances result from noise, lighting etc. Such disturbances result to stress and other body reactions.

There may be disturbances, which are likely to cause stress and other similar effects mostly during project implementation processes due to continued vibrations and noise generated by heavy machinery.

Potential Mitigation Measures

- Construction activities should be done only during the day.
- Erect billboards on the start of the project to psychologically prepare the people in the vicinity.
- The signs should indicate and inform the public when works starts and when it will be completed. Such information should be made clear for the interest of the motorists along the connecting roads.

(k) Security

Security is a necessity for any development since it ensures that all planned activities run smoothly without any loss of construction materials especially during the construction phase. It (security) controls movement within the site especially for the intruders who might be injured by the materials and other hazardous features in the construction site. The area is well covered by communication networks and this to a great extent facilitates in security. The project site will have a band wall on three sides and the fourth side will be towards the highway.

Potential Mitigation Measures

- Security should be beefed-up and movement within the site should be controlled.
- Provide lighting systems that illuminate the area well. Security alarms should be installed in strategic points all over the site area after completion of the project.
- Contractor should provide adequate security during the construction period when there is no work going on at the site. E.g. during the night and weekends.

(l) Fire hazards and Fighting

There are some operations that may pose a risk to fire occurrences at the construction site and even during the operational period. These occurrences may arise during the construction phase but more in the operation phase since there will be extensive use of electricity in the service station. High risk of fire is also expected due to the flammability of the products (petrol, diesel) handled at the service station. It should therefore be ensured that all operations during construction and operation phases are in tandem with the Fire Risk Reduction Rules, 2007.

Potential Mitigation Measures

- Install an automatic fire alarm system for the entire project mostly on operation.
- Install fire fighting equipment, heat and smoke detectors, static water storage tanks for fire fighting as approved by the Nyamira County Council.
- All fire control and fighting facilities to be installed as per the requirements stipulated in the approved plans.
- The occupier to ensure that the requirements of the Fire Risk Reduction Rules, 2007 are in place.

In addition to the above, the project management should consider the following:-

- Conduct regular fire drills/simulations to sensitize workers during construction phase.
- Adapt an emergency response plan for the entire project during operational phase.
- Ensure that all fire fighting equipment are strategically positioned, regularly maintained and serviced.
- Provide fire hazard signs such as 'No Smoking' signs, Direction to exit in case of any fire incidence and emergency contact numbers should be provided.
- Provisions of marked fire exits and ensure that all fire exits are unobstructed at all times.
- The proponent to put up a trained fire fighting team in accordance with the sec. 20& 21 of the Fire Risk Reduction Rules, 2007.

(m) Traffic density

The project will come along with increased (vehicle) traffic along the adjacent road networks and mostly during construction phase.

The effect will also be felt during operation phase; along the Nyamira - Kisii Road.

Potential Mitigation Measures

- Notify the motorists about the development once implementation is started. It is important that warning/informative signs (billboards) 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.
- The traffic along connecting routes should be controlled especially during construction phase and mostly when large trucks are turning into the site, say for delivery of materials.

Summary of Positive Impacts of the Project

The development will have positive impacts to the society and the environment in general. Some of benefits include the following:

- The optimal use of the land.
- Economic-investment hence increases in wealth because the proponent will own a petrol station that will provide direct income.
- Creation of market for goods and services and especially construction inputs which include raw materials, construction machinery and labour. Secondary businesses are also likely to spring up during the construction phase especially those providing foods and beverages to the construction workers.
- Provision of employment during construction phase and operational phase.
- Return of the proponent's investments
- Increased revenue to local and national authorities
- Rehabilitation of site after decommissioning

Summary of Negative Impacts

Against the background of the above positive impacts, there are a few negative drawbacks that are anticipated mostly during the construction of the project. They include the following:

- Impact to soil (soil erosion and degradation) especially when laying the foundation of the development.
- Change of biodiversity
- Increased waste generation (both solid and liquid) during construction and operational phases.
- Air and water pollution as a result of dust particles emanating from construction activities. Exhausts from the involved machinery will lead to increased levels of noxious gases such as sulphur, carbon and nitrogen oxides
- The health and safety of workers and immediate residents/neighbours may be compromised due to accidents, pollution and disturbance
- Oil and grease spills and leakages that can find its way into the river and can also expose hard elements into the ground.

Summary of Mitigation Measures

One of the objectives of the environmental assessment has been to identify measures to be taken by the proponent to mitigate environmental impacts. These will include:

- A code of practice to minimize construction noise, vibration, dust and disturbance on the site.
- Application of soil conservation measures to reduce surface runoff during wet seasons and especially during construction phase.
- Reforestation, landscaping and re-vegetation to counter change of biodiversity.
- Recovery of all debris generated and reuse of materials where possible e.g. the stone chippings which can be used as hardcore.
- Recycling and reuse of appropriate materials.

- Provision of security measures to deter intruders and protect them from the risk of injury; and fitting of noise mufflers on generator exhausts.
- Installation of oil/diesel separators on site to keep oils from storm runoff.
- Predetermined route to the site, oil spillages will be minimized by using right machinery that are regularly serviced and operators who are qualified following the operations instructions strictly.
- The contractor and the proponent/management will ensure effective wastewater management, maintain equipment to avoid leaks.
- Drainage structures will be installed properly, loose soils will be compacted and landscaping carried out.
- The contractor will ensure management of excavation activities, activities will be controlled especially if construction will take place during rainy season.
- Sensitize drivers of construction machinery on effects of noise; billboards will be suitably erected on the start of the project to psychologically prepare the people in the vicinity.
- Signs must indicate and inform the public when the works starts and when it will be completed, construction activities to be restricted to daytime to avoid accidents and possible harm to construction crew.
- Workers in the vicinity of high-level noise to wear safety and protective gears, provide barriers such as walls around site boundaries to provide some buffer against noise propagation.
- Vehicle speeds in the construction area will be limited to minimize dust in the area, discourage idling of vehicles i.e. vehicle and equipment engines will be turned off when not in direct use to reduce exhaust emissions.
- Regular maintenance of construction plant and equipment, engage sensitive construction workers.
- Provide Personal protective Equipment such as nose masks to the workers on site; the construction contractor will water the site with exposed soil surfaces twice each day during dry weather.
- All residual waste materials to be recycled sold or disposed in an environmentally friendly manner. Wastes will be properly segregated and separated to encourage recycling of some useful wastes, dustbins will be provided at the construction site
- A First Aid Kit will be provided within the site and it will be fully equipped at all times,
- Sanitary facilities will be provided for each gender, local individuals preparing food for the workers at the site will be controlled to ensure that food is hygienically prepared,
- Construction crew at the site will be sensitized on social issues such as drugs, alcohol diseases, ensure proper solid waste disposal and collection facilities, ensure effective wastewater management.
- Provision of safe drinking water, contractor to take an insurance cover for workers in case of major accidents on site.
- Unauthorized persons will be restricted from construction site, enforce speed limits for construction vehicles especially along roads leading to the site, provide bill boards at the site/entrance to notify

motorists about the development, put up warning signs like “speed limit 15-20kph”, “heavy vehicles” etc.

- For the prevention of accidents the contractor shall adhere to the guidelines under the OSHA (2007)

PROJECT COMPLETION AND DECOMMISSIONING

Project completion

On completing the construction works on the site, everything should be left in order. This can be achieved through the following:

- Comprehensive Landscaping of undeveloped and disturbed areas should be done. Such areas should be sealed from pits and other depressions.
- All waste materials should be cleared and removed from the site. There should be no such materials as wood, glass, stones, scrap metals etc. However, these should be disposed off appropriately.
- General rehabilitation of any excavated areas; quality vegetation should be introduced to add aesthetic value to the site. This should be regularly watered.
- All construction equipment and machinery should be removed and the old ones sold to the respective scrap material handlers.

Project decommissioning

Information pertaining to the decommissioning of the project at the end of its life cycle and associated impacts, project measures to return the site as far as possible to its suitable state, or rehabilitation measures, have been provided in *Table 3 below*.

The proponent shall plan, engineer and implement the decommissioning, demolition and clean up of the station and other associated structures. The proponent shall develop decommissioning designs so that hazardous and dangerous materials are safely removed and salvageable equipment and structures are protected before the remaining facilities are safely dismantled. The designs shall carefully consider re-use goals for the site and materials. It should however be noted that at the time of decommissioning of the project, a separate EIA for decommissioning shall be necessary.

Existing Condition Evaluation

The first step in engineering a decommissioning project is to evaluate existing conditions and plan for appropriate handling of all site conditions, materials or structures. The considerations to be considered shall include:

- Developing an inventory of hazardous and solid wastes, underground storage tanks and other subsurface structures to assure proper management.
- Identification of electric utilities and communication systems to ensure that active site operations continue uninterrupted.
- Assessment of historic structures and materials, which can be reclaimed to comply with preservation requirements (if applicable) and to maximize cost recovery.

Facility Demolition

The development of demolition plans shall consider the structural stability of the structures being taken down, clearance of adjacent structures and rigging requirements. The proponent shall engineer the dismantling of buildings, tanks, piping, fueling facilities and storage facilities.

Preparation for the site reuse

Future site use is a key consideration because costs can be reduced by understanding which components of the site have to be removed versus built over or around. Topography and backfilling needs will be efficiently addressed relative to future construction and storm water management.

Materials Recycling and Reuse

Materials that can be recycled, reused, or salvaged shall be identified and removal planned accordingly to capture financial benefits.

Integrated Safety Design and Review

Safety for workers and the community is of great importance, and includes physical hazards, protection of water ways, and control of potential airborne hazards.

ALTERNATIVES INCLUDING THE PROJECT ACTION

The project Development Alternative

Under this alternative, the full study report will be presented to the National Environment Management Authority (NEMA). The report will help in evaluating and examining the effects of the project on the environment. After the evaluation and under the project development alternative, an Environmental Impact Assessment (EIA) License would be issued. This way, NEMA would approve implementation of the project's project. However, the development has to ensure that all environmental measures are complied with during the construction period and during operation.

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

The 'No Action Alternative'

There are no alternative sites for the project development. Under this option, the proponent's proposal would not receive the anticipated approval from NEMA. This means that the project development will not be implemented. The proponent will not be able to relocate the service station. The socio-economic impacts resulting from the site activities will not be realized. The economic benefits especially during construction i.e. provision of jobs for skilled and non-skilled workers will not be realized and there will be no generation of income. The anticipated country's industrial development may not be realized. On the other hand, the anticipated insignificant environmental impacts resulting from construction, and operation activities would not occur.

The comparison of Alternatives

Under the project Development Alternative, the project would provide a service station which could be used for dispensing fuel oil. This would provide employment directly and indirectly to the Kenyan population. It would provide jobs for the workers during construction. After completion more jobs would be generated at the station. More goods will also be provided in the market thus giving consumers a wider range of products as well as reduced prices. The stations operations would also increase government revenue through the payment of the various fees by the occupier before engaging in any business. This way, the industrial development would expand and the country's GDP would go up.

Under the No Action Alternative, there would be no development whatsoever. There would be no increased benefits from the site neither would there be the insignificant environmental Impacts. With the implementation of the project mitigation measures, including sound construction management practices, the anticipated impacts on soils and drainage, air and water quality will be reduced and where possible avoided. Commitment associated with this alternative would ensure that potential negative impacts are avoided or reduced to levels of insignificance.

Mitigation for the Project Action

Mitigation measures include proper handling of the waste material as generated especially during preparation of the site and completion of the project. The application or adaptation of standard construction management practices is fundamental. The measures will be appropriately designed and implemented to protect the environment and especially water, soil, flora and fauna of the site. The statutory certificate that will be issued and the project aspects included in the report will help to control damage to the environment. This is in relation to the Environmental Management and Co-ordination Act (EMCA).

ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS

(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 EMPs outlined in tables 2 and 3 addresses the identified issues of concern (potential negative impacts) and mitigation measures as well as roles, costs and monitorable indicators that can help to determine the effectiveness of actions to upgrade the quality of environment; as regards the subject project. The EMPs have considered both construction and operational phases).

Table 2

PROJECT DESIGN & CONSTRUCTION	PROJECT ACTIVITIES	NEGATIVE IMPACTS	MITIGATION MEASURES	RESPONSIBLE PERSONS	MONITORING MEANS	ESTIMATED COST (KSHS)
PRE-CONSTRUCTION PHASE	Consultation proposal Development proposal write-up	None	None	Consultant/proponent	Observation	Done
	Architectural drawings & Specifications approval	None	None	Architect/proponent	Observation	Done
	Structural Drawings & Specifications approval	None	None	Structural Engineer/proponent	Observation	Done
	Mechanical Drawings & Specifications approval	None	None	Mech. Engineer/proponent	Observation	Done
	Electrical Drawings &	None	None	Electrical Engineer/proponent	Observation	Done

Specifications approval					
Site visit, Project	None	None	Environmental expert/proponent	Observation	Done
Bill of quantities	None	None	Quantity surveyor/proponent	Observation	Done
Superstructure construction	<ul style="list-style-type: none"> • Oil spillage • Noise • Dust • Soil destruction 	<ul style="list-style-type: none"> • Ensure NO oil spillage occurs • Ensure use of manual labour and hand tools • Ensure use of serviceable machinery • Fence off construction site 	Contractor Supervising and Environmental expert	Inspection/Observation	20,000 (Covered under planning and administration costs of the contractor)
Construction of Infrastructure utilities	<ul style="list-style-type: none"> • Oil spillage • Noise • Dust • Soil 	<ul style="list-style-type: none"> • Ensure NO oil spillage occurs • Ensure use of Manual labour and hand tools 	Contractor Supervising and Environmental expert	Inspection/Observation	40,000 (Covered under planning and administration costs of the contractor)

	Construction of facility for solid waste handling and temporary storage	Poor sanitation and Environmental health degradation as a result of inadequate effluent wastewater disposal and solid waste management	<ul style="list-style-type: none"> • Ensure proper/sound waste bins provided • Ensure use of manual labour and hand tools • Ensure waste site covered on top 	Contractor Supervising or Environmental expert	Inspection/Observation	10,000(Covered under planning and administration costs of the contractor)
	Construction of sewer pipes, run off drains septic and soak pits Construction of the UPSTs for fuel storage	<ul style="list-style-type: none"> • Open pits • Noise • Dust • Soil destruction • Ground water • Pollution 	<ul style="list-style-type: none"> • Ensure no seepage of sewage to soil • Apply for effluent discharge license • Cover open pits during excavations 	Contractor Supervising or Environmental expert	Inspection/Observation	50,000(Covered under planning and administration costs of the contractor)
DE-COMMISSIONING PHASE	Site closure and demolition of the site office, and all other facilities including the UPSTs	<ul style="list-style-type: none"> • Oil spillage • Noise • Dust • Soil destruction 	<ul style="list-style-type: none"> • Ensure NO oil spillage occurs • Ensure use of serviceable machinery 	Contractor Supervising or Environmental expert	Inspection/Observation	100,000 (Covered under planning and administration costs of the contractor)

OPERATIONAL PHASE OF THE PETROL STATION	General maintenance of the Petrol station, regular cleaning of the petroleum storage tanks and de-sludging of the septic tank	<ul style="list-style-type: none"> • Oil Spillage • Noise • Possible asphyxiation of tank cleaners • Generation of waste materials, e.g. paints, painting accessories 	<ul style="list-style-type: none"> • Develop and implement plans for maintenance of all site facilities. • Ensure use of appropriate PPEs for tank cleaners including oxygen masks. • Establish an environmental record keeping system. • Ensure de-sludging of the septic tank is done by a license effluent waste handler 	Proponent	Routine Inspection	Per Year: Kshs. 40,000 (Covered under planning and administration costs).
OPERATIONAL PHASE OF THE PETROL STATION	Generation of solid waste	If not properly managed, could create hazardous conditions for those in the station and its vicinity	Ensure solid waste is collected regularly by professional waste handlers and disposed off at the designated County Council dumping sites.	Proponent	Routine Inspection	Per Year: Kshs. 50,000/=(Covered under planning and administration costs).
OPERATIONAL PHASE OF THE PETROL STATION	Generation of sewerage, waste water	If not properly managed, could compromise sanitary hygiene of the Development result in closure of the facility	Ensure the sewage waste water is collected and disposed off into the properly constructed septic tanks.	Proponent	Routine Inspection	Per Year: Kshs.50,000 (Covered under planning and administration costs of the proponent).

Environmental education and awareness	Lack of knowledge may result in disregard of the benefits attached to sustainable environmental management.	Awareness campaign for the inhabitants regarding resource conservation and environmental protection	Proponent	Observation	Per Year: Kshs.50,000/= (Covered under planning and administration costs).	
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TABLE 3: ENVIRONMENTAL MANAGEMENT/MONITORING PLAN FOR THE DECOMMISSIONING PHASE

Expected Negative Impacts	Recommended Mitigation Measures	Responsibility Party	Time Frame	Cost (ksh)
1. operation machinery/structures & wastes				
<ul style="list-style-type: none"> • Scraps and other debris on site 	<ul style="list-style-type: none"> ▪ Use of an integrated solid waste management system i.e. through a hierarchy of options ▪ 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 based on the properties of the particular waste stream. 	Contractor	One-off	0
	<ul style="list-style-type: none"> ▪ All buildings, machinery, equipment, structures and tools that will not be used for other purposes should be removed and recycled/ reused say in other projects. 	Contractor	One-off	0
	<ul style="list-style-type: none"> ▪ Where recycling/reuse of the machinery, equipment, implements, structures, tools and other waste is not possible, the materials should be taken to approved dumpsites. 	Contractor	One-off	0
Oil spills and leaks	<ul style="list-style-type: none"> ▪ Clean and treat all oil contaminated areas ▪ Suitably dispose all used oil and oil handling materials 	Contractor	One-off
2. Rehabilitation of project site				

<ul style="list-style-type: none"> • Vegetation disturbance • Land deformation: soil erosion, drainage problems 	<ul style="list-style-type: none"> ▪ Implement an appropriate re-vegetation programme to restore the site to its original status. ▪ During the re-vegetation period, appropriate surface water runoff controls will be taken to prevent surface erosion. ▪ Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences. ▪ Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas. 	Contractor/proponent	One-off	80,000
	<ul style="list-style-type: none"> ▪ Comprehensive Landscaping 	Contractor	One-off	50,000

3. Safety and Social-Economic impacts				
<ul style="list-style-type: none"> • Loss of income • Reduced ability to support dependants • Loss of quality of life 	<ul style="list-style-type: none"> – The safety of the workers should surpass as a priority of all other objectives in the decommissioning project – Adapt a project – completion policy: identifying key issues to be considered earlier before decommissioning. – Assist with re-employment and job-seeking of the involved workforce. – Compensate and suitably recommend the workers to help in seeking opportunities elsewhere. – Offer advice and counselling on issues such as financial matters. 	Proponent(s)

CONCLUSION AND RECOMMENDATIONS

Conclusion

Development of new projects are now preceded by critical analysis and assessment of the activities and operations as required by EMCA through conducting of Environmental Impact Assessment (EIA); to provide indications of the likely environmental consequences of the activity. EIA identifies both negative and positive impacts of the project, how it affects people, their property and the general environment. An EIA was therefore done for the project.

The analysis of the EIA has evidenced that the implementation and operation phases of the project will have positive impacts to the proponent and the country at large.

The impacts will include:

- Creation of jobs
- Increased industrial operation space for the proponent
- Increase in Government revenue
- General development of the site

Although the upcoming project development will stimulate growth of the company (proponent), there are environmental concerns that are associated with its implementation.

It will come up with some negative impacts such as:

- Increased pressure on existing infrastructure (such as water, drainage system)
- Pollution/contamination (to air and soil) mostly during construction phase
- Increased waste (solid and liquid) generation
- Oil pollution during operations among others

Hence the need to identify any negative environmental impacts of the project, during the early stages of planning and design. The strategy will ensure sustainable execution of project activities and protection of the environment; and guaranteeing a respectful and fair treatment of all people working on the project and general public including motorists.

Recommendations

In order to alleviate the negative impacts that may emanate from the implementation of the project, the project mitigation measures should be incorporated during construction and operation phases. This will ensure that environmental management strategies are incorporated at every stage and thus the perpetual co-existence of the project's project with the environment to its life cycle.

It is therefore the expert's recommendation that the project be approved subject to the outlined mitigation measures being adhered to. The key goal should be geared towards minimizing the occurrence of impacts that (may) have the potential to degrade the general environment. This will be effectively overcome through close monitoring and adoption of the recommended Environmental Management and Monitoring Plans (EMPs). The project proponent shall work closely with the environmental Expert including NEMA, the general public and the local council to enhance the management of the issues of concern.

Monitoring compliance with Environmental Regulations through conducting Environmental Impact Assessments can provide several benefits. Firstly, management of the risks associated with non-compliance is of tremendous value both from environmental and a health safety perspective. Secondly, EIA can identify where additional pollution prevention activities are required. Implementation of appropriate pollution prevention measures result in waste minimization, which can provide significant cost savings associated with waste management. Thirdly, companies that are proactive in ensuring compliance with regulations may develop a competitive advantage, as consumers, customers and investors today look for products from companies that have clearly demonstrated a commitment to minimizing their impact on the environment.

It is important to note that compliance with local, regional and state regulations will not provide the maximum possible pollution prevention and competitive advantage benefits. Companies that manage overall environmental performance through the implementation of an environmental management system (EMS), of which compliance is just one part, will realize much greater rewards. Assessment of compliance with regulations together with the effectiveness of the entire EMS will provide the best value to a company looking to enhance its environmental performance.

An EMS typically involves the planning, implementing, reviewing and improving of processes and actions designed by the company to meet its environmental goals. The most common EMS model follows the Plan-Do-Check-Act (PDCA) cycle. The first step is developing an environmental policy, which is then followed by planning of the EMS and then implementing it.

Success of an EMS is based on commitment from top level managers on down through all levels of employees and also requires a continuous improvement approach that involves constant review and revision.

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).

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APPENDICES

- i. Approved project plan
- ii. Bills of quantities
- iii. Hydrological assessment report
- iv. Questionnaires
- v. NEMA experts license
- vi. WRMA water sample report
- vii. Soil analysis report
- viii. Lease agreement