ENVIRONMENTAL IMPACT ASSESSMENT FULL STUDY REPORT FOR THE PROPOSED RE-CONSTRUCTION OF KILELESHWA SHELL SERVICE STATION ON PLOT L.R NO: 4858/16 KILELESHWA LOCATED ALONG RING ROAD, IN DAGORETTI NORTH CONSTITUENCY, NAIROBI COUNTY.

EIA/EA LEAD EXPERT

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DECEMBER, 2019

CERTIFICATION

This EIA Full Study Report was prepared in accordance with the Environmental Management and Coordination Act (EMCA), 1999 (Amended, 2015) and the Environmental (Impact Assessment and Audit) Regulations, 2003 for submission to the National Environment Management Authority (NEMA).

LEAD EXPERT

BILL OKEMWA

Signature……

Date……

PROJECT PROPONENT

VIVO ENERGY KENYA LTD

Signature……

Date……

ABBREVIATIONS

CO_x	Carbon Oxides
EEZ	Exclusive Ecological Zone
EHS	Environmental Health and Safety
EHS	World Bank General Environmental Health and Safety Guidelines
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
EPRA	Energy and Petroleum Regulatory Authority
EPRP	Emergency Preparedness and Response Plans
EPT	Energy and Petroleum Tribunal
ERC	Energy Regulatory Commission
GIIP	Good international Industry Practice
GRS	Grievance Redress System
HRM	Human Resource Management
HSE	Health & Safety
HSEMP	Health & Safety Environmental Management Plan
IFC	International Finance Corporation Performance Standards
KEBS	Kenya Bureau of Standards
KPLC	Kenya Power and Lighting Company
LPG	Liquid Petroleum Gas
MSDS	Material Safety Data Sheet
NEMA	National Environment Management Authority
NO_x	Nitrogen Oxides
NPEA	Nuclear Power and Energy Agency
NTTI	Nairobi Technical Training Institute
OHS	Occupational Health and Safety
OSH	Occupational Health & Safety
OSHA	Occupational Safety and Health Act
PDCA	Plan-Do-Check-Act
PM	Particulate Matter

QSR	Quick Service Restaurants
RERAC	Renewable Energy Resource Advisory Committee
REREC	Rural Electrification and Renewable Energy Corporation
SO_x	Sulphur Oxides
TOR	Terms of Reference
TPH	Total Petroleum Hydro-carbons
UNESCO	United Nations Educational, Scientific and Cultural Organization
USTs	Underground Storage Tanks
VEKL	Vivo Energy Kenya Limited
WHO	World Health Organization

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EXECUTIVE SUMMARY

The proposed project for which this EIA full study report has been prepared is a re-construction project for Kileleshwa Shell Service Station along Ring Road, Nairobi County. The project had previously been submitted as Project Report (**NEMA/PR/5/2/21999**) in July 2019. However, in compliance with the requirements and provisions of the Constitution of Kenya under Part VI, Section 58 of the Environmental Management and Coordination Act No. 8 of 1999 and Regulation 10 of the Environmental (Impact Assessment and Audit) Regulations, 2003 Legal Notice No. 101 and Legal Notice 15 of the Environmental (Impact Assessment and Audit) Regulations, 2016, the Authority required the proponent to initiate an Environmental Impact Assessment full study to facilitate wider public consultation, in-depth evaluation of the potential impacts associated with the proposed project and materialize harmony with stakeholders.

The development comprises the development of a modern service station and its associated facilities and infrastructure Located on co-ordinates 1° 16' 28.9812" S & 36° 47' 59.2548" E on Plot L.R No: 4858/16 Kileleshwa, located along Ring Road, in Dagoretti North Constituency, Nairobi County. This re-construction project shares impacts similar to most construction activities ditto urban development projects, and are thus manageable through the proposed EMP that shall be developed commensurate to the assessment of its potential environmental and social impact in this study report.

This Environmental Impact Assessment full study has been undertaken under requirements of Environmental Management Coordination Act (EMCA), 1999 (Amended 2015), schedule II that lists the projects supposed to undergo EIA studies in accordance with section 58 (1-4) of the Act. This is as stipulated by National Environment Management Authority that requires all development projects to do so in order to elucidate the potential adverse impacts of a project and thereby devising appropriate mitigation measures.

The overall objective of the study was to re-construct Kileleshwa Shell Service Station and its associated facilities and infrastructure to provide fuel and other petroleum products for motorists and residents in Kileleshwa and Nairobi County in general. On the other hand, the major objective of the EIA full study was to evaluate the effects/impacts of proposed development in relation to the general environmental aspects i.e. physical, biological, and social-economic environments. It

aims at influencing the protection and co-existence of the development with the surroundings as well as the compatibility of the proposed development to the area; to ensure and enhance sustainable environmental management during implementation and operational phases.

The scope of EIA study was to identify impacts likely to be caused to the environment, public health, socio-economic wellbeing, carrying out of environmental investigations in line with current legislations. The methodologies for EIA full study were environmental screening, environmental scoping, desktop studies, site visits, public and stakeholder participation and finally study report writing.

The study covered the physical extent of the project site and its immediate environs, implementation works of the proposed development and installation of key utilities and other facilities required for the project to function optimally. The baseline survey included physical, biological and the socio–economic environment.

This Environmental Impact Assessment full study examined the potential positive and negative environmental and social impacts of the project on the immediate surroundings with due regard to all the phases of re-construction, operation and eventual decommissioning of the service station. It encompassed all aspects about the physical, ecological, socio-cultural, health and safety conditions at the site and its environs during and after construction.

The EIA full study has revealed that there are both positive and negative impacts. The main positive impacts of the project include but not limited to: provision of petroleum products, easy movement of people, goods and services, boost growth of local economy, employment opportunities and generation of income and improve livelihoods, create business opportunities for various service suppliers and contractors, improvement of infrastructure, income to the proponent, various servicing services like car park, car wash and automated tyre fitting, restaurant services, optimal land utilization, revenue to the government, and decongest existing service among others.

The significant negative impacts include: pressure on existing water resources, pollution (soil, air, noise, and water), solid and liquid waste generation, increased power demand, soil erosion and sedimentation, potential incidences of petroleum product leaks from underground tanks and supply lines, potential fire risk because of the highly combustible petroleum products handled, public

utilities disruption, occupational health and safety hazards, impacts on material sourcing, and increased traffic to the petrol station.

To avoid, reduce, and/or minimize for potential significant, negative environmental and social impacts, mitigation measures were proposed and environmental and social management plan (ESMP) formulated. Recommendations were proposed to carry out annual environmental audits and follow ups once the project is in operation. However, a monitoring program was also developed to not only track down occurrence of impacts, but also to check on compliance requirements. Outlined below is a summary of impacts and mitigation measures;

Impact	**Proposed Mitigation Measure**
Objective: To minimize occupational health and safety risks	
Occupational Health and Safety Risks	• Provide all workers with the necessary protective gears • Ensure all workers are in protective gears all the time when on site • Place fire extinguishers in strategic areas within the station • Designate and mark smoking areas • Workers to be trained as fire marshals • Fire escape routes to be shown clearly • Provide enough first aid kits within the project site • Train workers in administering first aid • Label all potential hazards such as movable machine parts • Raise awareness and educating workers on risks from equipment and training them on the use of the equipment. • Placing visible and readable signs around where there are risks. • Ensuring security in and around the site to control the movement of people. • Providing safe and secure storage for equipment and materials in the site. • Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site.
Objective: To minimize solid waste generation ensuring efficient solid waste management	
Increased Solid Waste Generation	Following EMCA regulations on Waste Management, Legal Notice 121 including: • Use of an integrated solid waste management system like: Source reduction; Recycling; Reuse; and Land filling/Backfilling. • Using waste minimization techniques like buying required quantities in bulk.

	• Identifying all sources of wastes, and ensuring wastes are handled by licensed personnel • Making available suitable facilities for the collection, segregation and safe disposal of the wastes. • All construction materials left over at the end of construction should be used in other projects or sold • Ensure proper handling and storage of construction materials to reduce damage
Objective: To minimize impacts on soil geology, degradation and soil erosion	
Soil Geology, Degradation and Soil Erosion	• Use properly maintained hoses and fittings • Make the cement screeds in all the chambers using water proof material. • Install a monitoring well next to the tanks to check on leaks • Use water finding dipstick and/ or a hydrometer to check on density/ specific gravity • Ensure there is no oil spills, leaks during refilling and when offloading the fuel • Excavated materials should be removed promptly from the site to avoid erosion • Avoid unnecessary movement of soil materials from the site • Control activities especially during rainy any windy conditions • Regular sprinkling of water to reduce dust • Landscaping after completion of the service station with appropriate local vegetation. • Apply soil erosion control measures including: ✓ Control speed and operation of construction vehicles. ✓ Sprinkle water on excavated areas. ✓ Maintenance of construction equipment. ✓ All bare areas should be landscaped after ✓ Provide workers with dust masks if working on sensitive areas.
Objective: To minimize impacts on riparian land, and water quality	
Riparian Land and Water Quality	• Plant vegetation to induce breaks before the river to reduce water velocity and force preventing infrastructural damage. • Construct gabions on the riparian area to reduce erosion and bind the soil and ensure deposit of fertile sediments forming healthy riparian areas • The vegetated buffer (separate the water body and the service station) will intercept and trap debris, toxics, nutrients, and other pollutants from surface run off facilitating chemical break down of pollutants hence maintaining the ecological integrity of the land and water body. • Vegetated Buffers reduces the impacts from nonpoint sources of pollution on Kirichwa River. • Other practices that can help reduce nonpoint source pollution are:

	✓ Properly disposing of hazardous wastes such as auto fluids from the service station ✓ Recycling ✓ Adopting environmentally friendly development practices such as reducing impervious (paved) surfaces and installing storm water treatment practices ✓ Preserving natural areas • Conducting regular stream survey to understand the river system and identify effects of pollution on the Kirichwa River. • Construct gabions to contain stream bank erosion to protect the riparian buffer • Strictly adhere to the **Riparian Buffer Plan** to mitigate flooding, water pollution and littering. • Ensure development control by observing the required distance between infrastructural development and water bodies
Objective: To minimize impacts on hydrology, drainage and storm water	
Hydrology, Drainage and Storm- water	• A well-drained area should be identified for parking, servicing and maintenance of the vehicles and equipment. • Observe appropriate disposal procedures for oils and lubricants • Provide drainage channels should during construction to minimize any possible water logging. • Provide a segregated drainage system where water contaminated with oils drains to instead of draining into the open storm drains. • Water contaminated should be directed into the oil-water separator from where it should be treated before it is released to the rest of the drainage system. • An interceptor tank made up of reinforced concrete walls and floor shall be constructed and its inner walls shall be plastered with water proof cement. (Each chamber shall have a manhole with a reinforced concrete cover). • The used oil tank will have a concrete wall which will be able to contain the net products of used oil. Its plinth shall be sloped towards the Oil-Water separator for treatment. • The drainage system should ensure that surface flow is drained suitably into the public drains provided to control flooding within the site. • The channels should be covered with gratings or other suitable and approved materials to prevent occurrence of accidents and entry dirt that would compromise flow of run-off. • The drainage channels should ensure the safe final disposal of run-off /surface water and should be self-cleaning which means it should have a suitable gradient. • Implementation of roof water harvesting
Objective: To minimize impacts of air, dust pollution and exhaust emissions	

Air/Dust Pollution and Exhaust Emission	• Avoid excavation works in extremely dry weathers. • Personal protective equipment to be worn. • Post signs that limit vehicles speed onto unpaved roads and over disturbed soils. • Cover stockpiles of sand, soil and similar materials or surround them with wind breaks. • Ensure strict enforcement of on-site speed limit regulations. • Sprinkle water on access routes when necessary to reduce dust generation by construction vehicles. • Ensure strict enforcement of on-site speed limit regulations • Sprinkle water on graded access routes whenever necessary to reduce dust generation by construction vehicles • Enclosing the structures under construction with dust proof nets. • Using efficient machines with low emission technologies for the ones that burn fossil fuels. • Regular maintenance and services of machines and engines. • Use of clean fuels e.g. unleaded and de-sulphurized fuels. • Educate and raise awareness of construction workers on emission reduction techniques.
Objective: To minimize impacts of noise and vibration	
Noise and Vibrations	Complying with the EMCA noise regulation Legal Notice 61 including: • Prescribe noise reduction measures if appropriate e.g. restricted working hours, transport hours and noise buffering • Consult with the surrounding community on the permissible noise levels and best working hours. • Use best available technology • Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used. • Ensure that construction machinery is serviced and kept in good condition to reduce noise generation. • Observe normal working hours during noisy construction works (00800 to 1700) hours • Ensure that all generators and heavy duty equipment are insulated or placed in enclosures • Construction workers to wear ear muffs if working in noisy section.
Objective: To minimize impacts of increased traffic	
Increased Traffic	• Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. • Ensuring all drivers for the project comply to speed regulations. • Making sure the construction doesn't occupy the road reserves and complying with traffic and land demarcation obligations. • Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.

Objective: To minimize impacts of underground fuel storage, handling and potential leaking	
Underground Fuel Storage, and Handling	• Use properly maintained hoses and fittings • Make the cement screeds in all the chambers using water proof material. • Install a monitoring well next to the tanks to check on leaks • Use water finding dipstick and/or a hydrometer to check on density/specific gravity • Ensuring no spills during refilling and /or when offloading the fuel
Objective: To minimize water consumption and ensure efficient water use	
Increased Water Demand	• Ensure that water is sourced from a sustainable source and from licensed water vendors. • Recycling waste water and using it for other purposes • Provide information signs on means and needs to conserve water • Promote re-cycling and re-use of water as much as possible • Sensitize the occupants to conserve water by avoiding unnecessary wastage. • Detect and repair broken pipes promptly • Install roof gutters and installing water storage tanks to collect and harvest rain water • Avoid unnecessary toilet flushing
Objective: To minimize incidences and accidents	
Increased Incidences and Accidents	• Registration of all workplaces by the Director, Directorate of Occupational Health and Safety (DOHSS) • Provision of appropriate Personal Protective Equipment (PPE) for staff • Erect warning signs • Allocate a fire assembly point • Comply with all standards and legally required health and safety regulations as set out by the Occupational Safety and Health Act (Part XI: Section 96) as pertains to construction activities; • Provide fully functional standard First Aid Kit on site. Recommendations for Employees exceeding fifty (50) [as per the • Demarcate all works which may pose a employees and other site workers • For fire and safety the Contractor, should ensure the following: • For fire and safety the Contractor, should ensure the following: • Place portable fire extinguishers at suitable locations • Training all staff on fire safety policy and procedures • Clearly mark all fire exits within the site
Objective: To minimize impacts of hazardous waste	
Insecurity	• Maintaining a perimeter wall and have a manned barrier • Maintaining security alarms • Partnership with the neighbors and police in community policing.

	• Control of secondary businesses. • Round the clock security for the facility. • Adequate lighting and an alarm system installed at strategic points. • Bushes around and within the site cleared to avoid hiding areas for thieves.
Objective: To minimize of impacts on community	
Community Impacts	• Initiate good public relation between the proponent, contractor and the community • Erect and maintain information boards in the position, quantity, design and dimensions of the proposed sugar factory • Keep a "Complaints Register" on Site

In conclusion, results from EIA study show that the proposed project will have numerous positive socio-economic impacts as outlined earlier. However, the negative environmental impacts resulting from establishment of the facility are mitigate-able. Therefore, implementation of the Environmental Management Plan will assist in dealing with environmental issues during the project cycle. There are also guidelines for addressing environmental health and safety.

This project is recommendable for approval by the National Environment Management Authority (NEMA) for the issuance of an EIA license subject to periodic monitoring and evaluation from the day of commencing construction operations and decommissioning phases, as long as the set standards, measures and regulations are thoroughly upheld and adhered to. This will be in compliance with the Environmental Management and Coordination Act of 1999 (Amended 2015) and the Environmental Impact Assessment and Audit regulations, 2003.

CHAPTER ONE: INTRODUCTION

1.1 Introduction and Background Information

This Environmental Impact Assessment (EIA) full study report has been prepared for the purpose of seeking licensing for re-construction project for Kileleshwa Shell Service Station along Ring Road, Nairobi County resulting from the Authority requiring the proponent to initiate an Environmental Impact Assessment full study to facilitate wider public consultation, in-depth evaluation of the potential impacts associated with the proposed project and materialize harmony with stakeholders. The project had previously been submitted as Project Report (**NEMA/PR/5/2/21999**) in July 2019.

This Environmental Impact Assessment full study report seeks to examine both the positive and negative effects that the proposed Shell Service Station development project is likely to have on both the physical and socio-economic environment in order for sound decision making to promote human activities that align synergistically with the natural world within a sustainable development framework.

A comprehensive environmental policy was therefore needed to take care of the environment in a holistic way. This was achieved through enactment of the Environmental Management and Coordination Act (EMCA), 1999 (Amended, 2015), schedule II that lists the projects supposed to undergo EIA studies in accordance with section 58 (1-4) of the Act. The Act stipulate that Environmental Impact Assessment be carried out on all development projects to do so in order to elucidate the potential adverse impacts of a project and thereby devising appropriate mitigation measures. It is in response to this provision that this project report has been prepared.

1.2 Justification of the Proposed Project.

The project once implemented, will be in accordance with the Energy and Petroleum Regulatory Authority (EPRA) the successor to the Energy Regulatory Commission (ERC) under the Energy Act, 2019 that is responsible for the economic and technical regulation of the petroleum sub sectors. Therefore, the proposed re-construction of Kileleshwa Service Station will serve one of the Authority's key mandate as provided by the Energy Act 2019 which is to; Co-ordinate the development of upstream petroleum infrastructure and promote capacity building in upstream petroleum operations.

Besides, the service station will increase the business activities and economic growth in the Kileleshwa area. Additionally, it will create more job opportunities for the Kenyans as many will be employed in the businesses and the supply chain. In summary, the project will empower the proponent, Nairobi County and the country at large, economically in the future considering the fact that the Kenyan Government has pledged to be middle income state in Vision 2030.

1.3 Objectives of the Project

The overall objective of the study was to re-construct Kileleshwa Shell Service Station and its associated facilities and infrastructure to provide fuel and other petroleum products for motorists and residents in Kileleshwa and Nairobi County in general.

1.3 Specific Objectives of the Project

This project seeks to achieve the following objectives:

1. Re-construct Kileleshwa Shell Service Station and its associated facilities and infrastructure
2. Maximize returns on investment for the proponent while taking due consideration of policy, legal and administrative procedures governing the operations of a facility of this nature.
3. To ensure that the concerns of the neighboring community in this environment are captured and addressed in all stages of the project's cycle.
4. Ensure that implementation of the project does not in any way interfere with the environmental sustainability of the area in question giving due consideration to:
    - Neighboring population and land uses.
    - Facilities and infrastructure within the project area
5. Put in place mitigation measures that will ensure that any potential negative impacts resulting from project activities are taken care of at the earliest opportunity to alleviate any harmful effect to the neighboring populations and the environment.

1.4 Objectives of the EIA

The overall objective of the study is to assess the potential significant adverse impacts of the proposed development and articulate appropriate mitigation measures.

The specific objectives of this study include the following:

1. To identify and evaluate the significant environmental impacts of the proposed project.
2. To assess the environmental costs and benefits of the proposed project to the local and national economy.
3. To determine the compatibility of the proposed facility with the local environmental setting.
4. To evaluate and select the best project alternative from the various options.
5. To propose mitigation measures for the negative environmental impacts
6. To incorporate Environmental Management Plans and monitoring mechanisms during implementation, operation and decommissioning phases of the project.

1.5 Scope of the Study

The study has been conducted to evaluate the potential and foreseeable negative impacts of the proposed development. The physical scope is limited to the proposed site and the immediate environment as may be affected by or may affect the proposed project. Any potential impacts, are also evaluated as guided by EMCA 1999 and the Environmental (Impact Assessment and Audit) Regulations 2003. This report includes an assessment of impacts of the proposed site and its environs with reference to the following:

1. A review of policy, legal and institutional framework.
2. Description of the proposed project.
3. Review of baseline information.
4. Assessment of the potential negative environmental impacts of the proposed project.
5. Analysis of alternatives.
6. Development of mitigation measures and future monitoring plans.
7. Occupational and Environmental health and safety management.

1.6 Methodology

1.6.1 Environmental Screening.

The environmental screening was carried out to determine whether an EIA study is necessary for this project and at what level of evaluation.

1.6.2 Environmental Scoping.

In environmental scoping, the focus was on environmental impacts of great concern. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects. Impacts were also classified as immediate and long-term impacts.

1.6.3 Desktop Study and Review.

The desktop study and review provided a detailed description of the project with respect to the intended revisions i.e. spatial coverage, preliminary design layout, magnitude, implementation schedules, costs and human resources. Relevant documents were reviewed to obtain information on the baseline information in general but specifically at the proposed project site.

Proposed project documentary review provided further understanding the project design (site plan and architectural drawings), land use, local micro-environmental conditions, data on demographic trends, land use practices, development strategies and plans (local and national) as well as the policy and legal documents among others. Others included area maps, current and past survey documents, Development Plans of the Nairobi City, relevant policy, legal and institutional frameworks, regulations, guidelines and standards were also relied upon.

1.6.4 Field Site Visits

Physical evaluation of the project area was carried out with specific focus on landform trends, land use patterns, biodiversity, natural resources, hydrology and climatic variations. This was also an evaluation of the current environmental status with respect to physical, biological and socio-cultural perspectives. It was a systematic field inspection backed with available documentation and direct interviews. Reference was made to the previous conditions established through **NEMA/PR/5/2/21999**.

In addition to identifying the potential positive and negative impacts, field assessments contributed understanding the additional proposed works to be undertaken. The field survey adopted various techniques of baseline data collection on the existing environmental conditions, namely:

- Field observations and recordings including photography the project site and its vicinity.
- Use of checklists for determining potential environmental impacts of the proposed project.
- Consultations and public participation within the neighborhood of the project site.

1.6.5 Field Observations

Detailed field observation assessment was undertaken to enable existing determination of the exact socio-economic activities within the proximity of the project site. Among the broad focal areas for which observation was done included; current settlement patterns and land use, commerce, and trade industry among others. Checklists were used along with observations to check on additional/ possible environmental impacts of the project would have on the environment during both re-construction and operational phases. In this assessment, checklists were utilized to:

- Facilitate identification of potential additional environmental impacts;
- Provide a means of comparing the predicted environmental impacts;
- Indicate the magnitude of the additional developments environmental impacts both positive and negative;
- Indicate possible adverse environmental impacts that are potentially significant but about which sufficient information can be obtained to make a reliable prediction on the additional developments; and
- Indicate negative potential environmental impacts in the project area, which merit mitigation measures and monitoring during project implementation based the additional developments.

1.6.6 Public Participation and Stakeholders Engagement

Structured stakeholder engagement was undertaken in the Kileleshwa neighborhood to capture the views and concerns of interested and affected parties. Photos of the project site and the immediate neighboring developments were taken from the initiated field visits and physical inspections for inclusion in this full study report. The engagement process entailed face to face meetings and interviews.

The study also sought public opinion/views of neighbors, interested or affected parties of the proposed project if any through Consultation and Public Participation (CPP) exercise. Clip board questionnaires were administered to the public and interviews held with neighbors. The local county administration and relevant lead government agencies were engaged in the organization and participation of this meetings with key stakeholders. The questionnaires have been included in this report.

1.6.7 Reporting.

In the entire exercise, the proponent and EIA experts contacted each other on the progress of the study and signing of various documents. Ten copies of this report alongside a soft copy will be submitted to the National Environment Management Authority for review and issuance of an EIA license. All the materials and workmanship used in the execution of the work shall be of the best quality and description.

CHAPTER TWO: PROJECT DESCRIPTION

2.1 Nature of the Project

The overall objective of the study was to re-construction of Kileleshwa Shell Service Station and its associated facilities and infrastructure to provide fuel and other petroleum products for motorists and residents in Kileleshwa and Nairobi County in general.

2.2 Site Ownership

The land where the proposed re-construction works of Kileleshwa Shell Service Station shall take place is owned by the proponent as appended to this report.

2.3 Justification of the Proposed Project

The proposed project will entail re-construction of Kileleshwa Shell Service Station and its associated facilities and infrastructure. The project once implemented, will be in accordance with the Energy and Petroleum Regulatory Authority's (EPRA) key mandate as provided by the Energy Act 2019 in coordinating the development of upstream petroleum infrastructure and promote capacity building in upstream petroleum operations.

The project is anticipated to provide fuel for motorists and residents in Kileleshwa and Nairobi County residents and motorists, provide cooking gas to the residents of the area, and provide restaurants services, mini supermarket, car park and car wash services, and automated car/vehicle tyre fitting services to the motorists plying the Nairobi-Malindi road and Nairobi County in general.

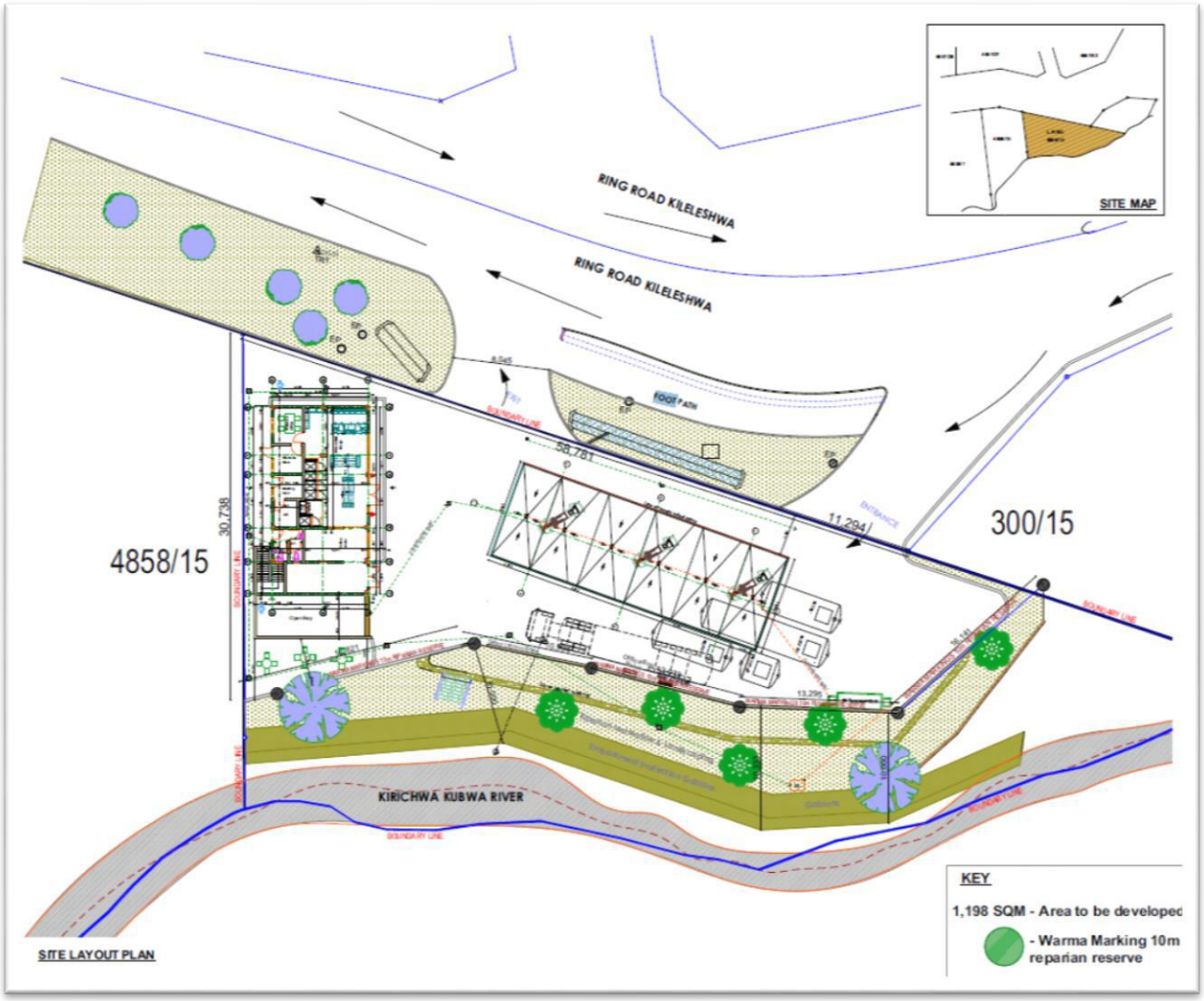
The project will lead to economic empowerment not only of the project proponent but also of a host of other people who will both directly and indirectly benefit from jobs creation among other services. Revenue will be generated to the National and County Governments. In summary, the project will empower the proponent and the country at large, economically in the future considering the fact that the Kenyan Government has pledged to be middle income state in Vision 2030.

2.4 Project Design

The proposed development project is consisting of re-construction of Kileleshwa Shell Service Station and its associated facilities and infrastructure. The typical map layout of the service station's infrastructural facilities includes the following;

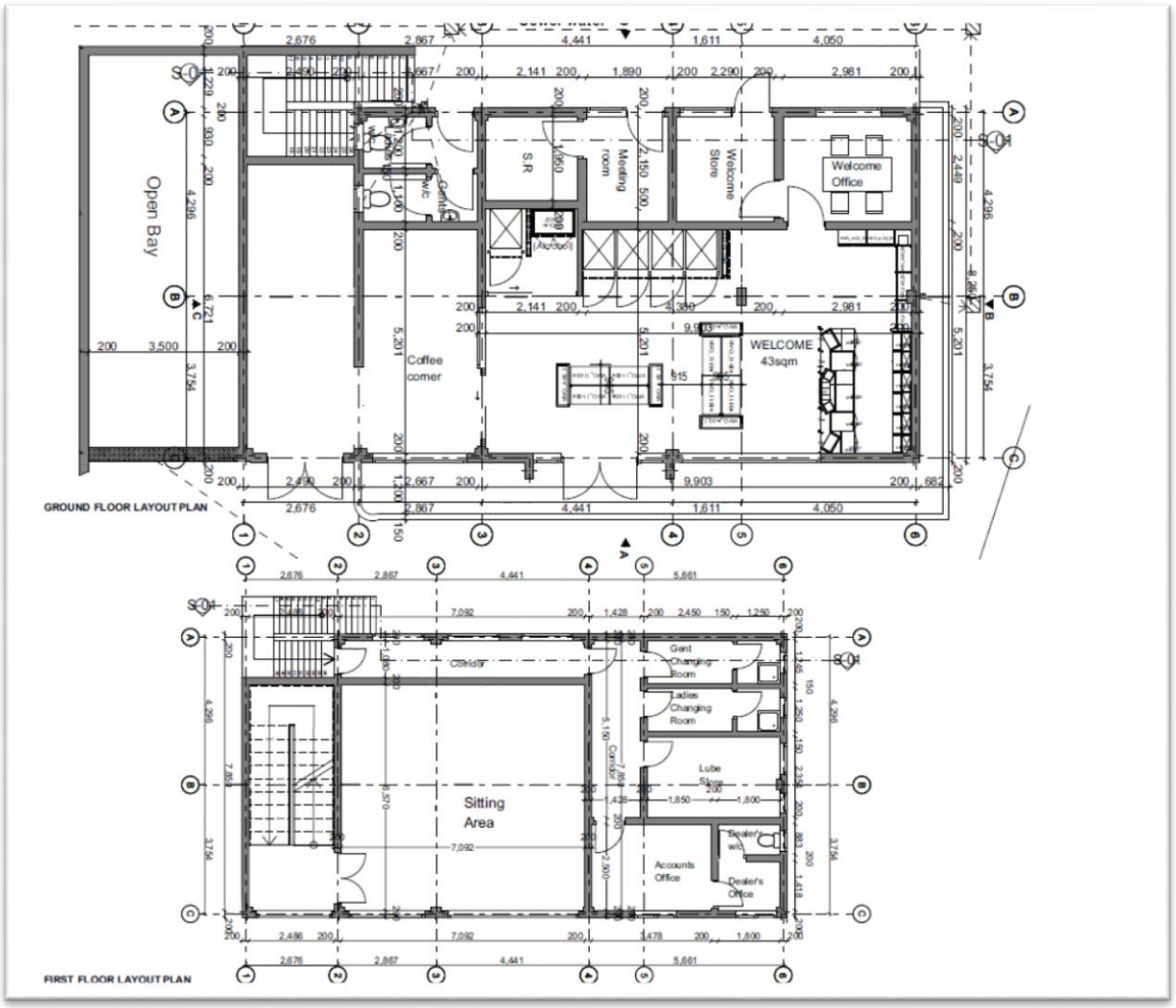
a. Filling pumps,
b. 4 Underground Storage Tanks namely: 1 No. 10,000 Liters V. Power; 1 No. 50,000 Liters Unleaded; 1 No. 30,000 Liters Unleaded; and 1 No. 30,000 Liters Diesel.
c. Administration offices,
d. Parking bay,
e. Open bay,
f. Required infrastructure storage facilities,
g. Water supply and/or water tanks for daily and general use and cleaning,
h. Required telecommunication infrastructure,
i. Required washroom facilities (Gents and Ladies)
j. Required entry and exit roads into and out of the service station
k. Coffee corner and a quick shop
l. Meeting rooms
m. Telecommunication infrastructure, and
n. Generator/power equipment room and back up 60 KVA and 200 KVA generators.

2.4.1 Proposed Kileleshwa Shell Service Station Map Layout Plan



Layout 1: Proposed Kileleshwa Shell Service station typical site layout plan

2.4.2 Ground Floor and First Floor Layout Plans



Layout 2: Ground floor and first floor layout plans

Photo 1 & 2: The proposed Kileleshwa Shell Service station

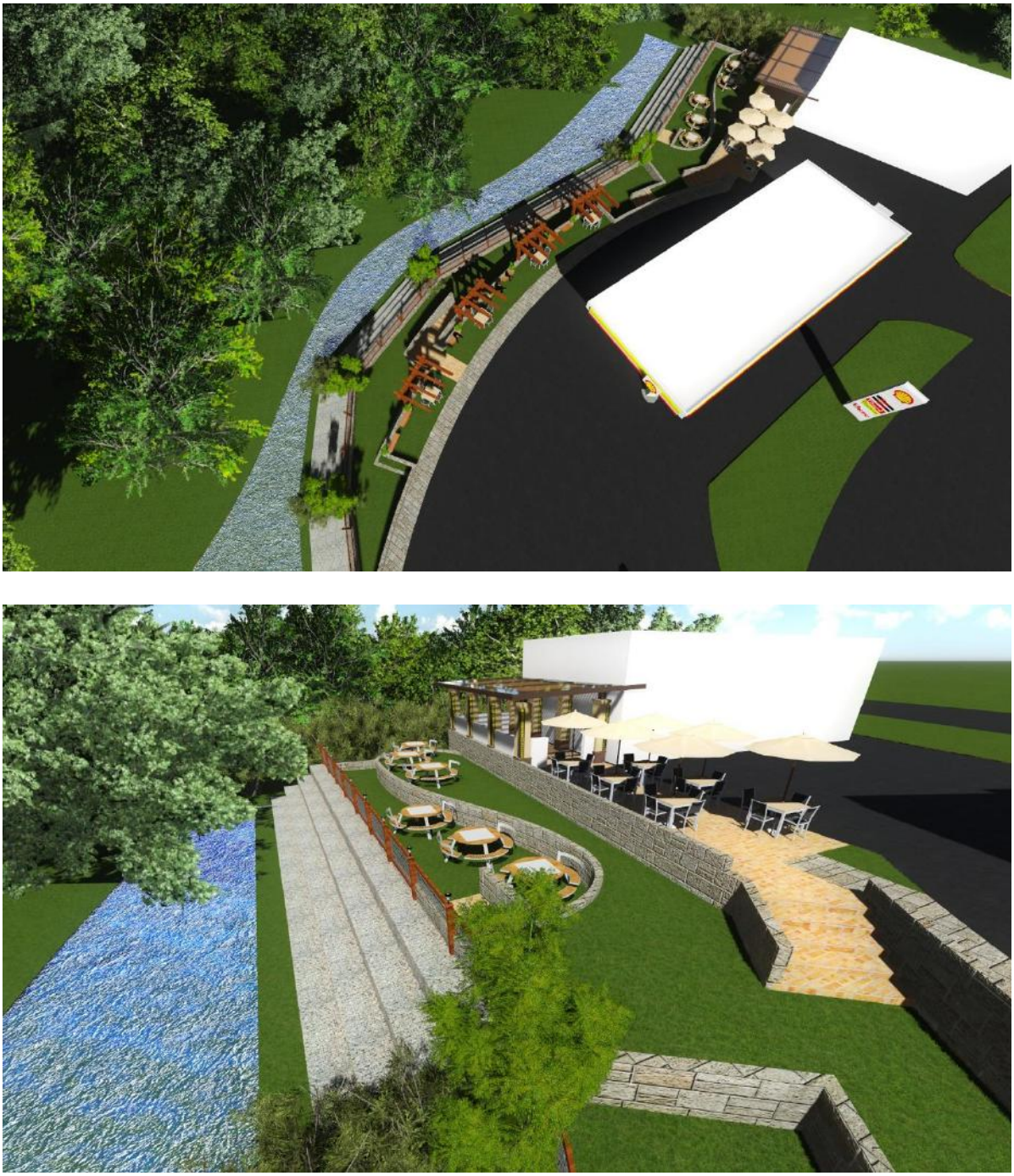


Photo 3 & 4: The proposed Kileleshwa Shell Service station

The building plans were designed and drawn by KENT AFRICA LIMITED, Nairobi. All the necessary Physical Planning regulations such as plot ratio and plot coverage's were taken into account by the consultant during the design of the proposed development project.

2.5 Re-construction Raw Materials

The construction phase of this project will utilize a lot of inputs and raw materials. The proponent and contractor are expected to procure building materials from licensed dealers. Besides, they must meet both local and international safety and quality standards. Main inputs during construction include building blocks, sand, gravel, hand-cut construction stones, and timber for making structural formwork and interior design, and floor tiles. Others are pre-cast units for drains, PVC pipes for sewer and water reticulation, roofing sheets, water tanks and gutters. Window casement and glasses, earthmovers, spades and other hand held tools are also to be used during construction.

2.6 Technology and Activities

The contractor shall employ modern and best building technologies. They should not be inferior to locally and internationally established building standards. Construction of these units will involve ground excavations; making foundations; building courses; and roofing. This will be followed by fixing water pipes, connection to the sewer system and furnishing the building.

2.7 Description of the Project's Re-construction Activities.

2.7.1 Excavation

In order to prepare the site for and reconstruction of the building, some minimal excavations may be carried out since much of the infrastructure including the Underground Storage Tanks (UST), fuel pumps, piping, among others are already installed and functional. Further, all the installed infrastructural facilities including underground fuel tanks, filler pumps, piping, dispensing units, among others all meet the nationally required Kenya Bureau of Standards (KEBS) standards as well as Internationally required standards.

2.7.2 Foundation and Masonry

Completion of excavations will be followed with setting a foundation for the service station. Thereafter masonry which entails building courses, ground floors, pavements, and drainage systems, shall take place. Other masonry activities include concrete mixing, and plastering, slab construction, reinforcing walls/lintels and curing of walls.

2.7.3 Roofing

The service station shall have roofs with steel structure and iron sheets.

2.7.4 Electrical Works

Electrical work during will involve installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets among others. In addition, there will be other activities involving the use of electricity such as welding and metal cutting.

2.7.5 Plumbing

Plumbing will entail fixing pipes water pipes and conduits within the floors. Likewise, storm water will be channeled to a peripheral storm water drainage system. Plumbing activities include metal and plastic cutting, the use of adhesives, metal grinding and wall drilling among others.

2.7.6 By-Products and Disposal Methods

During the reconstruction of the proposed service station project, some waste and other by products are usually produced on the project site. They include; broken glasses, pieces of broken tiles, nails, pieces of broken wood, and pieces of roofing materials among others. The contractor will emphasize on efficiency to minimize generation of construction wastes.

Hence, regular removal and disposal of such construction and related wastes to a void accumulation, unsightliness, and public nuisance by a registered and licensed waste handler for sound disposal is recommended. The contractor shall therefore work hand in hand with the waste handlers from Nairobi County to facilitate waste handling and sound disposal from the site to licensed and approved waste disposal dumping sites.

2.8 Staff Amenities

2.8.1 Site Office

The proponent is to construct a modest site office and a sample materials store with iron sheet walls and timber framing and concrete floor. The roof will be made using iron sheets whereas the ceiling board will be constructed using soft board on timber framing.

2.8.2 Site Workers' Toilets

The proponent will put up semi-permanent toilets within the premises to be used by the construction staff. The foul water drainage will be connected to the sewerage system on site.

2.8.3 Material Storage and Handling

All materials to be used shall conform to the Kenya Bureau of Standards (KEBS) requirements for quality or equal and approved.

2.8.4 Non-Hazardous Materials

The store for non-hazardous materials will be accommodated within the site office. Materials to be stored in this store shall include samples for review by consultants and inspectors.

2.8.5 Hazardous Materials

Hazardous materials shall include paints, oil, grease and fuel. The store for these materials shall have iron sheet walling and roof and a waterproof concrete floor to contain spills. Storage and handling of all Hazardous chemicals shall be in accordance with manufacturer's instructions as outlined on the material safety data sheets.

2.8.6 Bulk Construction Materials

The bulk materials to be stored on site include: sand, ballast, stones, cement, quarry chips and timber. These materials will be sourced from local suppliers within Nairobi and neighboring environs.

2.9 Description of the Service Station's Operational Activities

Completion of re-construction activities will be followed by use of the service station by residents and motorists. Both solid and liquid wastes will be produced during this phase of the project. Effluent from toilets and washrooms will be discharged into the existing sewer line that joins the main Nairobi Water and Sewage Company Sewer line system. Storm water will be conveyed to the county's storm water drainage system.

The proponent will observe the EMCA (Waste Management Regulations, 2006). Receptors/litterbins will be placed at strategic positions in all floors of the building for temporary storage of general solid wastes.

Viable alternatives to handle these wastes are use of septic tanks and connection to the existing sewer system via well designed drainage system networks. An Oil Interceptor shall be constructed along the drainage system to trap sediments and grease/ oils in the service station premises. Grease, oil spills and detergents could lead to contamination of surface water sources and soils.

2.10 Project's Decommissioning Activities

Decommissioning will also entail restoring the project area to its original state. During decommissioning, buildings, pavements, drainage systems, parking areas and perimeter fence will be demolished in order to restore land to its original state. Different kind of workers and equipment shall be deployed to carry out these tasks. This will produce a lot of construction waste, which will be reused for other construction works or if not reusable, disposed off appropriately by a licensed waste disposal company. It will be upon the proponent and the contractor to ensure restoration is done in an orderly manner.

2.11 Total Project Costs and Duration

The total project cost **KShs 44,263,568.84** (Forty four million, two hundred sixty-three thousand, five hundred sixty-eight shillings and eighty-four cents). This cost includes construction cost, cost of labor, professional fees and **VAT**.

CHAPTER THREE: BASELINE INFORMATION OF THE STUDY AREA

3.1 Introduction

Baseline information (background information on the biophysical, social and economic settings) is important reference point for conducting EIA. Baseline data is essential for the assessment of the potential impacts of the project. The conditions of the natural environment forms a basis for the selection by planners of the area to be developed for various land uses for the sustainability of the proposed project and therefore evaluation of the baseline information is important in understanding the existing environmental set up. The main objective of baseline information is to provide adequate and accurate environmental baseline information and this can be broken down as follows:

- To provide a description of the status and trends of environmental factors, against which predicted changes can be compared and evaluated in terms of importance
- To provide a means of detecting actual change by monitoring once the project is implemented.

3.2 Location of the Project

The project is located on co-ordinates 1° 16' 28.9812" S and 36° 47' 59.2548" E on **Plot L.R No.** 4858/16 Kileleshwa, located along Ring Road, in Dagoretti North Constituency, Nairobi County. Below is the project site

Photo 5: The current project site

3.3 Topography

Nairobi County lies within the latitudes 1°9'N and 1°28'S, and longitudes 36°4'W and 37°10'E. It is located 30 km to the east of the Great Rift Valley and occupies an area of about 696km^2. Altitude varies between 1600 and 1850 meters above sea level. There is however an eastward slope of land with maximum altitude of 2300m in the northwest and 2000m in the southwest. The western part of Nairobi is on high ground of the Kikuyu highlands that rise from an altitude of between 1600-1800 meters with rugged topography. The eastern side is generally low, approximately 1600 meters, and flat.

The physiography of Nairobi is consequent upon the volcanic rocks found and the tectonic movements which have affected them. It is part of the lava plains that are bordered to the north-west and west by the Kikuyu highlands, an extension of the high ground of the eastern flank of the Rift Valley; and to the south-west by the Ngong hills. The Kikuyu highlands are characterized by a steep downward slope in an easterly direction. The northern boundary between the two physiographic units of the Kikuyu highlands and the plains is roughly along the east-west line across the Nairobi city center. The plains are made up of two parts, i.e. the Athi plains and the northern section of the Kapiti plains, both of which extend further southwards and eastwards.

3.4 Climate and Meteorology

The project lies in Kileleshwa, Dagoretti North Constituency, Nairobi County which has a temperate tropical climate with two rainy seasons. The highest rainfall is received between March and April and the short rainy season is between November and December. The average annual rainfall in Nairobi is about 900m, but the actual amount in any one year may vary from less than 500 mm to more than 1900 mm and the seasons of rainfall coincide approximately with the time of changeover of the monsoon currents which affect Eastern Africa, the South-West Monsoon becoming established in April, and north-east monsoon in November.

The average daily temperatures in Nairobi varies only from about 17°C during July and August to 20°C in March, the daily range of temperature is quite large, averaging about 10°C in May and 15°C in February. These leads to Nairobi having an annual average temperature maximum of 24.9°C and an average minimum of 13.3°C and average mean relative humidity value is 78.3% in the morning and 50.5% in the afternoons.

3.4.1 Winds

The wind near the ground is very predominantly easterly throughout the year, generally between north-east and east from October to April, and between east and south-east from May to September. The strongest winds occur during the dry season just prior to the "Long Rains" when speeds of 20 to 25 mph are common from mid-morning to early afternoon; at other times of the year winds speeds are usually 10 to 15 mph. During the night the wind is usually light. In the squalls sometimes associated with thunderstorms, short-lived of up to 70 mph. have been known to occur.

3.4.2 Precipitation

Nairobi has a bimodal rainfall pattern, in which the maxima occur in March-April (long rains) and November-December (short rains). This simple rainfall regime is complicated by the uncertainty of rainfall from year to year. Thunderstorms may occur, nearly always during the afternoon or evening, during most months of the year but they are rare during the period June/August. Hail is comparatively rare in Nairobi, being reported on average less than once a year unlike other areas such as the western part of Kenya.

3.4.3 Sunshine and Solar Radiation

Nairobi experiences a total of about 2,500 hours of bright sunshine per annum, which is equivalent to an annual mean of approximately 6.8 hours of sunshine per day. July and August are characterized by cloudiness and during these months the average daily sunshine in Nairobi is 4 hours. Often there are several days in succession when the sun fails to penetrate the thick stratocumulus cover, although on other days the cloud cover does break for a short period. There is about 30% more sunshine in the afternoon than in the morning, and it follows that westerly exposures receive more insulation than easterly ones.

3.4.4 Ambience and Air Quality

The project area lies in Nairobi, an urban area, where the major sources of air pollution are as a result of industrial, construction, increased development activities and their related amenities (majorly cars). However the project area falls out of the central business and industrial districts thus enjoys better air quality and this forms part of the reason as to why the area is majorly residential.

3.5 Geology

The project and its surrounding area lie in Nairobi which is covered mainly by Tertiary volcanic material overlying folded Precambrian Basement System rocks of the Mozambique Belt. The youngest Tertiary rocks are the Limuru Trachytes, which are subsequently underlain by Kerichwa Valley Tuffs, Nairobi Trachytes, the Athi Series and the Kapiti Phonolites. In Nairobi lava sheets from subsequent lava flows are superimposed on top of each other and on outcrop they form extensive and remarkably flat volcanic terraces, such as the Embakasi Plains (Nairobi Phonolites), Athi Plains (Mbagathi Phonolitic Trachytes), the Karen-Langata and Kilimani-Lavington Areas (Nairobi Trachytes) and Kapiti Plains (Kapiti Phonolites).

Weathering from this Tertiary period resulted in Old Land Surfaces which have the characteristic reddish-brown color inherent of the soil in the project area. Aquifers were formed when the lava flows produced voids in permeable and semi-permeable lava series due to joints and fractures. The geological history of Nairobi has been dominated by volcanic activity since Miocene times. These areas are currently underlain by a series of volcanic rocks as a result of successive lava flows that originated from centers and fissures on the high eastern flank of the Rift region to the west. The main rocks exposed in the area and its surroundings are:

- Basement system (Precambrian metamorphic rocks of the Mozambique Belt),
- Tertiary volcanic and sediments,
- Pleistocene sediments, and
- Recent deposits

3.6 Soil Types

The soils of the Nairobi region consist of red soils that increase in their depth westwards and north-westwards from about 4 m at the City center to over 10 m in the vicinity of the Rift Valley. Other soils include alluvium, clays and swamp soils occupying former river valleys or swamps. The main types of soil in the project area region are silty clays of moderate to high plasticity. Other soils are sandy-clayey silt with thixotrophic characteristics.

3.6.1 Soil Laboratory Analysis

To establish the baseline status of the soils at the site, soil samples were collected for TPH analysis. The analysis result shows that the sample has got low levels of organic carbon, Nitrogen, Pentanes and Benzene. These are within the permissible limits indicating that this site has not been impacted

by petroleum products as shown in the Appendices. Further, there are monitoring wells at the existing service station and so far there is no leakage from the underground storage tanks. Micronutrients are sufficiently supplied in the soil samples. There is no limitation to the establishment of the proposed petrol station hence highly recommended.

3.7 Drainage and Hydrology

The main drainage in Kileleshwa as that of Nairobi, is consequent upon the regional topography and prevailing slope of the volcanic rocks. Nairobi is characterized by two main drainage basins. The Nairobi River and its tributary valleys (Kirichwa Kubwa, Kirichwa Ndogo, Gitathuru and Mathare) dissect and drain the northern and north-western parts; while the tributaries of Athi River (Sosian, Makoyeti, Ormanya, Donga and Mbagathi valleys) drain the southern and south-western parts.

River Rui Ruaka also drains the northwest and is joined by the Karura stream before it enters Nairobi River at a point about 2.5 km off Dandora railway station. The Nairobi sub-basin drains eastwards, while the flow in the Athi river basin is mainly to the south and south-east. A smaller sub-basin occurs mid-way across Nairobi and consists of the Ngong River and its tributary of Motoine valley both of which flow eastwards. The uplifting and deposition of volcanic materials have given rise to streams that are characterized by young valleys with steep gradients and narrow and/or sharp V-shapes in the north-western and western parts.

The rapid down-cutting, together with the relatively soft character of the younger volcanic rocks have resulted in the streams flowing in generally parallel courses, with limited instances of river capture. The streams are most active during the period of heavy rains and head-ward erosion of gullies and tributaries is common. The transported load is mainly a result of erosion of the thick soil cover which gives rise to flowing streams of red mud.

3.7.1 Water Laboratory Analysis

To establish the baseline status of the water at the site, water samples were collected for TPH analysis. The analysis result shows that the sample has got low levels of organic carbon, Nitrogen, Pentanes and Benzene. These are within the permissible limits indicating that this site has not been impacted by petroleum products as shown in the Appendices. Further, there are monitoring wells at the existing service station and so far there is no leakage from the underground storage tanks.

Photo 6: A section of Kirichwa River flowing at the periphery of the project site

Photo 7: The riparian are and the WARMA beacons marking the 10 m riparian reserve

Photo 8 & 9: The WARMA beacons marking the 10 m riparian reserve

3.8 Demographic Features

Nairobi County's population projections in 2009, 2018, 2020 and 2022 based on the 2009 Kenya Population and Housing Census by age cohort and gender with an inter-censual growth rate of 3.8 per cent. In 2009, the County population was projected to be 3,138,369 and is expected to rise to 4,941708 in 2018, 5,433,002 in 2020 and 5,958,338 in 2022 respectively.

3.9 Infrastructure Development

3.9.1 Road, Railway Network and Airports

The current road network in the County is inadequate in terms of coverage to meet current and future demands as envisaged in the Vision 2030. There is heavy congestion on most of the City's roads especially during the morning and evening peak hours. The total road network covers 3,602 Km out of which 1,735 Km are tarmac while 1867 Km are earth roads.

Nairobi County hosts three airports; Jomo Kenyatta International Airport, Wilson Airport and Eastleigh Airport. Jomo Kenyatta International Airport (JKIA) is the biggest airport in East and Central Africa, and is the focal point for major aviation activities in the region.

The County has a railway network of 75 Km and a total of 10 functional railway stations which are: Embakasi, Makadara, and Nairobi main terminal, Dandora, Githurai, Kahawa, Kibra, Dagoretti, JKIA and Syokimau. The established Makadara and Imara Daima railway stations and expansion of Nairobi platform has improved public transportation in Nairobi and with it socio-economic development.

Photo 10 & 11: Section of Ring Road serving the project area

3.9.2 Information and Communication and Technologies

Posts and telecommunication sub-sector has experienced mixed growth in the recent past. While the County has 38 post office branches, the growth of postal services has been declining due to increase in penetration of mobile telephony and internet. Mobile telephony has the highest coverage in Nairobi compared to other parts of the country with over 95 per cent of the inhabitants having access to mobile communication.

The players engaged in mobile telecommunication include: Safari-com, Airtel, Telkom, and Orange while those in mailing services include Kenya Postal Corporation, Group 4 Securities (G4S), DHL and Wells Fargo among others.

3.9.3 Waste Water and Sewer Line System

Completion of the re-construction activities will be followed by use of the service station by Kileleshwa and Nairobi County residents and motorists. Both solid and liquid wastes will be produced during this phase of the project. To manage solid wastes, the proponent will avail litterbins/receptacles within the service station premises for temporary storage awaiting sound disposal.

There is an existing 900mm diameter trunk NCWSC sewer line which runs along the line of Ring road adjacent to the service station where effluent from toilets and washrooms will be discharged into. Storm water will be conveyed to the NCWSC's storm water drainage system.

A segregated drainage system shall be provided by the proponent where water contaminated with oils drains to instead of draining into the open storm drains. The contaminated water will be directed into an oil-water separator from where it should be treated before it is released to the rest of the drainage system. For this purpose, an interceptor tank made up of reinforced concrete walls and floor shall be constructed and its inner walls shall be plastered with water proof cement. (Each chamber shall have a manhole with a reinforced concrete cover).

Photo 12 & 13: NCWSC's storm water drainage system at the project site

3.10 Energy Access

The main sources of energy in Nairobi County are electricity, solar, liquefied petroleum gas (LPG), biogas, paraffin, charcoal and firewood. Lack of access to clean sources of energy is a major impediment to development due to health related complications such as increased respiratory infections and air pollution.

For instance, 63.2 % of the population use paraffin as cooking fuel. Other sources of energy for cooking include LPG (20.2 %), charcoal (10.5 %) and firewood (1.8 %). About 68.2 % of households use electricity as a means of lighting 28.8 % use paraffin while 2.9 % and 1.7 % use grass and dry cells respectively.

There is adequate power infrastructure within the vicinity of the proposed site that can be reinforced by KPLC for the provision of the power requirements of the proposed project. Two diverse incoming 11kV overhead lines to a new 11kV Switch room will be erected for the proposed service station development.

Photo 14: Electricity supply right at the site

3.11 Housing Types

Materials used in the construction of dwelling units are an indicator of housing conditions and the extent to which they protect occupants from the elements and other environmental hazards. Availability of materials, cost, weather and cultural conditions have a major influence on the type of materials used in different localities. The housing type by wall materials in Nairobi County is mainly characterized by stone, brick/block, mud/wood and corrugated iron sheet. The stone and block walled houses are 65.9 % while wood and corrugated iron sheet are 31.1 %. The classification by floor type indicates that 75.8 % of household have cement floor, 14.2 % earthen floor, 7.5 % tiles and 2.2 % for those with wooden floor. Most of the households in Nairobi have corrugated iron sheet roofed houses which accounts for 56.6 %. Tiles and concrete roofs account for 12.4 % and 27.9 % respectively.

Photo 15 & 16: Housing around the project site

3.12 Land and Land Use

Industrial and commercial land has dwindled in the last decade and many industries have been relocating to other counties particularly Machakos. The projected housing land requirement is estimated to be 250 Km^2. Land meant for urban agriculture has been on the decline as more of it is turned to residential use with the City relying on other counties for supply of food. Industries are largely concentrated in Industrial Area, Kariobangi South and Baba Dogo.

3.13 Vegetation

The proposed site on the former Kileleshwa Shell service station premises, an already developed site formerly consisting of restaurant, and underground fuel tanks among other service station facilities and infrastructure. There are no trees to be cut down.

3.14 Tourism and Wildlife

Nairobi County is a major center of tourism in the region. Its relative proximity to many tourist attractions areas both in Kenya and East Africa makes it an asset of great importance in the tourism sector. As the capital city and commercial center, it attracts many business and leisure tourists. This is partly because the Jomo Kenyatta International Airport (JKIA), the main point of entry to Kenya by air, is located in the County.

3.14.1 Main Tourist Attractions, National Parks and Reserves

Nairobi County has major parks and museums which serve as the main tourist attraction and activities centers. The main national parks are Nairobi National Park, Nairobi Safari Walk and Nairobi Mini Orphanage. The Nairobi Safari Walk is a major attraction to tourists as it offers a rare foot experience for wildlife viewing.

The County boasts of the Nairobi National Museum which houses a large collection of artifacts portraying Kenya's rich heritage through history, nature, culture and contemporary art. Other important museums include Nairobi Gallery and the Nairobi Snake Park.

CHAPTER FOUR: POLICY, LEGISLATIVE AND INSTITUTIONAL FRAMEWORKS

4.1 General Overview

Kenya has a policy, legal and administrative framework for environmental management. Under the framework, the National Environment Management Authority (NEMA) is responsible for ensuring that environmental impact assessments (EIAs) are carried out for new projects and environmental audits on existing facilities as per the Environmental Management and Coordination Act 1999. EIAs are carried out in order to identify potential positive and negative impacts associated with the proposed project with a view to taking advantage of the positive impacts and developing mitigation measures for the negative ones.

The government has established regulations to facilitate the process on EIAs and environmental audits. This in accordance with the requirements and provisions of the Constitution of Kenya under Part VI, Section 58 of the Environmental Management and Coordination Act No. 8 of 1999 and Regulation 10 of the Environmental (Impact Assessment and Audit) Regulations, 2003 Legal Notice No. 101 and Legal Notice 15 of the Environmental (Impact Assessment and Audit) Regulations, 2016. In the past, the government has established a number of National policies and legal statutes to enhance environmental conservation and sustainable development.

The proponent will need to observe the provisions of the various statutes that are aimed at maintaining a clean, healthy and sustainable environment. Some of the policy, legal and institutional provisions are explained in the following sub sections

4.2 Policy Framework

The Kenya Government policy on all new projects, plans, programs or activities requires that an Environmental Impact Assessment is carried out at the planning stages of the proposed development. This is to ensure that significant potential impacts on the environment and health are taken into consideration during the design, construction, operation, and decommissioning of the facility. The EIA report will include but not limited to the following information:

- Human Environment: socio-economic, socio-cultural and socio-legal aspects.
- Built Environment: material assets.

- Natural Environment: flora, fauna, soil, water, air, climate, landscape, historical landmarks, archeological and ecological aspects.

Environmental policies cut across all sectors and government departments. As such policy formulation should be consultative steered by interdisciplinary committees.

4.2.1 National Environmental Action Plan (NEAP)

National Environmental Action Plan was a deliberate policy effort to integrate environmental concerns into the country's development initiatives/plans. This assumed a consultative and multi-sectoral approach. Such an approach ensured that environmental management and the conservation becomes integral in various decision making platforms.

As a result of its adoption and implementation, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been and/or are in the process of development. Under the NEAP process, Environmental Impact Assessments were introduced targeting the industrialists, business community and local authorities.

4.2.2 National Shelter Strategy to the Year 2000

Kenya adopted this strategy following the International Year of Shelter for the Homeless in 1987. This advocates for the involvement of various actors to come in and assist the government in providing housing. This took cognizance of the governments' inability to provide sufficient shelter for all its citizens. The government was to simply facilitate other actors such as developers to invest in shelter.

4.2.3 National Policy on Water Resources Management and Development

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

In addition, the policy provides for charging levies on waste water on the basis of quantity and quality. The "polluter-pays-principle" applies in which case parties contaminating water are required to meet the appropriate cost of remediation. Consequently, to ensure water quality, the policy provides for establishment of standards to protect water bodies receiving wastewater, a

process that is ongoing. The standards and measures to prevent pollution to water resources are provided for in the Environmental Management and Coordination (Water Quality) Regulations, 2006 which is a supplementary legislation to EMCA, 1999.

4.2.4 Policy Paper on Environment and Development (Sessional Paper No. 6 of 1999)

The key objectives of the Policy include: -

- To ensure that from the onset, all development policies, programmes and projects take environmental considerations into account,
- To ensure that an independent environmental impact assessment (EIA) report is prepared for any industrial venture or other development before implementation,
- To come up with effluent treatment standards that will conform to acceptable health guidelines.

Under this paper, broad categories of development issues have been covered that require a "sustainable development" approach. These issues relate to waste management and human settlement. The policy recommends the need for enhanced re-use/recycling of residues including wastewater, use of low or non-waste technologies, increased public awareness and appreciation of a 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.

4.3 Environmental Legal Framework

4.3.1 The Constitution of Kenya

The Constitution of Kenya bestows the right to a clean and healthy environment, which includes the right:

a. To have the environment protected for the benefit of present and future generations through legislative and other measures, particularly those contemplated in Article 69; and
b. To have obligations relating to the environment fulfilled under Article 70.

69. (1) The State shall:

a. Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;

b. Encourage public participation in the management, protection and conservation of the environment;
c. Protect genetic resources and biological diversity;
d. Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;
e. Eliminate processes and activities that are likely to endanger the environment; and
f. Utilize the environment and natural resources for the benefit of the people of Kenya.

(2) Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

70. (1) If a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same matter.

(2) On application under clause (1), the court may make any order, or give any directions, it considers appropriate:

a. To prevent, stop or discontinue any act or omission that is harmful to the environment;
b. To compel any public officer to take measures to prevent or discontinue any act or omission that is harmful to the environment; or
c. To provide compensation for any victim of a violation of the right to a clean and healthy environment.

(3) For the purposes of this Article, an applicant does not have to demonstrate that any person has incurred loss or suffered injury.

48. The State shall ensure access to justice for all persons and, if any fee is required, it shall be reasonable and shall not impede access to justice.

4.3.2 Environmental Management and Co-ordination Act No. 8 of 1999. Cap 387

This EIA project report has been undertaken in accordance with the provisions of Section 58 of Environment Management and Coordination Act, 1999 and subsequent EMCA (Environmental Impact Assessment /Environmental Audit regulations, 2003). Part II of EMCA, 1999 states that

every person is entitled to a clean and healthy environment and had the duty to safeguard the same. In this regard, development proposals should not compromise the quality of the environment. Section 58 of EMCA No.8 of 1999 and EIA/EA regulations, 2003 underscore the need for environmental impact assessments for development activities such as this new commercial development.

The Environment Management and Coordination Act (EMCA), 1999 provides for the establishment of an umbrella legal and institutional framework under which the environment in general is to be managed. EMCA is implemented by the guiding principle that every person has a right to a clean and healthy environment and can seek redress through the High court if this right has been, is likely to be or is being contravened. Entitlement to a clean and healthy environment in:

1. Every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment.
2. The entitlement to a clean and healthy environment under subsection (1) includes the access by any person in Kenya to the various public elements or segments of the environment for recreational, educational, health, spiritual and cultural purposes.
3. If a person alleges that the entitlement conferred under subsection (1) has been, is being or is likely to be contravened in relation to him, then without prejudice to any other action with respect to the same matter which is lawfully available, that person may apply to the High Court for redress and the High Court may make such orders, issue such writs or give such directions as it may deem appropriate to—
    a. Prevent, stop or discontinue any act or omission deleterious to the environment;
    b. Compel any public officer to take measures to prevent or discontinue any act or omission deleterious to the environment;
    c. Require that any on-going activity be subjected to an environment audit in accordance with the provisions of this Act;
    d. Compel the persons responsible for the environmental degradation to restore the degraded environment as far as practicable to its immediate condition prior to the damage; and

e. Provide compensation for any victim of pollution and the cost of beneficial uses lost as a result of an act of pollution and other losses that are connected with or incidental to the foregoing.

4. A person proceeding under subsection (3) of this section shall have the capacity to bring an action notwithstanding that such a person cannot show that the defendant's act or omission has caused or is likely to cause him any personal loss or injury provided that such action—
    a. Is not frivolous or vexatious; or
    b. Is not an abuse of the court process
5. In exercising the jurisdiction conferred upon it under subsection (3), the High Court shall be guided by the following principles of sustainable development—
    a. The principle of public participation in the development of policies, plans and processes for the management of the environment;
    b. The cultural and social principles traditionally applied by any community in Kenya for the management of the environment or natural resources in so far as the same are relevant and are not repugnant to justice and morality or inconsistent with any written law;
    c. The principle of international co-operation in the management of environmental resources shared by two or more states;
    d. The principles of intergenerational and intra-generational equity;
    e. The polluter-pays principle; and
    f. The pre-cautionary principle

4.3.2.1 The EMCA (Water Quality) Regulations, 2006

These Regulations were published in the Kenya Gazette Supplement No. 68, Legislative Supplement No. 36, and Legal Notice No. 120 of 29th September, 2006. The Regulations provides for sustainable management of water resources including prevention of water pollution and protection of water sources (lakes, rivers, streams, springs, wells and other water sources).

Regulation No. 14 (1) requires every licensed person generating and discharging effluent into the environment to carry out daily effluent discharge quality and quantity monitoring and to submit quarterly records of such monitoring to the Authority or its designated representatives.

The proponent will have to ensure that appropriate measures to prevent pollution of underground and surface water are implemented throughout the project cycle.

4.3.2.2 The EMCA (Waste Management) Regulations, 2006

These Regulations were published in the Kenya Gazette Supplement No. 69, Legislative Supplement No. 37, and Legal Notice No. 121 of 29th September, 2006. The regulations provide details on management (handling, storage, transportation, treatment and disposal) of various waste streams including:

- domestic waste
- industrial waste,
- hazardous and toxic waste
- pesticides and toxic substances
- biomedical wastes and
- radioactive waste

Regulation No. 4 (1) makes it an offence for any person to dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.

The proponent shall ensure that the main contractor adopts and implements all possible cleaner production methods during the construction phase of the project.

Regulation 6 requires waste generators to segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal.

Regulation 14 (1) requires every trade or industrial undertaking to install at its premises anti-pollution equipment for the treatment of waste emanating from such trade or industrial undertaking.

Regulation 15 prohibits any industry from discharging or disposing of any untreated waste in any state into the environment.

Regulation 17 (1) makes it an offence for any person to engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by NEMA.

Regulation 18 requires all generators of hazardous waste to ensure that every container or package for storing such waste is fixed with a label containing the following information:

- The identity of the hazardous waste
- The name and address of the generator of waste
- The net contents
- The normal storage stability and methods of storage
- The name and percentage of weight of active ingredients and names and percentages of weights of other ingredients or half-life of radioactive material
- Warning or caution statements which may include any of the following as appropriate- The words "WARNING" or "CAUTION"

Regulation 19 (1) requires every person who generates toxic or hazardous waste to treat or cause to be treated such hazardous waste.

The proponent shall ensure that the main contractor implements the above mentioned measures as necessary to enhance sound environmental Management of waste.

4.3.2.3 The Occupational Safety and Health Act, 2007

This is an act of Parliament to provide for the safety, health and welfare of 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. The Act was published in the Kenya Gazette Supplement No. 111 (Acts No.15). It received presidential assent on 22nd October, 2007 and became operational on 26th October, 2007.

The key areas addressed by the Act include:

a) General duties including duties of occupiers, self-employed persons and employees
b) Enforcement of the act including powers of an occupational safety and health officer
c) Registration of workplaces.
d) Health General Provisions including cleanliness, ventilation, lighting and sanitary conveniences
e) Machinery safety including safe handling of transmission machinery, hand held and portable power tools, self-acting machines, hoists and lifts, chains, ropes & lifting tackle,

cranes and other lifting machines, steam boilers, air receivers, refrigeration plants and compressed air receiver

f) Safety General Provisions including safe storage of dangerous liquids, fire safety, evacuation procedures, precautions with respect to explosives or inflammable dust or gas
g) Chemical safety including the use of material safety data sheets, control of air pollution, noise and vibration, the handling, transportation and disposal of chemicals and other hazardous substances materials
h) Welfare general provisions including supply of drinking water, washing facilities, and first aid
i) Offences, penalties and legal proceedings

Under section 6 of this act, every occupier is obliged to ensure safety, health and welfare of all persons working in his workplace.

The proponent will be required to ensure that the main contractor includes in the contract document, adequate measures to promote safety and health of workers.

4.3.2.4 Noise and Vibration Pollution (Control) Regulations, 2009

These regulations were published as legal Notice No. 61 being a subsidiary legislation to the Environmental Management and Co-ordination Act, 1999. The regulations provide information on the following:

a) Prohibition of excessive noise and vibration
b) Provisions relating to noise from certain sources
c) Provisions relating to licensing procedures for certain activities with a potential of emitting excessive noise and/or vibrations and
d) Noise and excessive vibrations mapping.

Regulation 5 further makes it an offence for any person to make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property.

Regulation 12 (1) makes it an offence for any person to operate a motor vehicle which- *(a)* produces any loud and unusual sound; and *(b)* exceeds 84 dB(A) when accelerating. According to

sub regulation 2 of this regulation, No person shall at any time sound the horn or other warning device of a vehicle except when necessary to prevent an accident or an incident.

Regulation 16 (1) stipulates that 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. According to regulation 18 (6), the license shall be valid for a period not exceeding seven (7) days.

The project proponent will be required to comply with the above mentioned regulations in order to promote a healthy and safe working environment.

4.3.3 Public Health Act Cap 242

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. As such, proponents and contractors of housing projects should ensure that health and safety concerns of workers, neighboring communities and occupants of the building are taken into consideration.

4.3.4 Physical Planning Act, 1999

Physical Planning Act, 1999 gives the local authority power to prohibit or control development activities in their jurisdictions. Section 30 states 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.

Finally, section 36 states that if development with a development action, local authority is of the opinion that the proposed development activity will have injurious impacts on the environment, the applicant will be required to submit together with the application the EIA report.

4.3.5 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 into sewers. The code also prohibits construction of structures or building on sewer lines.

4.3.6 Water Act, 2002

The water act No. 8 of 2002 provides for the management, conservation, use and control of water resources and for acquisition and regulation of rights to use water; to provide for the regulation and management of water supply and sewerage services.

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

Section 73 of the Act provides that a person who is licensed to supply water has a responsibility of safeguarding the water sources against degradation. According to section 75 (1) such a person is required to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing pollution of water sources within his/her jurisdiction.

4.3.7 The County Governments Act, 2012

An Act of Parliament giving effect to Chapter Eleven of the Constitution; to provide for county governments' powers, functions and responsibilities to deliver services and for connected purposes Section 102 of the Act: The principles of planning and development facilitation empowers the County to

a) Integrate national values in all processes and concepts;
b) Protect and develop natural resources in a manner that aligns national and county government's policies;

Section 103 of the Act: The objectives of county planning shall be to—

a) Ensure harmony between national, county and sub-county spatial planning requirements;

b) Facilitate the development of a well-balanced system of settlements and ensure productive use of scarce land, water and other resources for economic, social, ecological and other functions across a county;
c) Maintain a viable system of green and open spaces for a functioning eco-system;
d) Protect the historical and cultural heritage, artefacts and sites within the county;
e) Make reservations for public security and other critical national infrastructure and other utilities and services;
f) Work towards the achievement and maintenance of a tree cover of at least ten per cent of the land area of Kenya as provided in Article 69 of the Constitution.

Section 104 of the Act: Obligation to planning by the county.

a) The county planning framework shall integrate economic, physical, social, environmental and spatial planning.
b) The county government shall designate county departments, cities and urban areas, sub-counties and Wards as planning authorities of the county.
c) To promote public participation, non-state actors shall be incorporated in the planning processes by all authorities.
d) County plans shall be binding on all sub-county units for developmental activities within a County.

4.3.8 The Penal Code (Cap. 63)

Section 191 of the Penal Code makes it an offence for any person or institution that voluntarily corrupts, or foils water for public springs or reservoirs rendering it less fit for its ordinary use. Similarly, section 192 of the same act prohibits making or vitiating the atmosphere in any place to make it noxious to health of persons/institution in dwellings or business premises in the neighborhood or those passing along a public way.

The proponent will be required to ensure strict adherence to the Environmental Management Plan throughout the project cycle in order to mitigate against any possible negative impact.

4.3.9 Petroleum Act, Cap. 116

The legislation has noted several challenges that face the sector which include proliferation of substandard Petroleum Products dispensing and storage sites which pose environment health and safety risks; diversion of petroleum products destined for export into the local market by

unscrupulous business people to evade tax and a dominance of the market by a few companies among others.

The Government noted these challenges in its energy policy contained in Session Paper No. 4 of 2004 on Energy and recommended review of the Petroleum Act Cap 116 and other energy sector statutes and the introduction of a new energy sector legislation to cover petroleum, electricity and renewable energy. It also recommended the formation of a single energy sector regulator to regulate electricity, downstream petroleum, renewable energy and other forms of energy.

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

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

4.3.10 The Energy Act, 2019

In March 2019, the Energy Act of 2019 was enacted. This led to the transformation of the then Energy Regulatory Commission (ERC) to the Energy and Petroleum Regulatory Authority (EPRA), The Energy Tribunal transformed to The Energy and Petroleum Tribunal (EPT), The Rural Electrification Authority transformed to Rural Electrification and Renewable Energy Corporation (REREC)/ Renewable Energy Resource Advisory Committee (RERAC) and the Kenya Nuclear Electricity Board transformed to Nuclear Power and Energy Agency (NPEA) to regulate petroleum and renewable energy sectors in addition to electricity.

The Act is to consolidate the laws relating to energy, to provide for National and County Government functions in relation to energy, to provide for the establishment, powers and functions of the energy sector entities; promotion of renewable energy; exploration, recovery and commercial utilization of geothermal energy; regulation of midstream and downstream petroleum

and coal activities; regulation, production, supply and use of electricity and other energy forms; and for connected purposes.

Construction Permits are also to be issued by ERC (now, EPRA), for all petroleum related facilities in order to check proliferation of substandard sites. All petroleum operators are required to comply with provisions for Environment Health and Safety. Petroleum products should also meet the relevant Kenya Standards. The mandate of the Authority as provided by the Energy Act 2019 include:

a) Regulate -
    i. Generation, importation, exportation, transmission, distribution, supply and use of electrical energy with the exception of licensing of nuclear facilities;
    ii. Importation, refining, exportation, transportation, storage and sale of petroleum and petroleum products with the exception of crude oil;
    iii. Production, conversion, distribution, supply, marketing and use of renewable energy
    iv. Exploration, extraction, production, processing, transportation, storage exportation, importation and sale of coal bed methane gas and other energy forms;
b) Regulate, monitor and supervise upstream petroleum operations in Kenya in accordance with the law relating to petroleum, the regulations made thereunder and the relevant petroleum agreement;
c) Provide such information and statistics in relation to upstream petroleum operations in Kenya to the Cabinet Secretary responsible for matters relating to petroleum as may be required from time to time;
d) d) Collect, maintain and manage upstream petroleum data;
e) Receive, review and grant an application for a nonexclusive exploration;
f) Co-ordinate the development of upstream petroleum infrastructure and promote capacity building in upstream petroleum operations;
g) Inspect and test any machinery or equipment that has been used, is used or shall be used in upstream petroleum operations;
h) Assess field development plans and make recommendations to the Cabinet Secretary responsible for matters relating to petroleum for approval, amendment or rejection of the plans;

i) Assess tail-end production and cessation of upstream petroleum operations and oversee decommissioning by a contractor;
j) Verify the measurements of petroleum production to allow for estimation and assessment of royalties and profits of oil and gas due to the National Government;
k) Verify the recoverable cost of oil and gas due to the parties to a petroleum agreement;
l) Audit contractors for cost recovery;
m) Monitor in consultation with the Competition Authority conditions of contractors' operations and their trade practices;
n) Provide information to the relevant authority for the collection of taxes and fees from upstream petroleum operations;
o) Set, review and approve contracts, tariffs and charges for common user upstream petroleum facilities;
p) Make proposals to the Cabinet Secretary responsible for matters relating to petroleum in relation to regulations which may be necessary or expedient for the regulation of the upstream petroleum sector or for carrying out the objects and purposes of this Act;
q) Work with the relevant statutory authorities to formulate, enforce and review environmental, health, safety and quality standards for the upstream petroleum sector;
r) Develop guidelines, in consultation with other statutory authorities, in relation to the implementation of treaties, conventions or protocols affecting the upstream petroleum sector that have been ratified by Kenya;
s) Regulate contracts on upstream petroleum operations not specifically provided for under the law relating to petroleum;
t) Advice the Cabinet Secretary responsible for matters relating to petroleum in the evaluation of the bids and applications made for upstream petroleum blocks;
u) Ensure that contractors uphold the relevant laws, regulations and petroleum agreement terms;
v) Ensure optimal levels of recovery of petroleum resources;
w) Promote well planned, executed and cost-efficient operations;
x) Ensure optimal utilization of existing and planned facilities;
y) Ensure the establishment of a central database of persons involved in upstream petroleum operations; and

z) Manage upstream petroleum data and provide periodic updates and publication of the status of upstream petroleum operations.

4.3.11 Institutional Framework

At present there are over twenty (20) institutions and departments which deal with environmental issues in Kenya. Some of the key institutions include the National Environmental Council (NEC), National Environmental Management Authority (NEMA), the Forestry Department, Kenya Wildlife Services (KWS) and others. There are also local and international NGOs involved in environmental activities that impact on the environment in one way or the other in the country.

Institution	Mandate/EIA Relevance
NEMA	The National Environment Management Authority (NEMA) is established under the Environmental Management and Coordination Act (EMCA) No. 8 of 1999, as the principal instrument of government in the implementation of all policies relating to the environment. (*Source: GoK. (2012). National Environmental Management Authority. www.nema.go.ke*).
Nairobi County Government	The onset of the 2010 constitution of Kenya ushered in the County Government of Nairobi. The county took over from the defunct County Council of Nairobi that was created by then Local Government Act, Cap 265 of the Laws of Kenya. Its mandate is to provide services to residents of the Nairobi city. Among other functions, the County government is responsible for the provision of essential services like water, sewer and public safety (Functions of County Governments Part 2 (Fourth Schedule, Article 185 (2), 186 (1) and 187 (2)). Some of the county departments whose functions are pertinent to the project include the following: • Planning Department • Public Health Department • Social Services and Housing Department • Housing Development Department • Inspectorate Department • Engineer's Department • Department of Environment
Nairobi City Water and Sewerage Company (NCWSC)	The Nairobi Water Company is a water service provider charged with the provision of the water and sewerage services in Nairobi. Those services were previously offered by the Water and Sewage Department of the County Government of Nairobi .Nairobi Water Company's formation arose from the enactment of the Water Act 2002 and

	amendment in 2016, which created new institution to manage water resources in the country. Under the new Act, water service providers will be licensed by water service boards to retail water in their jurisdictions. Nairobi Water Company is one such water service provider, which has been appointed by the Athi Water Service Board to provide water and sewerage services to the residents of Nairobi and its environs.
Ministry of Energy-KPC	The Ministry of Energy derives its mandate from Cap.112 and 435 of the Laws of Kenya. In addition, a Sessional Paper (No.4 of 2004) provides the policy framework and direction on Energy Development in Kenya for the next 20 years. The Cabinet Secretary of Energy oversees policy formulation while the Permanent Secretary oversees efficiency and effectiveness in the implementation of formulated policies. The Ministry has three technical departments namely; Geo-Exploration, Electric Power and Renewable Energy. The Ministry of Energy's mission is to facilitate provision of clean, sustainable, affordable, reliable and secure energy sources for national development while protecting the environment, (*Source: GoK, MoE, www.energy.go.ke).*
Ministry of Labor	This ministry's mandate is to: enforce labour laws, maintain industrial peace, industrial training and promote safety and health of employees. We also develop and coordinate implementation of policies and strategies for human resource development, micro and small enterprise sector and productivity improvement. Our mandate is derived from Presidential Circular No 1/2006 of March 2006 and also from the following Acts of Parliament and other policy documents: • Employment Act, Cap. 226; • The Regulation of Wages and Conditions of Employment Act, Cap. 229; • The Trade Disputes Act, Cap. 234; • The Workmen's Compensation Act, Cap. 236; • The Trade Unions Act, Cap. 233; • The Industrial Training Act Cap 237; • The Factories and Other Places of Work Act, Cap. 514; • National Social Security Fund (NSSF) Act, Cap 258; • ILO Conventions and Recommendations; • The Industrial Relations Charter of 1984; • Economic Recovery Strategy for Wealth and Employment Creation; • The 9th National Development Plan;

	• Session Paper No.2/2005 on MSE development; and • The Legal Notice 7354 of September 2002 on the establishment of the • Productivity Centre of Kenya (PCK). (Source: GoK, Ministry of Labour,) *www.labour.go.ke*)
Ministry of Finance Planning, National Development	The Ministry of Finance, Planning and National Development is mandated to facilitate and coordinate the national development planning process and to provide leadership in national economic policy management. Its core functions include: • The coordination of government economic policies, including regional and international cooperation policies; • The coordination and preparation of the planning components of the Medium Term Expenditure Framework (MTEF); the Fiscal Strategy Paper and the requisite budget documents; • The provision of leadership and coordination in the preparation of the main National Development Plan documents, including the integration of County Integrated Development Plans (CIDP); National Development Plans, and specific socio-economic programmes and plans; • The coordination and management of population, economic and national statistical services within government; and • The Coordination and provision of leadership in the national Monitoring and Evaluation (M&E) framework. (*Source: GoK. MoFPND and Vision 2030. www.planning.go.ke*)
Ministry of Health	This ministry is charged with the functions of: • Public health and sanitation policy • Preventive and promote health services • Community health services • Health education • Reproductive health • Food quality and hygiene • Health inspection and other public health services • Quarantine administration • Oversight of all sanitation services • Preventive health program including vector control • National public health laboratories • Government chemist • Dispensaries and health centers (i.e., levels 2 & 3) • Kenya Medical Research Institute (KEMRI)

	• Radiation Protection Board • Member of KEMSA Board • Member of Kenya Medical Training College (KMTC) Board (*Source: GoK, (2013) Ministry of Public Health and Sanitation, www.publichealth.go.ke*)
Ministry of Transport and Infrastructure	The development of integrated Nairobi metropolitan areas growth and development strategy covering among other things: • Integrated roads, bus and rail infrastructure for metropolitan area • Efficient mass transport system for Nairobi metropolitan area • Replacement of slums with affordable low cost/rental housing provision of adequate housing • Development and enforcement of planning and zoning regulations • Preparation of spatial planning for metropolitan area • Efficient water supply and waste management infrastructure • Promotion, development and investment in sufficient public utilities, public services and world class infrastructure for transforming Nairobi into a global competitive city for investment and tourism • Identification and implementation of strategic projects and programmes requiring support by government • Promotion of Nairobi metropolitan area as a regional and global services centre for financial, information and communication technology, health, education, business, tourism and other services • The development of a sustainable funding framework for the development of identified urban and metropolitan areas (*Source: GoK. (Ministry of Transport and Infrastructure Development, Mandate.*)
Kenya Urban Roads Authority	The mandate of KURA as defined in the Kenya Roads Act, 2007 is the Management, Development, Rehabilitation and Maintenance of all public roads in the cities and municipalities in Kenya except where those roads are national roads. KURA's core functions include: • Constructing, upgrading, rehabilitating and maintaining roads under its control. • Controlling urban road reserves and access to roadside developments. • Implementing roads policies in relation to urban roads.

	• Ensuring adherence by motorists to the rules and guidelines on axle load control prescribed under the Traffic Act and under any regulations under this Act. • Ensuring that the quality of road networks is in accordance with such standards as may be defined by the Cabinet Secretary. • In collaboration with the Ministry responsible for transport and the police department, overseeing the management of traffic and road safety on urban roads. • Monitoring and evaluating the use of urban roads. • Planning the development and maintenance of urban roads. • Collecting and collating all such data related to the use of urban roads as may be necessary for efficient forward planning under the Roads Act. • Preparing the road works programs for all urban roads. • Liaising and coordinating with other road authorities in planning and on operations in respect of roads. • Advising the Cabinet Secretary on all issues relating to urban roads. • Performing such other functions related to the implementation of the Roads Act as may be directed by the Cabinet Secretary (*Source: GoK (2012) Kenya Urban Roads Authority. Retrieved July 4, 2012 from www.kura.go.ke*)
County Environment Committees.	According to EMCA, 1999 and amended 2015, the Governor by notice in the gazette appoints County Environment Committees of the Authority in respect of every county respectively. The Environment Committees are responsible for the proper management of the environment within the county in respect of which they are appointed to. They are also to develop a county strategic environmental action plan every five years and perform such additional functions as are prescribed by the Act or as may, from time to time be assigned by the Governor by gazette notice. The decisions of these committees are legal and it is an offence not to implement them.
National Environmental Complaints Committee.	The Committee is charged with the following functions: Investigating allegations/ complaints against any person or against the Authority (NEMA) in relation to the condition of the environment and its management, Prepare and submit to the Council periodic reports of its activities which shall form part of the annual report on the state of the environment, and to perform such other functions and excise such powers as may be assigned to it by the Council.

National Environment Action Plan Committee.	This Committee is responsible for the development of a 5-year Environment Action plan among other things. The National Environment Action Plan shall contain: Analysis of the Natural Resources of Kenya with an indication as to any pattern of change in their distribution and quantity over time, and Analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intra-generational equity among other duties as the EMCA specifies.
National Environmental Tribunal.	This tribunal guides the handling of cases related to environmental offences in the Republic of Kenya. The Tribunal hears appeals against the decisions of the Authority. Any person who feels aggrieved may challenge the tribunal in the High Court.

CHAPTER FIVE: ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1 Description of the Anticipated Impacts

5.1.1 Anticipated Impacts

An impact assessment was undertaken following full characterization of the environmental and social baseline, and identification of all project aspects. The anticipated impacts of the proposed project on the environmental elements are both positive and negative. The magnitude of each impact is described in terms of being significant, minor or permanent, short-term or long term, specific (localized) or widespread, reversible or irreversible.

The scope of the assessment will cover the proposed project site, and will be undertaken in accordance with, the National Environmental legal requirements, and guidelines triggered for the project. All the relevant environmental, social and economic aspects will be identified for the proposed activities, the activities will be considered in terms of their potential to interact with the (physical, biological, socio-economic) environment. The EIA project report shall distinguish the impacts through the following phases

- Re-construction phase
- Operational phase
- Decommissioning phase

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

5.2 Positive Impacts

5.2.1 Provision Fuel Products

The Service Station will provide fuel for Kileleshwa residents, businesses and motorists plying the Ring road and Nairobi County in general enabling easy movement of people and goods and services. The station will also provide cooking materials like LPG gas including gas cylinders, regulator, valve cap, and hose pipe. In Nairobi County, the main source of cooking energy for the county residents is paraffin at 53.6%. Similarly, 51.5 % of the county residents use paraffin as their

main source of lighting. The service station shall therefore come in handy by providing paraffin to the county residents for their use.

5.2.2 Stimulate Local Economy

Energy plays a key role in economic growth and development. Therefore, the reconstruction of Kileleshwa service station will serve to improve the accessibility of petroleum products all through the day and night to residents and motorists thus boosting the local economy in Kileleshwa area, and Nairobi County in general.

This project will contribute to the country's economic development. In particular, the proposed project will help in the achievement of strategies specified in the Kenya's energy policy commitment of ensuring provision of reliable and adequate supply and distribution of petroleum products in all parts of Kenya at least cost.

5.2.3 Ensuring Availability and Accessibility of Petroleum Products

The proposed reconstruction of Kileleshwa Shell service station will ensure the reliable availability and accessibility of fuel, diesel and gas within at affordable and least cost for the local community in Kileleshwa area and Nairobi County in general. Further, this will ensure competition and cushion the local community and Kenyans from exploitative rising fuel prices from scrupulous middle men in the petroleum industry.

5.2.4 Creation of Employment and Income Opportunities

The proposed reconstruction of Kileleshwa Shell service station will create employment to some skilled and semi-skilled Kenyan citizens. A number of employment opportunities will be created for various personnel re-construction and operation phases of the service station thus generating income and improve livelihoods of Kenyan citizens. This will be a significant impact since unemployment is currently quite high in Nairobi County and Kenya at large.

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.

5.2.5 Creation of Business Opportunities

The proposed service station development project will require various in its planning, re-construction and operation phases. This will in turn create business opportunities between the proponent and various service suppliers and contractors.

5.2.6 Improved Infrastructural Development

The proponent is intending to reconstruct the service station to international Shell standards. This will involve proper re-constructing and developing the station. Thus, at the end of the re-construction, it will be an improvement of whole service station facilities and infrastructure including drainage system.

5.2.7 Improved Aesthetic Value

Currently, there is some planted vegetation at the edges of the service station. However, at the end of the , the service station will be further landscaped and re-vegetated with some local plant species and grass to improve site appearance, make more environmental friendly and attractive to clients who will be fuelling, eating and receiving various car services at the station.

5.2.8 Generation of Income

At operational stage, the service station shall be an economic investment hence more income to the proponent and a source of livelihood to various employees who will be working at the service station.

5.2.9 Provision of QSR Services

The service shall provide various services such as restaurants, car park services, car wash and automated tyre fitting to the motorists in Kileleshwa area and Nairobi County in general.

5.2.10 Optimal Land use

The project will lead to the optimal utilization of the land that is currently not utilized and not fully developed.

5.2.11 Generation of Revenue

Economic returns will be realized in terms of revenue collection to both National government and County Government of Nairobi.

5.2.12 Provision of Market for Building Materials

The proposed project will require supply of building materials most, of which will be sourced locally in Nairobi and the surrounding areas. This provides ready market for building material suppliers such as quarrying companies, hardware shops and individuals with such materials.

5.2.13 Decongestion Existing Service Station

The re-construction of service station will create more space and provide fuel services to residents and motorists in Kileleshwa. This will in turn reduce the amount of time wasted queuing for fuel and other car services in other existing service stations. Hence increases efficiency in serving clients.

5.2.14 Training on OHS

During the operation of the service station, the employees shall be trained on work place occupational health and safety measures on handling of flammable petroleum products, how to respond to work place accidents, hazards and other conditions. These will be effectively mitigated on through the use of appropriate PPEs at all times and proper handling of the petroleum products.

5.3 Potential Negative Environmental Impacts

The impacts that are seen as likely to negatively affect the environment and local population include the following:

5.3.1 Occupational Health and Safety (OHS)

During re-construction works and operation of the service station, occupation hazards, incidences and accidents may occur which might result in injuries of construction workers, service station employees, pedestrians, motorists, private properties and infrastructure.

5.3.2 Increased Water Demand

Water is a major concern especially in many construction sites. The proposed development may cause some strain to the existing water source since construction activities are known to be heavy water consumers. Operation of the service station will bring about an increase in water consumption. The proponent will apply for connection with water supply from existing NCWSC or sink their own borehole. In case of water shortage, there will be reserves at the storage tanks which will be constructed to harvest and store rain water.

5.3.3 Increased Power Demand

There will be increase in power consumption especially during reconstruction and operation phase of the service station. The service station shall connect to the existing power main for their and reconstruction activities like welding, lighting, and operation activities like charging other electrical gadgets used for running the station, pumping fuel among other daily station services and this might strain the power resources.

5.3.4 Pollution

The re-construction activities on the site will result to increased dust and gas emissions. Such dust and gases have direct negative impact to the quality of air and hence animal/human health.

Hooting idling of the vehicles delivering construction materials and workers will generate noise and vibrations which may have negative effects to the Kileleshwa neighborhood. Petroleum oils, and grease, used in vehicles and construction machinery and paints used in the re-construction works may spill or leak on/into the ground further contaminating the soil and potentially ground water.

5.3.5 Air Quality

The re-construction activities on the site may result to increased dust and gaseous emissions. Some construction machinery and trucks, including small vehicles may generate hazardous exhaust fumes such as Carbon Oxides (CO_x), Sulphur Oxides (SO_x) and Nitrogen Oxides (NO_x). Dust particles as caused by wind and vehicles suspended in the air mostly during dry and windy seasons. Such dust and gases have direct negative impact to the quality of air hence affects human and animal health and livelihoods.

5.3.6 Noise and Vibrations

Re-construction activities will be generating noise and hence affecting other daily operations in the Kileleshwa neighborhood. Such noise will mainly emanate from the construction machinery and equipment which include trucks and other vehicles accessing the site. There might also be noise from the workers on site workers carrying on the construction works. Unwanted and undesirable noise may has negative psychological effects impacting on job performance, safety, and health.

5.3.7 Flora and Fauna

Currently, there no natural vegetation on the existing service station. However, there is a little planted vegetation on the edges of the service station and at the moment none of them shall be cleared to pave way for the re-construction of the station. However, noise/dust pollution from construction activities might disturb such fauna like small that might be flying around the service station.

5.3.8 Soil Geology and Degradation

Some small leaks from underground tanks and supply lines might lead to extensive contamination of soil, soil organisms and ground water overtime. This would require a lot of resources and time

to clean up the pollution and its general effects on the environment and people. Soil degradation may occur during excavations for foundation laying. The excavated materials can be carried by water or blown by wind causing erosion.

5.3.9 Hydrology, Drainage and Water quality

Water may get contaminated by oil/fuel leaks from the underground storage tanks. The leaks may be from overfilled tanks, and accidental leaks that may contaminate the soil, soil micro and macro organisms and waster aquifers.

5.3.10 Waste water and Sewage Effluents

Effluent/sewage resulting from sanitary facilities and wastewater from the proposed developments is of significant concern with respect to the environment. It should always drain effectively into the available sewerage treatment system via well designed drainage system networks.

If possible, a pollution solution system which is a compact oil separator which separates oil from wash down water collected from the under canopy area of a service station in two different tanks, and allows the wastewater to be discharged to sewer, while separating the solid material and contaminants in a separate tank for collection and sound disposal can be installed.

5.3.11 Solid Waste

This will be as a result of re-construction activities. Such waste materials include stones, wood, broken glasses and tiles, containers, metal rods, pieces of iron sheets/ tiles and sharp objects such as nails. During operation of the service station, solid wastes shall be generated from daily service station activities, motorists, clients and employees.

5.3.12 Lubricant Shop

There could be spills from leaking the following containers displayed at the lubricant shop; lubricants, battery water and acid, brake fluids and greases or leaking when being used. This might lead to potential water, soil and vegetation contamination.

5.3.13 Oil Interceptor

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

5.3.14 Disaster Preparedness

During and re-construction works, there might be cases of injuries, accidents or occupation hazards which might result in injuries of construction workers, service station employees, pedestrians, motorists, private properties and infrastructure.

5.3.15 Fire Risks

Petrol stations have a greater fire risk than most establishments because of the highly combustible products handled. A lot of care must be taken while offloading, refueling and while undertaking day to day activities.

5.3.16 Increased Traffic

A petrol station comes with increased traffic to the petrol station especially for refilling purposes, car wash, and automated tyre checking and fitting. Therefore, there might be incidences of high traffic inflow especially during peak hours at the entry and exit of the service station, along Ring road. If not properly controlled, it might lead to traffic snarl ups, time wasting and potential accidents.

5.4 Mitigation Measures for Potential Negative Impacts

5.4.1 Potential Mitigation Measures for Occupational Health and Safety

During reconstruction of the service station, the contractor will be required to prepare a waste management plan for the work sites at the start of the project. The site is to be kept clean, neat and tidy at all times. The contractor shall implement measures to minimize occupational health and safety risks:

- Workmen and visitors shall be provided with suitable protective gear (such as dust masks, ear muffs, helmets, overalls, industrial boots etc.) particularly during reconstruction. There must be fully equipped first aid kits on site and a safety officer who has a first aid training and knowledge of safety procedures. In addition, the contractor must have insurance for the workmen.
- Carrying out annual environmental and safety audits for the petrol stations.
- Safety kits and emergency facilities should be provided in case of any accidents and incidents common to projects of such nature. These should be placed in strategic locations on site.
- Delivery and storage of materials at appropriate locations.

- The contractor will be required to adhere to Factories and Other Places of Work Act, especially the building operations and works of engineering construction rules and its subsidiary and supplementary regulations on safety and public health in the construction activities. Standards and legal requirements should be adhered to. These include:
    - ✓ Building codes,
    - ✓ Occupational Safety & Health Act,
    - ✓ The Public Health Act,
    - ✓ As well as other recognized best practices and procedures.
- The project proponent and contractor should take appropriate insurance cover for the various project activities and personnel.
- The workforce should be further trained on safety measures.

5.4.2 Potential Mitigation Measures for Water Use and Management

The contractor and proponent shall implement the following water use and management to maximum utilization:

- Provision of notices and information signs within the project site to notify on means and need to conserve water resource.
- Installation of water conserving taps that turn-off automatically when water is not in use will be done
- Encouragement of water re-use/recycling during both re-construction and operation phases of the project.
- Avoid wasting the water supplied to the site.
- Roof catchments should be provided with rainwater harvesting systems to enhance collection and storage of rain water. Such water can be used to water flower gardens and all kind of cleaning required on site.
- Install water meters for the offices to ensure accountability and responsibility.
- Provide water storage tanks to handle water shortages.

5.4.3 Potential Mitigation Measures for increase Power Demand

- All electrical appliances should be switched off when not in use.
- Put off all lights when not in use.

- Use a design that is environmentally sound to avoid use of electricity for air conditioning
- Use energy conserving electric lamps for general lighting.
- Utilize natural light inside buildings to avoid using electricity for lighting during the day.

5.4.4 Potential Mitigation Measures for Pollution

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

5.4.5 Potential Mitigation Measure for Air Quality

- Provide personal protective equipment to workers during works
- Ensure regular and prompt maintenance of construction machinery and equipment to minimize generation of hazardous gases and other suspended particulate matter.
- Control over areas generating dust particles and regularly cleaning and sprinkling water to reduce and keep down dust.
- Use environmentally friendly fuels such as unleaded gasoline.

5.4.6 Potential Mitigation Measures for Noise and Vibrations

- Re-construction works should be carried out **strictly** during normal working hours i.e. 0800 to 1700 hrs.
- Machineries should be maintained regularly to reduce noise resulting from friction.
- There should not be unnecessary horning of the involved machinery
- Provision of appropriate signage at the construction site notifying of the construction activity and timings

5.4.7 Potential Mitigation Measures for Flora and Fauna

- Additional secondary and local vegetation will be panted at the end of the reconstruction activities improve the aesthetic value of the service station and manage soil erosion.

- Landscaping should be done within the site to make the service environmentally friendly

5.4.8 Potential Mitigation Measure for Soil Geology and Degradation

- Use properly maintained hoses and fittings
- Make the cement screeds in all the chambers using water proof material.
- Install a monitoring well next to the tanks to check on leaks
- Use water finding dipstick and/ or a hydrometer to check on density/ specific gravity
- Ensure there is no oil spills, leaks during refilling and when offloading the fuel
- Excavated materials should be removed promptly from the site to avoid erosion
- Avoid unnecessary movement of soil materials from the site
- Control activities especially during rainy any windy conditions
- Regular sprinkling of water to reduce dust
- Landscaping after completion of the service station with appropriate local vegetation.

5.4.9 Potential Mitigation Measures for Hydrology, Drainage and Water quality

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

5.4.10 Potential Mitigation Measures for Wastewater and Sewage Effluents

- Ensure no undue interference with the laid drainage system.

- All drain pipes passing under the building, driveway or parking should be of heavy duty PVC pipe tube encased in 150mm concrete all round.
- All manholes on drive ways and parking areas should have heavy duty covers set and sealed airtight as approved by specialists.
- All waste pipes should have cleaning roding eyes accessible from outside and free to every part of the system for inspection, cleaning and repair.
- Sanitary facilities should be kept clean always through regular cleaning.
- Ensuring the sewerage treatment plant is not overloaded to minimize incidences of untreated sewer spills to the environment
- If possible, install a "pollution solution" system, which separates oil from wash down water and allows the wastewater to be discharged to sewer, while separating the solid material and contaminants in a separate tank for collection
- The channels shall be designed with regard to peak volumes.
- Paving of the sidewalks, parking and other open areas shall be done using pervious materials

5.4.11 Potential Mitigation Measures for Solid Wastes

The contractor shall implement measures to minimize waste and develop a waste management plan to include the following:

- Express condition shall be put in the contract that before the contractor is issued with a completion certificate; he will clear the site of all debris and restore it to a state acceptable to the supervising architect and environmental consultant.
- Bins/receptacles shall be placed at strategic locations within the site as collection centres to facilitate separation and sorting of the various types of wastes. These bins shall be placed with clear markings e.g. plastics, paper and others, to receive different solid waste materials.
- The contractor and proponent shall work hand in hand with private refuse handlers that are already on the ground and local council to facilitate sound waste management.
- The wastes shall be properly segregated and separated to encourage recycling of some useful waste materials.

- Use of an integrated solid waste management system through a hierarchy options i.e. source reduction, recycling, composting and reuse shall be encouraged. This will facilitate proper handling of solid waste during operation stage.
- Recycle construction materials where possible.
- Designating one central collection point to ensure the service station is tidy.

5.4.12 Potential Mitigation Measures for Lubricant Shop

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

5.4.13 Potential Mitigation Measures for Oil Interceptor

- Oil skimming should be done frequently to prevent carryover of contaminants to the open storm drains
- Analysis of discharge from the interceptor to be conducted one every 6 months
- Heavy duty manhole covers provided and in place at all times unless skimming is in progress to prevent fall of persons

5.4.14 Potential Mitigation Measures for Disaster Preparedness

- Provide accessible and clearly marked EXIT routes that in the event of an accident
- Install enough fire-fighting equipment at strategic locations and within reach.
- Train workers and office caretakers on fire fighting and first Aid and personal safety
- Carry out fire and emergency drills to assess disaster preparedness
- Provide personal protection equipment during construction

5.4.15 Potential Mitigation Measures for Fire Risks

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

- A bucket full of dry sand shall be placed at each pump.
- Water hydrants should be installed.
- All the electrical connections shall be designed by a registered engineer and connected to one central emergency stop switch.
- Installation of an automatic fire alarm system for the entire facility
- All fire control and fighting facilities shall be installed following local council fire master's requirements and approval e.g.
    - Provision of 2. No. 9kg carbon dioxide (CO_2) fire extinguisher stationed at each pumping/dispensing area.
    - Provision of fire blanket
    - Provision of long fire hose reel

5.4.16 Potential Mitigation Measures for Traffic Implication

- The contractor shall be required to erect clear road signs showing speed limits and warning other motorists of turning vehicles
- Provision of parking spaces
- Clearly demarcated pedestrian walkways to be provided
- Liaising with traffic police to control movement of vehicles and pedestrians within the petrol station

5.4.17 Potential Mitigation Measures for Site Security

- The management shall strategically install lighting as well as security alarms and backup systems including surveillance of the area on a 24 hours basis.
- Security guards shall protect the property in a 24-hour basis and document any suspect movement within the facility and its environs.

CHAPTER SIX: PROJECT ALTERNATIVES

6.1 Introduction

This section examines alternatives of the proposed project in terms of the site, products, materials, technology and waste management options. It also compares impacts of each alternative *vis-a-vis* those of the proposed project. This becomes an aid to decision making process.

6.2 Zero or No Project Alternative

The No Project Option is the least preferred from the socio-economic and partly environmental perspective since if the project is not done:

- The economic benefits especially during re-construction, i.e. provision of jobs for skilled and non-skilled workers will not be realized.
- There will be no generation of income by the developer/proponent to the County and National Government.
- The social-economic status of Kenyans and local Kileleshwa people would remain unchanged.
- The local skills would remain under-utilized.
- No employment opportunities will be created for Kenyans who will work in the service station.
- Discouragement for investors to produce this level of standard and affordable developments.

If the project is stopped then the trickle-down effect of financial resources will not be felt in this area. In this respect, the "No project alternative" is not deemed appropriate.

6.3 Alternative to Site

Currently, the proposed site was formerly operating as Kileleshwa Shell service station and it is currently un-utilized. The proponent doesn't own another land to implement the proposed reconstruction development. Looking for an alternative land may take quite some time of which there is no guarantee that it will be acquired. This will also mean that the proponent redesigns the project and commit himself to additional expenses.

6.4 Alternative Land Use Activities

Most facilities in the project area are for commercial and development purposes. Besides, there is on the project existing shell service station infrastructure. Alternative land use activities such as residential, farming, or grazing land will conflict with the current land use. For uniformity and conformity, the proponent is interested in the reconstruction of the Kileleshwa service station.

6.5 Solid Waste Management Alternatives

Throughout the re-construction process, the project will produce wastes such as soil, wood chips, metal scraps and paper wrappings among others. The proponent will observe the EMCA (Waste Management Regulations, 2006). Receptors/litterbins will be placed at strategic positions within the station premises for temporary storage of general solid wastes awaiting proper and sound disposal.

6.6 Waste Water Management Alternatives

Waste water from the premises will come from the toilets and surface runoffs. Viable alternatives to handle these wastes are use of septic tanks and connection to the existing NCWSC sewer system via well designed drainage system networks.

6.6.1 Use of Oil Interceptor

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

CHAPTER SEVEN: CONSULTATION AND PUBLIC PARTICIPATION

7.1 Introduction

Public participation and community consultation has been taken up as an integral part of social and environmental assessment process. Public participation has been viewed as a continuous two-way process, involving promotion of public understanding of the processes and mechanisms through which developmental problems and needs are investigated and solved. Consultation was used as a tool to inform and educate stakeholders about the proposed action both before and after the development decisions were made. It assisted in identification of the problems associated with the project as well as the needs of the population likely to be impacted.

The Consultation and Public Participation Process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA 1999 section 58, on ESIA for the purpose of achieving the fundamental principles of sustainable development. Public consultation was carried out in this Project with the objectives of minimizing probable adverse impacts, and to achieve speedy implementation of the project by creating awareness amongst the community on the benefits of the project.

The purpose of the public consultation includes the following:

- To ascertain the public views on various environmental issues related to the proposed development.
- To encourage and provide for people's participation in project development.
- To obtain new insight and site specific information, and to appropriating possible mitigation measures based on local knowledge of the communities
- To facilitate and open and inclusive approach to consultation that provided timely and transparent information to the stakeholders;
- To provide an opportunity for stakeholders to provide feedback on the project raise their concerns;
- To aid project planning and development of mitigation measures and monitoring plans to address issues raised.

7.2 Methodology Used in the CPP

The public participation exercise was conducted in three in three ways, namely;

- Focus group discussions and Key informant interviews;

- Field surveys and observations; and
- Public meetings.

In that regard, two stakeholder consultation and public participation meetings were held at the proposed service station site. The first one was held on 13/12/2019 while the second one which requested by the Kileleshwa Ward Neighborhood Association (KIWANA) was held on 19/12/2019. Appended herein are the summary comments, minutes of the meetings, attendance list and photographs from the CPP meetings.

Table 1: Summary of comments from the first CPP meeting held on 13/12/2019

Stakeholder Name	Issues Raised	Responses by Proponent/EIA Experts
Area Chief	• Employment opportunities • Improve local economy • Serve motorists and residents • Revenue to the government • Pressure on water services • Include all government agencies • Supported the project	Recycle water Harvest rain water Maximize on positive impacts
Kileleshwa Police Station	• Employment opportunities • Fuel to residents and motorists • Revenue to the government • Noise • Traffic • Safety measures • Recommended the project	Work within normal hours Use efficient machines Follow traffic rules, speed limits & signs Implement EMP Maximize on positive impacts
Kileleshwa Ward Neighborhood Ass. (KIWANA)	• Employment opportunities • Employment opportunities • Control traffic • Ensure all approvals are done • Recommended the project	Maximize on positive impacts Collect waste regularly Avoid illegal dumping of construction waste
Kirichwa Water Resource Users Ass. (Kirichwa WRUA)	• Provision of fuel close to residents • Clean environment and security • Employment opportunities • Involve all stakeholders • Recommend the project	Maximize on positive impacts

Universiy of Nairobi, Chiromo Campus	• Access to fuel, & petroleum products • Job creation • Access to vehicle accessories • Land development & improved aesthetic value • Traffic congestion • Storm water from ring road • Supported the project	Improve efficiency of fuel delivery Observe speed limits Ensure storm water doesn't enter the station Maximize on positive impacts
Chiromo Environmental Awareness Club (CEAC) - UoN	• Convenient point for fuel • Co-exist with nature & conservation • Employment opportunity • Improved infrastructure • Improve local economy/surrounding • Traffic & Water services • Conduct annual audits • Manage effluents adequately	Liaise with the traffic officers Deliver materials during off-peak hours Observe traffic laws, signs Recycle water Use available water properly Harvest and store rain water Maximize on positive impacts
Biological Association Of Nairobi University Students (BANUS) - UoN	• Revenue to the government • Improve aesthetic value • Utilization of idle land • Vehicle fitting services • Waste generation • Involve all stakeholders • Recommended the project	Purchase right quantities of materials Collect waste regularly Soundly dispose the waste Maximize on positive impacts
Deputy sub County Commander, Dagoretti North Constituency - Inspectorate	• Employment opportunities • Improve aesthetics of the area • Fuel for motorists and residents • Improve security • Traffic • Recommends the project	Liaise with the traffic officers Observe traffic laws, signs Maximize on positive impacts
Kileleshwa SDA Sabbath School	• Convenient fueling point • Manage the traffic • Recommended the project	Liaise with the traffic officers Observe traffic laws, signs Maximize on positive impacts
Friends of Nairobi Arboretum (FONA)	• Help with conservation of the forest • Traffic	Construct gabions at river bank Have monkey proof bins Observe traffic laws, signs

	• River pollution • Recommends the project	Maximize on positive impacts
Area Assistant Chiefs	• Employment • Improve local economy • Revenue to the government • Oil to be intercepted • Traffic inflow • Fuel for motorists and residents • Supported the project	Liaise with the traffic officers Observe traffic laws, signs Maximize on positive impacts
WRA	• Job opportunities • Fuel for motorists • Improve local economy • Development of infrastructure • Recommended the project • Observe determined riparian reserve	Maximize on positive impacts

Photo 17: The Area Chief addressing various stakeholders during the CPP

Photo 18: WRA official addressing participants during the CPP

Photo 19 & 20: VIVO Energy & Kent-Africa Engineers addressing stakeholders during the CPP.

Photo 21: Kirichwa Water Resource Users Association Chairman participating in the CPP

Photo 22: Kileleshwa Police Station Representative participating in the CPP

Photo 23: The EIA/EA Lead Expert addressing stakeholders during the CPP meting

Photo 24: A group photo of the participants/stakeholders after the CPP meeting

Table 2: Summary of comments from the second CPP meeting held on 19/12/2019

Stakeholder Name	Issues Raised	Responses by Proponent/EIA Experts
Chairman - Kileleshwa Ward Neighborhood Ass. (KIWANA)	• Fuel in an accessible venue • Employment opportunities • Lighting added security • Traffic • Pollution of the river • Project required urgently	Conduct a stream survey regularly To clean the river quarterly Conduct annual environmental audit Use integrated waste management system Apply soil erosion control measures Vegetate the river bank/riparian area Construct gabions Implement riparian buffer plan Maximize on positive impacts
Chairman - Boda Boda Delta - Kileleshwa	• Make business easy • Fuel to residents and motorists • Improve security and drainage • Traffic • Protect environment • Recommended the project	Follow traffic rules, speed limits & signs Work together with traffic officers Implement EMP Maximize on positive impacts
Members Delta – Kileleshwa Boda Boda	• Provide fuel & petroleum products • Restaurant services • Chemist services • Job opportunities • Improve local economy • Traffic and waste • Start project soonest • Recommended the project	Follow traffic rules, speed limits & signs Work together with traffic officers Maximize on positive impacts Collect waste regularly Avoid illegal dumping of construction waste
Kirichwa Water Resource Users Ass. (Kirichwa WRUA)	• Provision of fuel close to residents • Clean environment and security • Employment opportunities • Involve all stakeholders • Recommend the project	Maximize on positive impacts
Kileleshwa resident - River Gardens	• Convenient access to fuel, & petroleum products • Decent restaurant, Convenient store • Improved security • Include a pharmacy as before	Maximize on positive impacts

	• Supported the project	
Kileleshwa Resident	• Provide fuel & tyre services • Revenue to the government • Employment opportunity • Utilize idle land • Improve local economy/surrounding • Observe WARMA reserve	Maximize on positive impacts
Kilelelesshwa Residents	• Easy access to petroleum products • Beautification of the area • Traffic • Noise • Harvest rain water • Recommended the project	Liaise with the traffic officers Deliver materials during off-peak hours Observe traffic laws, signs Use efficient machines Switch off machines when not in use Observe normal working hours Maximize on positive impacts
KILLETON SACCO -Matatu Association	• Employment opportunities • Improved security • Fuel for motorists and residents • Traffic • Start the project quickly • Recommends the project	Liaise with the traffic officers Observe traffic laws, signs Deliver materials during off-peak hours Maximize on positive impacts
Kileleshwa Taxi Association	• Convenient fueling point • Employment opportunity • Improved security • Beautification of the area • Traffic • Start the project quickly • Recommended the project	Liaise with the traffic officers Observe traffic laws, signs Maximize on positive impacts
Kileleshwa Police Station	• Help with conservation of the forest • Traffic &River pollution • Recommends the project	Construct gabions at river bank Observe traffic laws, signs Maximize on positive impacts

Photo 25: Area Chief addressing the KIWANA, Matatu, Taxi and Boda Boda Association during the CPP

Photo 26: The EIA Lead Expert addressing participants during the CPP

Photo 27: The EIA Lead Expert addressing participants during the CPP

Photo 28: KILLETON Matatu Association participating during the CPP

Photo 29 & 30: CPP session going on

Photo 31: A group photo of the participants after the CPP meeting

From the two CPPs conducted, below is a summary of the neighbors' comments and views

- Provision of petroleum products including fuel for Kileleshwa residents, businesses and motorists.
- Enabling easy movement of people and goods and services.
- Provide cooking materials like LPG gas including gas cylinders, regulator, valve cap, and hose pipe.
- Improve the accessibility of petroleum products all through the day and night to residents and motorists
- Stimulate and boost growth and development of the local economy in Kileleshwa area, and Nairobi County in general.

- Contribute to the country's economic development as specified in the Kenya's energy policy commitment of ensuring provision of reliable and adequate supply and distribution of petroleum products in all parts of Kenya at least cost.
- Ensure the reliable availability and accessibility of fuel, diesel and gas within at affordable and least cost for the local community thus competition and cushion the local community and Kenyans from exploitative rising fuel prices from scrupulous middle men in the petroleum industry.
- Create employment to some skilled and semi-skilled Kenyan citizens
- Generation income and improve livelihoods of Kenyan citizens.
- Increased urbanization, industrialization and local markets for providing goods and services during both the implementation and operational phases.
- Create business opportunities between the proponent and various service suppliers and contractors.
- Improvement of infrastructure.
- Further landscaping with some local plant species and grass to improve site appearance, make more environmental friendly and attractive
- An economic investment hence more income to the proponent and a source of livelihood to various employees who will be working at the service station.
- Provide various services such as restaurants, car park services, car wash and automated tyre fitting to the motorists in Kileleshwa area and Nairobi County in general.
- Optimal utilization of the land
- Economic returns will be realized in terms of revenue collection to both National government and County Government of Nairobi.
- Provides ready market for building material suppliers such as quarrying companies, hardware shops and individuals with such materials.
- Decongestion existing service stations
- Training employees on First Aid, work place occupational health and safety measures on handling of flammable petroleum products, how to respond to work place accidents, hazards and other conditions.

- Chances of incidences and accidents may occur which might result in injuries of construction workers, service station employees, pedestrians, motorists, private properties and infrastructure.
- Pressure on existing water resources since
- Increased Power Demand
- Air, noise pollution
- Potential incidences of petroleum product leaks from underground tanks and supply lines might Generation of waste water and sewage effluents
- Generation of construction waste
- A greater fire risk because of the highly combustible products handled.
- Increased traffic to the petrol station especially for refilling purposes, car wash, and automated tyre checking and fitting.

CHAPTER EIGHT: ENVIRONMENTAL MONITORING AND MANAGEMENT PLAN (EMMP)

8.1 Significance of EMP

EMP involves the protection, conservation and sustainable use of the various elements or components of the environment. The EMP for the proposed project provides all the details of project activities, impacts, mitigation measures, time schedules, costs, responsibilities and commitments proposed to minimize environmental impacts. The main activities include monitoring and evaluation and environmental audits during implementation and decommissioning phases of the project.

8.2 Environmental Monitoring and Audits

Environmental monitoring and audits are essential in projects life span as they are conducted to establish if project implementation has complied with set environmental management standards for Kenya as spelt out in EMCA 1999 and the Environmental Impact Assessment and Audit Regulations 2003. In this project, environmental monitoring and audit will be conducted to ensure that identified potential negative impacts are mitigated during the project's life span.

Table 3: The proposed EMMP for Re-construction and Operation phases

RE-CONSTRUCTION PHASE				
Impacts	**Mitigation Measure**	**Responsibility**	**Indicator**	**Cost (KSh)**
Soil Erosion	• Apply soil erosion control measures including: ✓ Control speed and operation of construction vehicles. ✓ Sprinkle water on excavated areas. ✓ Maintenance of construction equipment. ✓ All bare areas should be landscaped after ✓ Workers should be provided with dust masks if working on sensitive areas.	Contractor	Amount of dust generated. Quality of landscaping Amount of run-off i.e. flow rate of run-off	40,000
Noise Pollution	• Complying with the EMCA noise regulation Legal Notice 61 including: ✓ Observe normal working hours during noisy construction works (00800 to 1700) hours ✓ Ensure that all generators and heavy duty equipment are insulated or placed in enclosures ✓ Sensitize drivers to avoid unnecessary gunning of vehicle engines ✓ Ensure regular servicing of engines and other machines shall be adhered to ✓ Workers to wear ear muffs if working in noisy section.	Contractor; Management	Amount of noise generated (dB)	30,000
Construction Waste	• Following EMCA regulations on Waste Management, Legal Notice 121 including:	Contractor; Management	Amount of waste on site	30,000

	✓ Using waste minimization techniques such as buying required quantities in bulk. ✓ Identifying all sources of wastes, and ensuring wastes are handled by licensed personnel ✓ Making available suitable facilities for the collection, segregation and safe disposal of the wastes. ✓ All construction materials left over at the end of construction should be used in other projects or sold ✓ Ensure proper handling and storage of construction materials to reduce damage ✓ Accurately estimate the sizes and quantities of materials required to reduce amounts left ✓ Excavated waste should be re-used or backfilled.		Presence of well-maintained receptacles and central collection points	
Air/Dust Pollution	• Ensure strict enforcement of on-site speed limit regulations • Avoid excavation works in extremely dry weathers if and where possible • Sprinkle water on graded access routes whenever necessary to reduce dust generation by construction vehicles • Enclosing the structures under construction with dust proof nets. • Using efficient machines with low emission technologies for the ones that burn fossil fuels. • Regular maintenance and services of machines and engines. • Use of clean fuels e.g. unleaded and de-sulphurized fuels.	Contractor; Management	Amount of gaseous emissions Amount of particulate emission	25,000

	• Educate and raise awareness of construction workers on emission reduction techniques.			
Oil spills and leaks	• Machinery should be well maintained to prevent oil leaks. • Contractor should have a designated area where machinery servicing and maintenance is carried out and that is protected from rain water. • All oil products should be stored in a site store and handled carefully.	Contractor; Management	No oil spills or leaks on site	90,000
Drainage and Storm- water	• The drainage system should ensure that surface flow is drained suitably into the public drains provided to control flooding within the site. • Drainage channels should be installed in all areas that generate or receive surface water such as car parking, driveways and along the building block-edges of the roofs. • The channels should be covered with gratings or other suitable and approved materials to prevent occurrence of accidents and entry dirt that would compromise flow of run-off. • The drainage channels should ensure the safe final disposal of run-off /surface water and should be self-cleaning which means it should have a suitable gradient. • Provide water storage tanks to collect storm water for cleaning uses. • Implementation of roof water harvesting	Throughout project period	Presence of drainage channels Percentage of paved area	10,000
Increased Traffic	• Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site.	Contractor; Management	Availability of signage Number complaints recorded per month	20,000

	• Ensuring all drivers for the project comply to speed regulations. • Making sure the construction doesn't occupy the road reserves and complying with traffic and land demarcation obligations. • Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.		Number of incidences and accidents recorded per month	
Insecurity	• Ensure the general safety and security at all times by providing day and night security guards • Adequately lighting within and around the at night premises.	Proponent Contractor	Proponent	30,000
Occupational Health and Safety Risks	• Provide all workers with the necessary protective gears • Ensure all workers are in protective gears all the time when on site • Place fire extinguishers in strategic areas within the deport • Designate and mark smoking areas • Workers to be trained as fire marshals • Fire escape routes to be shown clearly • Provide enough first aid kits within the project site • Train workers in administering first aid • Ensuring all potential hazards such as movable machine parts are labelled. • Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment.	Proponent Contractor NEMA County Government of Nairobi County Public Health Officer	Number of incidents/ accidents per monthly Availability of PPEs Number of fire drills conducted Visibility and clarity of signage and alerts Efficiency of equipment such as fire-fighting equipment Level of awareness of workers Number of fire assembly points	80,000

	• Placing visible and readable signs around where there are risks. • Ensuring there is security in and around the site to control the movement of people. • Providing safe and secure storage for equipment and materials in the site. • Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site.			
Increased Pressure on Utilities	• Employing water conservation techniques and using the required amounts of water to prevent wastage. • Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible. • Using machines with power saving technologies. • Providing proper sanitary facilities for construction workers. • Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency.	Proponent Contractor County Government of Nairobi KPLC	Amount of water consumed per day Amount of electricity consumed per day Number of machines and equipment serviced per month Amount of fuel consumed per day Number of drainage blockages per month	Within Project Cost
Vegetation loss	• Designate access pedestrian routes and parking zones that are cabro paved • Provide signs marked do not Walk/Park on the grass • To landscape the service station after re-construction and maintaining the planted vegetation.	Proponent; Contractor	Warning signs on site Landscaped lawns	Within Project Cost
OPERATIONAL PHASE				

Impacts	Mitigation Measure	Responsibility	Indicator	Cost (Kshs)
Underground Fuel storage and Handling	• Use properly maintained hoses and fittings • Make the cement screeds in all the chambers using water proof material. • Install a monitoring well next to the tanks to check on leaks • Use water finding dipstick and/or a hydrometer to check on density/specific gravity • Ensuring no spills during refilling and /or when offloading the fuel	Proponent; Management	Monitoring Fuel and Oil spills Monitoring well	**200,000**
Oil interceptor	• Use special tool to do skimming • Install spill control kit next to the interceptor during skimming	Proponent; Management	Presence of Oil spills Contamination of ground and surface water	**65,000**
Run-off and waste water disposal	• Waste water should empty to the septic tank via well laid sewage pipes • Conduct inspections for sewer pipe blockages or damages and fix them • Empty septic tank whenever its full by a licensed exhauster services	Proponent; Management	Effluent presence on open drains	**60,000**
Increased Water demand	• Provide information signs on means and needs to conserve water • Promote re-cycling and re-use of water as much as possible • Sensitize the occupants to conserve water by avoiding unnecessary wastage. • Detect and repair broken pipes promptly • Install water storage tanks	Proponent; Management	Presence of water meter Presence of automatic water taps Water bills	50,000.00

	• Install roof gutters to collect and harvest rain water • Avoid unnecessary toilet flushing			
Solid wastes generation	• Waste should be properly segregated and separated • Provide litter bins • Ensure regular waste collection • Making available suitable facilities for the collection, segregation and safe disposal of the wastes. • Creating waste collection areas with clearly marked facilities such as color coded bins and providing equipment for handling the wastes. The bins should be coded for plastics, rubber, organics, glass, paper, electrical equipment etc. • Ensuring all wastes are dumped in their designated areas and that the bins are regularly cleaned and disinfected. • Assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, and Recovering. • Creating adequate facilities for the storage of materials and chemicals and controlling access to these facilities. • Ensuring bins are protected from rain and animals.	Proponent Management County Government of Nairobi NEMA County Public Health Officer	Amount and type of waste generated per day	80,000.00
Demand for Electricity	• Energy conservation measures to be practiced • Lights to be switched off when not in use • Service solar panels regularly • Ensure standby general is functional • Install power meters to monitor power use	Proponent; Management	Presence of an KPLC meter Electricity bills	40,000.00

Fire Hazards & Accidents	• Keep well stocked and functional first aid box • Ensure proper storage of inflammables at the site. • Maintain fire-fighting equipment and ensure that they are regularly inspected • Create awareness among employees on proper safety measures.	Proponent; Management	Number of fire drills carried. Proof of inspection on firefighting equipment. Fire Signs put up in strategic places. Availability of fire-fighting equipment.	70,000.00
Occupational Health and Safety	• Provision of PPEs to all and replacing the PPEs on wear and tear. • Placing readable signs alerting people of flammable hazardous petroleum materials. • Servicing equipment and machine to ensure efficiency. • Providing fire-fighting equipment and maintaining them to ensure they are fully functional. • Delineating fire and emergency assembly points and creating awareness to ensure all people at site are aware of them, e.g. through the use map. • Putting in place and ERP and ensuring all people in the project are aware of it and the procedures to follow commensurate to the level of emergency. • Providing adequate storage for hazardous and flammable substances and controlling access to them. • Monitoring the movement, handling and management of wastes to ensure they safely managed and don't present any EHS risks. • Performing emergency drills on a frequent basis, setting benchmarks for response and evaluating	Throughout project Period	Number of incidents/ accidents per monthly Number of drills per year Effectiveness of drills Visibility and clarity of signs and alerts Efficiency of equipment such as fire-fighting equipment Level of awareness of workers Number of assembly points Separate washrooms (Gents & Ladies) Copies of Annual Audit Reports	200,000.00

	performance to ensure continuous improvement of response and preparedness. • Proponent to train employees on personal safety and how to handle equipment and machines • Record and report any accident/incidence, treat and compensate affected workers • Employees to ensure washrooms are clean			
Insecurity	• Maintaining a perimeter wall and have a barrier which is manned all the time. • Maintaining security alarms • Partnership with the neighbors and police in community policing. • Control of secondary businesses. • Round the clock security for the facility. • Adequate lighting and an alarm system installed at strategic points. • Bushes around and within the site cleared to avoid hiding areas for thieves.	Proponent; Management	Number of businesses around the site. Level of crime in the area	100,000.00
Generation of Noise	• Erecting signs and notifying other users of noisy activities. • Conducting all noisy activities during the day when permissible levels are higher. • Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment. • Using equipment with low noise ratings or noise reduction technologies such as for the generators	Proponent; Management	Amount of noise generated per day: dB Adequacy and quality of noise PPEs (ear muff, ear plugs)	30,000
Washrooms	• Provide sufficient and suitable sanitary conveniences the washrooms should be kept clean, in good working and usable conditions	Proponent; Management	Separate washrooms (Gents & Ladies)	40,000

	• Provide a water tank for the washrooms incase the piped water supply is not available			
Increased Pressure on available utilities	• Implementing water conservation techniques. • Using only the required amounts of water during normal operations. • Creating awareness through signs of conservation of water and electricity. • Using natural light during the day for lighting purposes. • Using machines and equipment with a high level of power efficiency in the station and servicing them as often as required to maintain their efficiency. • Using gas in the kitchens/restaurants for cooking purposes.	Proponent; Management County Government of Nairobi Members of the Public	Amount of water consumed /day: m3/day Amount of electricity consumed per day: Kwh Number of machines and equipment serviced per month Amount of fuel consumed per day: m3/day Number of drainage blockages per month	90,000
G. TOTAL				**1,380,000.00**

8.3 Decommissioning Phase

Decommissioning is an important phase in the project cycle and comes last to wind up the operational activities of a particular project. Decommissioning phase will involve; notification of intent to all relevant agencies and liaising with the project engineers, architects and environmentalists in a bid to ascertain guidelines on possible impacts and mitigation measures.

It refers to the final disposal of the project and associated materials at the expiry of the project lifespan. If such a stage is reached, the proponent needs to remove all materials resulting from the demolition/decommissioning from the site. The following should be undertaken to restore the environment.

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

Table 3: The proposed EMMP for decommissioning phase

DECOMMISSIONING PHASE				
Impacts	**Mitigation Measure**	**Responsibility**	**Indicator**	**Cost (KSh)**
Fuel tanks	• Ensure there is no spillage during emptying and removing of the underground tanks • Any fuels removed from the tanks, surrounding soil that maybe contaminated must be disposed into licensed dumpsites.	Contractor	Fuel spills Empty and disused tanks on site	70,000
Disturbed environment	• Undertake a complete environmental rehabilitation program • Landscaping and introducing appropriate local vegetation	Proponent; Contractor	A rehabilitated site	350,000
Noise & Air pollution	• Maintain decommissioning equipment • Demolition works to be carried out only during normal working time (00800 to 1700) hours. • Workers working in noisy section to wear ear muffs • Workers should be provided with dust masks • Sprinkling dusty areas • Install dust trappers around the site • Ensure strict enforcement of on-site speed limit regulations • Avoid excavation works in extremely dry weathers if and where possible			50,000

Demolition waste	• Demolition debris should be collected by a licensed private contracted waste collection company • Demolition waste should be re-used or backfilled. • Identifying all sources of wastes, and ensuring wastes are handled by licensed personnel • Making available suitable facilities for the collection, segregation and safe disposal of the wastes.	Proponent; Contractor	Amount of waste on site Presence of well Maintained receptacles and central collection point	50,000
Loss of income	• The safety of the workers should surpass all other objectives in the decommissioning project. • Adapt a project –completion policy; identifying key issues to be considered. • Compensate and suitably recommend the workers to help in seeking opportunities elsewhere.	Proponent	Proponent	30,000
Occupational Health and Safety Risks	• Provide all workers with the necessary protective gears • Ensure all workers are in protective gears all the time when on site • Place fire extinguishers in strategic areas within the deport • Designate and mark smoking areas • Provide enough first aid kits within the project site • Train workers in administering first aid	Proponent Contractor	Number of incidents/ accidents per monthly Availability of PPEs Visibility and clarity of signage and alerts Presence of First Aid Kits and fire-fighting equipment Level of awareness of workers	80,000

	• Ensuring all potential hazards such as movable machine parts are labelled. • Placing visible and readable signs around where there are risks. • Ensuring there is security in and around the site to control the movement of people. • Providing safe and secure storage for equipment and materials in the site. • Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site.			
G. TOTAL				**630,000.00**

Monitoring will be aimed at improving the management of the project. There will be periodic visits to the project site in order to observe and assess activities on the site and changes on the environment. A checklist for monitoring will include, among others, the state of the environment, land use activities; variations in project plan, adherence to provisions in EMP.

CHAPTER NINE: HEALTH, SAFETY AND ENVIRONMENT MANAGEMENT PLAN

9.1 Introduction

This HSE Management Plan outlines how the proposed project will manage its HSE risks commensurate to the significance and magnitude of these risks. The purpose of this management plan is not only to ensure that the project complies with the relevant HSE legislation and guidelines but also that it avoids (where possible), reduces or minimizes its risks. Together with the actions proposed in the Environmental Management Plan of this study report this management plan will synergistically enable the project to set environmental performance objectives, goals and targets and achieve them. This HSE Management Plan (HSEMP) is guided by both national HSE/OSH legislation and GIIP, which should always be made available in the project, these include:

9.2 National Legislation

- EMCA of 1999 revised 2015, and its subsidiary legislations
- OSHA of 2007
- The Public Health Act of 2005
- The Physical Planning Act, Cap 286
- The Energy Act of 2005
- The Kenya Water Act of 2016

9.3 Good international Industry Practice (GIIP)

- The World Bank General EHS Guidelines, April 30,2007
- The IFC Performance Standards of Environmental and Social Sustainability of 2012: Performance Standards 1, 2, 3, 4 & 6.
- The WHO Guidelines on indoor and outdoor Air Pollution

9.4 Health & Safety EMP Scope

This HSEMP covers all aspects that the project proponent has an influence over and all activities in the project's area of influence. This area of influence includes:

- The project's main and ancillary activities in the project site;
- Any works financed as part of the project that will be carried outside the project's site;
- Any works carried out by third parties or employees of the project, and
- The areas where the project's direct impacts will be felt and will cause a HSE risk.

This area of influence delineates the proponent scope of liability as legally defined and the measures proposed will assign adequate management control over these aspects and activities in order to manage risks.

9.4.1 Health & Safety Purpose

The primary purpose of this HSEMP is to ensure the proponent has an established benchmark for HSE legislative compliance and to ensure the project is carried out safely environmentally and ergonomically. This can be broken down in the following objectives:

- To ensure the project is undertaken without any incidents or accidents to its primary employees.
- To ensure the project is undertaken without any incidents or accidents to its secondary employees and members of the public.
- To ensure adequate facilities are put in place to carry out the project's principal and ancillary activities.
- To ensure that all of the project's employees are adequately trained, aware of and committed to of all HSE procedures.
- To ensure adequate resources are assigned towards HSE management.
- To ensure that period monitoring of HSE performance is undertaken so as to improve this performance.
- To ensure the project's compliance to HSE legislation is continuously and continually evaluated.

The proponent should also develop a HSE policy creating an umbrella of guidance for all its HSE functions and practices. This policy should be converted into sectoral goals (water, energy, OSH etc.) using the above objectives and targets developed for HSE performance. The proponent's top management should lead the commitment to the policy and it should be made available to all employees, contractors, sub-contractors and members of the public. This policy should also be integrated into the project's human resource and labor policies, which would delineate what the proponent would be liable to and what contractual obligations the project would have on the second and third parties involved in its supply and value chain.

9.4.2 Health & Safety Management Framework

In order for the project to successfully carry out all HSE procedures and achieve the goals of this HSEMP adequate human resources will be required on the part of the client to take a leading role of HSE. As a preliminary dependent on the resources available, the leading HSE responsibilities may be integrated into the roles of either primary or secondary staff charged with site and employee management. However if adequate resources are available it is suggested that the proponent creates a responsibility for an overall HSE manager who will oversee and direct all HSE functions of the project.

Under the HSE manager's docket, the HSE manager or person charged with HSE management duties will be responsible for monitoring, evaluation, reporting and developing internal HSE guidelines in line with national legislation and GIIP. Additionally HSE should be integrated into the procurement and human resources policies of the project, and thus roles should be defined for contractors working on behalf of the proponent. Each contractor should have a role in their company for HSE management if their activities fall within the scope of this HSEMP. They will report to the overall HSE manager and assist in the achievement of the project's HSE goals.

On an administrative scale the effectiveness of the HSEMP will depend upon the collaboration of other key institutional players who are mandated with HSE responsibilities legally and on national and locals scales. These include state agencies and offices who are charged with HSE responsibilities and they should be involved early in the project when developing the final HSE Management Plan and during its implementation.

9.4.3 Training and Capacity Building in HSEM

To ensure that the project staff with a role to play in HSEM and the implementation of this HSEMP, the proponent should always ensure all staff are recruited with adequate skills and knowledge in HSE and the HSE aspects of their roles. This also includes making sure the staff are medically fit to carry out their roles as part of its HRM and HSE policies. In addition to this the proponent should integrate training and capacity building in HSEM in its staff and career development training program. This also includes the training suggested in the ESMP.

Training can be undertaken in several ways dependent on its objectives, the initial capacity of the audience, and the level of control the audience has over the project's HSE performance. Some

methods can include: Induction training, Supervisor and management training, On-the-job training, Specific hazard training, Work procedures and skills training, Emergency procedure training, and First aid training among other trainings. All training and its content should be documented to enable monitoring and evaluation, and they should also training and education on social wellbeing and employee welfare through raising awareness of the principles of equal opportunity as well as communicable diseases.

Additionally, the proponent should as part of its capacity building program, create awareness on HSE practices, risks and new developments. This can be done through several ways such as: circulars, white papers, notices on notice boards, email, text messages, social media, meetings, workshops. Similarly these should also be documented to enable monitoring and evaluation.

9.4.4 Monitoring, Evaluation and Reporting

All aspects of the HSEMP should be recorded as required by its guiding principles, legislation and GIIP. Records should be kept onsite and backed up in case of any eventualities that may damage them. A monitoring plan should be developed as part of the HSEMP through which its different aspects will be monitored and documented based on aspect specific frequencies. The monitoring and records will include: training, training content, incidents, accidents, complaints, internal and external communications, levels of emissions, MSDS etc.

In this regard, the proponent should also develop adequate and efficient communication channels and procedures for the project through which all HSE will be communicated. The records should allow for the HSEMS to be audited or its performance evaluated periodically so that it may be improved continuously through a Plan-Do-Check-Act (PDCA) framework. Additionally audits should be undertaken as required by legislation such EMCA of 1999 (Amended 2015) and OSHA of 2007 and reported to the relevant authorities.

Incident and accidents should also be reported both internally and externally as required by legislations. A reporting schedule should also be developed as part of the HSEMP, which will guide the required reporting procedures based on their frequencies and format. Reporting and documentation should also cover corrective actions taken to close out non-conformities.

9.4.5 HSE Risk Management Measures

Several risk management measures are proposed in this subsection through which the project will adopt safe and self-improving measures in line with national legislation and GIIP, as part of its HSEMP. However, it is proposed that risks are best avoided early in the design and planning phases of the project following the hierarchy as below:

9.4.5.1 Risk Register

During all phases of the project, the proponent and their third parties where applicable such as contractors, should develop a risk register of all HSE risks in the project. This identification of risks can be done through an aspects-impacts register or log, which links the project's aspects to impacts and ranks the level of risk by analyzing its probability and likely consequences. Importantly, the risk register should also take into perspective the level of public concern over the risks involved and identified, as a matter of good practice.

As a matter of policy and good practice the proponent should ensure third parties have adequate skills in risk management and systems are put in place to manage all risks. Linked to the risks register are the remedial actions which reduce or avoid the risk where possible. The proponent through either the HSE manager and/or engineers should always seek to avoid risks early enough through design and planning but this is not possible they should develop the requisite remedial actions or plans to legally acceptable standards (such as EMCA of 1999 and OSHA of 2007) and GIIP standards.

The information of the risk register and these remedial actions should be documented, readily available and regularly updated to ensure it stays relevant and actual. Some of the HSE risks from the project will come from the following aspects:

9.4.5.2 Re-construction Phase HSE Aspects

- Air emissions
- Water emissions
- Moving parts
- Heavy equipment and trucks
- Inflammable materials
- Hazardous/Poisonous chemicals and substances

- Storage areas
- Ladders
- Working at heights
- Electricity
- Open pits
- Heated surfaces, solids and fluids
- Wastes
- Raised materials and equipment, etc.

9.4.5.3 Operational Phase HSE Aspects

- Slippery floors
- Moving parts and barriers
- Storage areas
- Heated surfaces, solids and fluids
- Cold surfaces, solids and fluids
- Hazardous/Poisonous chemicals and substances
- Inflammable materials
- Electricity
- Wastes
- Air emissions
- Water emissions
- Vehicles and service trucks, etc.

9.4.5.4 Decommission Phase HSE Aspects

- Falling debris
- Air emissions
- Water emissions
- Heated surfaces, solids and fluids
- Hazardous/Poisonous chemicals and substances
- Moving vehicles and trucks
- Heavy equipment and materials, etc.

9.4.6 HSE Resources and Responsibilities

An important part of the HSEMP is to delineate all the resources required for its effective implementation so as to ensure it remains as cost effective as possible. This will be the duty of the HSE Manager and all the resources human and financial should be listed alongside the remedial actions employed against each of the project's risks. Financial records should be maintained to ensure the HSE remains accountable and basically makes business sense by showing the costs avoided by maintaining the system in terms of lives saved, man hours saved, health care etc.

Whereas the human resources responsible for undertaking all activities that carry or create risk should be kept in record and maintained. This will ensure the project has a documented, maintained and established method of managing HSE responsibilities. This will in addition keep all the staff undertaking these activities abreast with not only the policies in place but also with the risks involved with their activities and importantly know how to manage the risks and carry out their duties safely. This information will also be vital when undertaking audits and targeting training towards the staff and foster greater accountability in the staff in terms of monitoring and reporting since all duties will be known and documented.

9.4.6.1 Medical Program and Insurance

The proponent and his contractors should also ensure the medical program is maintained for the project's staff on induction, during the job and include rehabilitation where appropriate and commensurate to the risks that the staff will be exposed to. This program should include regular check-ups to ensure the project's staff are medically and mentally fit to undertake their duties. It should also form part of training through an ergonomic and social curricular that will also include facilitations for lifestyle improvement and raise knowledge on diseases such as HIV/AIDS, STIs and other infectious illnesses.

The proponent and his contractors should additionally ensure adequate facilities and services are in place which promote employee rest, relaxation and rejuvenation. This may include rest and recreational areas, provision of clean water, undertaking stress relieving activities such as games, counselling and peer chats among others.

Importantly and as legally required the proponent and his contractors should provide a medical/insurance cover for all staff. The cover should in the least be able cover for all injuries,

illnesses and incidents that may occur on the job and follow up with rehabilitation that at least returns the employee(s) to their initial state before the occurrence where possible. It should be noted that although the proponent may provide insurance, it should be mitigation based by firstly promoting the actions of the HSEMP which when followed all risks will well managed.

9.4.6.2 Emergency Preparedness and Response Plans

The proponent through an all-inclusive process should develop an EPRP as part of the HSEMP and through which the project will stay ahead of risks presented by both man-made and natural hazards that have the capacity to turn into disasters. The proponent and his contractors should do this by first identifying all hazards pertinent to the project and its site in line with the risks register but with specific difference being that these hazards will have greater potential of turning into a disaster.

This should also be done in line with national policies on disaster management such as the National Disaster Management Response Plan of 2009, and involve all key players in disaster management nationally. This stakeholder involvement will enable the EPRP to be cross sectoral and multidisciplinary and the proponent should lead the process.

9.4.7 Grievance Redress System

The proponent should also develop a GRS and make it accessible to all stakeholders internal and external. The GRS should always seek to address grievances through legally acceptable methods and as fast as possible whilst not preventing any complainants from seeking other legally acceptable methods to justice. Such a GRS should be made available to staff on recruitment and to members of the public either through government agencies/offices through grievance application forms, and internally by establishing procedures for investigation and quick redress that will be recorded and tracked.

The GRS should be monitored through indicators of its efficiency and effectiveness of solving the grievance and producing lessons learnt through which corrective actions can be undertaken to improve the project's HSEMP. Additionally, as part of monitoring and review all grievances should be reported to the relevant authorities and the corrective actions taken, to ensure the system is credible and transparent. The process should also be culturally appropriate, transparent and non-coercive.

CHAPTER TEN: MONITORING GUIDELINES

10.1 Environmental Monitoring Systems

The management of the re-construction of the proposed Kileleshwa Shell Service station will introduce a monitory system for the various activities.

10.1.1 Waste Production Monitoring Systems

The waste to be produced will include:

- Solid wastes such as those from poly-filler polythene bags and paint tins.
- Liquid wastes from lavatories, kitchen and the washrooms.
- Air pollutants from burning activities within the site.

10.1.2 Solid Waste Monitoring System

This monitoring system will include follow-ups on the solid waste production within the service station premises. Strategies on how to handle the wastes from the service station will have are as stated in the EMP. Liquid wastes from the toilets and the washrooms will have to be carefully monitored while storm water from Ring Road should not mix with water contaminated with oil which is directed to the oil interceptor where it fills up and collected by a VEKL waste handler for sound disposal.

10.2 Monitoring the Environmental Health and Safety

This will include follow-ups on the environmental health and safety criteria in place together with the environmental management policy. The shortcomings will be noted and measures designed to counteract the impacts. Alternatives must be sort for any foreseen safety danger. Risk assessment of fire outbreaks, and others will not be ignored while waste management in the service station will be strictly monitored. Safety standards will constantly be maintained. Therefore the guidelines will encompass but not limited to the following;

- Accidents and risk assessment arising from the use fuel and petroleum products, roads, electricity and/ or any other amenity.
- Waste management
- Health and safety measures using such standards as ISO 14000 and EMS and the laid down regulatory framework.

CHAPTER ELEVEN: CONCLUSIONS AND RECOMMENDATIONS

The proposed re-construction of service station has been well designed as per the standards of the Physical Planning department and the relevant regulatory agencies. The proposed development project will have economic benefits such as generation of income to the proponent, creation of employment, making use of un-utilized plot and increasing revenue to the National and County Governments.

11.1 Conclusion

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

- It is important that informative signs (bill board) to be erected at the site. These should indicate the list of all Engineers, Contractor, details of the proposed project and all the Approval numbers. Operation hours and when works are likely to be started and completed to be indicated.
- All solid waste materials and debris resulting from excavation and construction activities must be disposed-off at approved dumpsites. The wastes should be properly segregated and separated to encourage recycling of some useful waste materials; i.e. some excavated stone materials can be used as backfills.
- All construction materials and especially sand, gravel, hardcore and wood must be sourced/procured from legalized dealers.
- Construction activities must be undertaken only during the day i.e. between 0800 hours to 1700 hours. This will minimize disturbance to the general public within the proximity of the site/project especially the nearby residents
- Proper and regular maintenance of construction machinery and equipment will reduce emission of hazardous fumes and noise resulting from friction of rubbing metal bodies.
- Heavy construction activities should be limited (or avoided) during the rainy season to minimize the chances of soil degradation (soil erosion).
- Maintenance activities must be carried out in service bay to reduce chances of oils or grease or other maintenance materials, from coming into contact with environment (water or soil).
- Workers should be provided with complete personal protective equipment (PPE) and safety gear. They should have working boots, complete overalls, helmets, gloves, earmuffs, nose masks, goggles etc. A fully equipped first aid kit must be provided within the site.

- The contractor must have workmen's compensation cover; the contractor is required to comply with workmen's compensation Act as well as other relevant ordinance, regulations and Union Agreement
- The contractor must provide adequate security during the construction period and especially during the night when there are no construction activities.
- The Proponent is advised to ensure the contractor does adhere to the architectural plans and proper backfilling and landscaping be done so as to rehabilitate the environment and improve its aesthetic value.

Further recommendations for the prevention and mitigation of adverse impacts are as identified by the study shall be mitigated as outlined in the EMP.

11.2 Recommendations

Finally, having gone through the EIA process for the proposed project to its conclusion, we hereby recommend approval of this report and subsequently issuances of the EIA license to the proponent to enable him commence, re-construction and implementation of the project.

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APPENDCES

- Approved Architectural Drawings
- Bill of Quantities
- Title Deed
- Questionnaires
- Copy of EIA practicing license