Environmental and Social Impact Assessment (ESIA) Study Report for the Proposed Sludge Handling Facility on Plot L.R. No. Mombasa/Block 1/258 in Shimanzi, Mombasa County.

Proponent	Firm of Experts
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Date: February 2022

CERTIFICATION

Certification by Lead Experts

We, Envasses Environmental Consultants Limited hereby confirm that this Environmental and Social Impact Assessment Study Report has been prepared by ourselves pursuant to Section 58 of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

Signed for and on behalf of: **Envasses Environmental Consultants Limited**
Firm of Experts No. 6175

Name: Mr. Simon Nzuki

Designation: Chief Executive Officer & Lead Expert No. 1350

Signature: _____ **Date:** _____

Certification by Proponent

We, Seahorse Energy Limited hereby confirm that this Environmental and Social Impact Assessment Study Report has been prepared and submitted to NEMA with our authority pursuant to Section 58 of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

Signed for and on behalf of:

Name: _____

Designation: _____

Signature: _____ **Date**: _____

ACKNOWLEDGEMENTS

The successful preparation of this Environmental and Social Impact Assessment Study Report was made possible by contributions from the proponent, the consultants and project stakeholders.

We acknowledge the proponent, Seahorse Energy Limited, for providing the requisite logistical, financial, human resources and documentation on the proposed project.

We are indebted to the neighbors and stakeholders for participating in the public consultations and providing their views, comments and concerns in respect to the proposed project.

Sampling and analysis of environmental media which included air quality, noise levels and soil tests were undertaken by Lahvens (K) Limited. The consultants are grateful for their invaluable input in the preparation of the EIA report.

EXECUTIVE SUMMARY

The proponent, Seahorse Energy Limited, proposes to set up a sludge handling facility in Shimanzi, Mombasa County. Pursuant to Section 58 of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya and the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, the proponent contracted Envasses Environmental Consultants Limited, a Firm of Experts licensed by NEMA, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed project. In addition to compliance with the law, the output of the ESIA process will provide a baseline of the environmental and social conditions of the project area to enable future monitoring of the environmental performance of the proposed project.

The methodology for preparing the ESIA study report was guided by the Third Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. Site visits were undertaken in January 2022 for purposes of area reconnaissance, assessing the baseline and environmental risks associated with the proposed project as well as applicable environmental safeguards and standards. Environmental screening criteria was informed by the Second Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. As per this Schedule the issues considered by the experts included; ecological and socio-economic issues, landscape changes, land use character and water. Data collection methods included literature review of relevant documents, observations during site visits and photography. The stakeholder engagement strategy included stakeholder consultative meeting and administration of questionnaires to the neighbors. Baseline environmental data was collected on ambient air, noise levels and soil tests in collaboration with Lahvens (K) Limited.

The findings of the ESIA study demonstrate that the proposed project is expected to have both positive and negative environmental and social impacts. The positive impacts include; provision of services for safe management of used oil, source of raw materials to used oil recycling facilities, creation of employment opportunities and generation of revenue to the government. Alongside the positive impacts, several environmental and social impacts will arise at different phases of the project cycle.

At construction phase, the main environmental issues will include environmental risks of sourcing raw materials, water demand and effluent generation, solid waste generation and management, occupational safety and health risks, air and noise pollution and asbestos disposal.

Construction activities will require raw materials such as steel bars, sand, cement and building blocks, among others. These materials will be sourced from the environment and will have a negative impact at their points of origin. The proponent should thus source raw materials from sites that are licensed as per the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya, have a procurement plan based on the Bill of Quantities prepared by a Quantity Surveyor and re-use construction materials which can be salvaged.

During construction, water will be required for concrete mixing, casting and curing works, drinking and sanitation purposes. The total estimated water demand per day is $10m^3$ and will be supplied by water bowsers. Out of these, 10% i.e. $1m^3$ will be used for domestic purposes and will generate $0.7m^3$ of effluent which will need to be disposed. The rest of the water soaks into ground areas within the project site. Poor disposal of the wastewater generated has potential to pollute underground aquifers. The workers will use the existing sanitary facilities at the project site and the effluent will be managed by a system of septic tanks and soak away pits. The recommended mitigation measures include; sensitizing the workers on the need to conserve the available water resources, installation of a bio-digester in place of septic tank and ensuring compliance with the

provisions of the Environmental Management and Coordination (Water Quality) Regulations, 2006.

Site preparatory and construction activities will generate significant quantities of solid waste such as overburden, rock rubbles, cuttings and rejected materials among others. These will need to be disposed off appropriately as poor solid waste management can create breeding grounds for disease causing pathogens. To mitigate this, the proponent should procure and strategically place adequate solid waste collection bins with a capacity for segregation, provide a sizeable central solid waste collection bin with chambers to accommodate separated waste, sensitize construction workers on the proper waste management, procure services of a NEMA licensed waste handler to dispose off the solid waste and comply with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006.

The workforce, visitors and neighbors to the proposed project site will be exposed to potential safety and health risks during construction activities. The potential safety risks will be from the use of machinery, risks from moving machinery, falling objects or even falls, air and noise pollution among others. These risks can possibly cause disturbances, injuries, permanent disability or even death. The proponent should register the site as a workplace with the Directorate of Occupational Safety and Health Services (DOSHS), obtain insurance cover for the workers at the site, provide adequate and appropriate Personal Protective Equipment (PPE) to workers and visitors to the site and enforce on their use, ensure moving parts of machines and sharp surfaces are securely protected with guards, provide first aid services and emergency vehicle at the site and comply with the set National Government and County Government Directives and guidelines on prevention of the spread of COVID-19 and the provisions of the Occupational Safety and Health Act, 2007.

Both air and noise pollution are inevitable during construction activities. Air pollution will be as a result of dust generated during excavations, concrete mixing activities and exhaust fumes from machinery use and Heavy Commercial Vehicles (HCVs)delivering construction materials to the site. Air pollution has health implications on the workers, visitors and the neighboring community as it causes respiratory diseases and is a visual irritant. On the hand, noise pollution will emanate from delivery of raw materials by heavy commercial vehicles (HCVs) and the use of machinery. The noise levels produced may be above the stipulated EMCA limits and are a health hazard. The proposed mitigation measures include providing dust masks and ear muffs to the workers and visitors to the site, installation of appropriate and adequate dust screens around the construction site, sprinkling water at the excavation areas to suppress dust and monitoring fugitive emissions. Additionally, the proponent should ensure delivery of raw materials, excavation and construction work are limited to day time hours only and comply with provisions of the Environmental Management and Coordination (Air Quality) Regulations, 2014 and Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

Currently, there are asbestos sheets stored at the project site. When asbestos-containing materials deteriorate or are damaged, asbestos fibers are released into the air. Fibers that are inhaled can lodge and remain in the lungs, or migrate to other locations in the body. Asbestos fibers have been shown to cause asbestosis, lung cancer and mesothelioma. The proponent should dispose all the asbestos sheets stored at the project site, procure services of a NEMA licensed contractor to dispose off the asbestos and ensure that all personnel involve in handling the asbestos are provided with PPE. Additionally, the sheets should be wrapped with a High-Density Polyethylene (HDPE), marked as hazardous and secured ready for transportation, transport vehicles used must have a NEMA licence for transportation of hazardous wastes and disposal should be at a NEMA licensed site with a capacity to handle hazardous wastes.

At operational phase, the main environmental concerns include waste oil leaks and spills, oil sludge management, fire risks and emergencies, occupational safety and health risks, air and noise pollution, water demand and effluent generation, solid waste generation and management, traffic congestion and energy demand.

There is potential of oil spills especially during offloading and transfer of waste oil into the storage tanks and into the oil/water interceptor. Oil/ lubricant leakages may result from the delivery tankers. These products contain detrimental elements which should not be exposed to the environment since they contain traces of heavy metals such as lead, sulphur and mercury among others and would thus contaminate ground water and soil. The proposed mitigation measures include paving the loading and offloading area with an impervious material to prevent any spills, constructing a bund wall around the storage tanks, and loading and offloading area to prevent accidental oil leaks and spills from flowing to other areas and ensuring that adequate spill containment is provided at all times in case of severe leakage of oils. Additionally, the proponent should regularly desludge and maintain the oil interceptor in good working condition, conduct regular tests on the waste oil tanks to curb possible tank failure and comply with the Technical Guidelines on the Management of Used Oil and oil Sludge in Kenya, 2016.

Oil sludge is the viscous, non-flowing, semi-solid material which is generated as a result of long storage of oils. The sludge is hazardous and thus special attention and utmost care in handling and disposal should be accorded. Sludge will be generated from the oil water interceptor and cleaning of the storage tanks. The sludge should be managed through incineration in in accordance with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006 and the proponent should ensure compliance with the Technical Guidelines on the Management of Used Oil and oil Sludge in Kenya, 2016.

Waste oil contains hydrocarbons which are volatile and their vapors in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise. Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Fire occurrence may lead to death, financial losses and loss of livelihoods for the workers and neighbors. The proponent should develop and implement a fire and emergency response plan, provide adequate firefighting equipment and ensure they are serviced quarterly by fire service providers, train employees on the use of fire-fighting equipment, designate a fire assembly point within the facility, display fire safety and warning signage and conduct fire drills biannually and fire safety audits annually.

There are potential safety and health risks associated with operations of the facility. These include dermal contact with waste oil and inhalation of vapors during handling of such products, accidental falls, musculoskeletal injuries and general exhaustion. All these risks have potential to cause injuries, permanent disability or even death and hence the management should be committed to ensuring safety and health of workers and visitors to the facility. The proposed mitigation measures include developing and implementing a safety and health policy, and emergency response plan for the facility, sensitizing employees to adhere to work procedures to minimize accidents, providing adequate and appropriate PPE to workers and enforcing on their use and displaying precautionary signage at appropriate sections within the facility. Additionally, the proponent should conduct first aid training among the workers, provide well-stocked first aid kit, conduct annual occupational safety and health audits and comply with the provisions of the Occupational Safety and Health Act, 2007.

Waste oil storage facilities can be a potential source of air pollution. The main sources of emissions to air include evaporative losses of volatile organic compounds (VOCs) of waste oil from storage, particularly during bulk deliveries. Other sources include exhaust fumes from the waste oil delivery tankers. On the other hand, noise pollution will emanate from vehicular movement in and out of the facility. However, the background noise within the area is in keeping with that will be generated by the vehicles accessing the facility. The proponent should provide appropriate and adequate PPE to all workers and enforce on their use, sensitize the drivers to avoid unnecessary hooting and running of vehicle engines and comply with the provisions of the Environmental Management and Coordination (Air Quality) Regulations, 2014 and (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

Water will be required for sanitation and drinking purposes and will be supplied by water bowsers. Water demand is estimated at 1 m^3 per day. Seventy percent (70%) of the domestic water use will be generated as effluent from sanitation facilities and will be managed by the existing system of septic tank and soak away pit. Additionally, wastewater will be generated at the interceptor during the separation process of the sludge. The proponent should create awareness among the staff on water conservation, monitor the quality of domestic effluent discharge the interceptor to ascertain conformity to the set standards, apply for and obtain an Effluent Discharge License (EDL) from NEMA and comply with the provisions of the Environmental Management and Coordination (Water Quality) Regulations, 2006.

The facility will generate different types of solid wastes i.e. from the office comprising of mainly paper from administrative activities, glass and plastics for office supplies; and from the used oil operations of the facility in the form of rags, used seals and packaging materials. Poor disposal of solid waste degrades environmental quality. Adequate measures should be put in place to ensure that oil contaminated wastes are not mixed with regular wastes. The proposed mitigation measures include provision of adequate solid waste collection bins with a capacity for segregation within the facility, sensitizing workers on proper waste management and procuring a sizeable central solid waste collection bin with chambers to accommodate separated waste. Additionally, the proponent should contract a NEMA licensed waste handler to dispose off the solid waste and ensure compliance with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006.

The site is located along the Unga street and the day-to-day activities of the facility may increase the vehicular count along the street but will not enormously impact on the normal traffic. The proponent should develop and implement a traffic management plan, control entry and exit of vehicles to and from the facility, ensure that all the vehicles accessing the facility are parked within the premises and comply with the Traffic Act, 2016.

The facility will use energy resources from the environment such as electricity and fuel. Electrical energy will be used for lighting the offices, operation of electronic equipment and other daily operations. The primary energy source will be the National Grid. The recommended mitigation measures include sensitizing workers to switch off lights when not in use, harnessing solar energy and ensuring regular servicing and maintenance of electrical appliances.

A decommissioning phase is possible in the event of end of project life, closure by government agencies due to non-compliance with environmental and health regulations, an order by a court of law due to non-compliance with existing regulations, natural calamities and change of user of land. Key environmental and social concerns at this phase will be economic decline, waste generation and safety and health risks. The proponent should prepare and submit a due diligence decommissioning audit report to NEMA for approval at least 3 months in advance.

In conclusion, the proposed project is considered important and beneficial to the economy as it will ensure safe management of used oil, provide raw materials to used oil recycling facilities promote socio-economic growth of the area through employment creation and revenue generation to the government. The ESIA study proposes a suite of comprehensive Environmental and Social Management and Monitoring Plans to address the anticipated negative impacts during the entire project cycle and improve the environmental performance of the proposed project. It is on this basis that we recommend that the project be allowed to proceed alongside conditions which will ensure compliance with the provisions of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

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ACRONYMS

CO	Carbon Monoxide
COP26	26th United Nations Climate Change Conference of the Parties
COVID-19	Coronavirus Disease 2019
DOSHS	Directorate of Occupational Safety and Health Services
EDL	Effluent Discharge License
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GRM	Grievances Redress Mechanism
HCVs	Heavy Commercial Vehicles
HDPE	High-Density Polyethylene
ITCZ	Inter Tropical Convergence Zone
KNBS	Kenya National Bureau of Statistics
MWSSCL	Mombasa Water Supply and Sanitation Company Limited
NCA	National Construction Authority
NEMA	National Environment Management Authority
NO_2	Nitrogen Dioxide
O_3	Ozone
OSHA	Occupational Safety and Health Act
PAH	Polycyclic Aromatic Hydrocarbons
PIEA	Petroleum Institute of East Africa
PM	Particulate Matter
PPE	Personal Protective Equipment
TORs	Terms of Reference
TPH	Total Petroleum Hydrocarbon
TVOC	Total Volatile Organic Compound
WRA	Water Resources Authority
WRB	Water Services Regulatory Board
WRUAs	Water Resources Users Associations
WSBs	Water Service Boards
WSPs	Water Service Providers

1 INTRODUCTION

1.1 Background information

The world demand for lubricant oil is about 41.35 million metric tons. The regional distribution indicates that Africa consumes only 2.068 million metric tons of the global lubricant consumption. Kenya consumes about 0.007 million metric tons of lubricating oils (PIEA, Kenya 2013). These lubricating oils become degraded after use due to presence of contaminants hence not fit for its intended use and require to be disposed. Improper storage, handling, transportation, treatment and disposal of the waste oils results in negative environmental impacts and public health hazards.

The proponent, Seahorse Energy Limited, proposes to set up a sludge handling facility in Shimanzi, Mombasa County. Pursuant to Section 58 of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya and the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003, the proponent contracted Envasses Environmental Consultants Limited, a Firm of Experts licensed by NEMA, to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed project. In addition to compliance with the law, the output of the EIA process will provide a baseline of the environmental and social conditions of the project area to enable future monitoring of the environmental performance of the proposed project.

1.2 Project location and neighbourhood

The proposed sludge handling facility will be located in Shimanzi, Mombasa County. It is geo-referenced at Latitude **4°02'40.82''South and Longitude 39°39'09.41''East** (Figure 1). The proposed project site lies along Unga Street adjacent to Summit Fibres Limited/Red Plum Enterprises. It is currently undeveloped and is being used as a parking area for petroleum trucks. There are dilapidated warehouses on site which were previously used by Kenya Meat Commission (Figure 2). The proponent will construct a perimeter wall to separate the warehouses from the sludge handling site. Other existing infrastructure include site offices (Figure 3), changing room (Figure 4) and sanitation facilities. The site is secured with a boundary wall and has an access gate.

The neighborhood is predominantly commercial. The proposed project site neighbors Greif East Africa to the West, Ministry of Public Works and Housing to the South West, Vitaform Products Limited and SGS Kenya Limited to the North West and Timsales to the North.

1.3 Project design and description

The proposed project will involve the construction and subsequent operation of a sludge handling facility. The facility will comprise of four (4) oil storage tanks with a capacity of 200m^3, loading and offloading area, oil/water interceptor, perimeter wall, office block and sanitation facilities. The tanks will be mounted on concrete slabs above a paved ground (2ft high) with a drain to channel the oil sludge into the oil/water interceptor. At the interceptor, oil will be separated from water. The end product is furnace oil which will be sold off to industrial clients for further use.

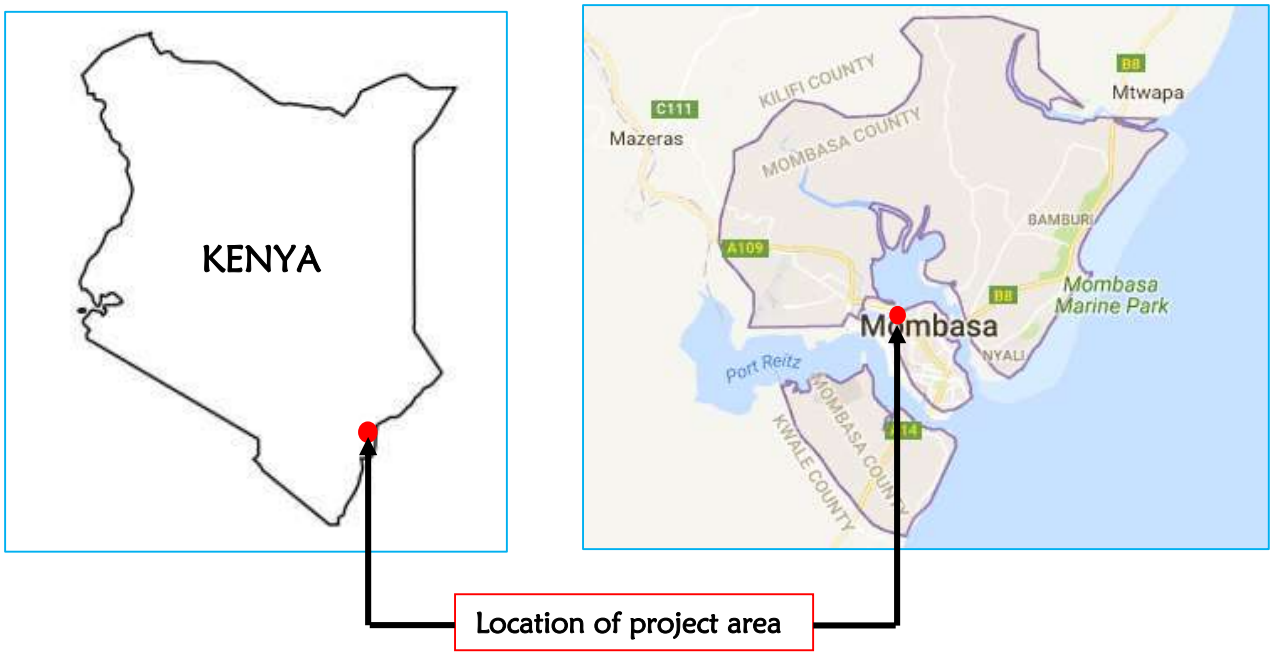

Figure 1: The location of the proposed project site (Source: Google Earth, 2022).

Figure 2: A section of the dilapidated warehouses at the proposed project site which were previously used by Kenya Meat Commission (Source: site visit, January 2022).

Figure 3: Administrative offices at the proposed project site (Source: site visit, January 2022).

Figure 4: Changing room at the proposed project site (Source: site visit, January 2022).

1.4 Study approach and methodology

1.4.1 Introduction

The methods adopted for preparing the ESIA study report were guided by the Third Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. The consultants prepared a scoping report and Terms of Reference (TORs) as required under Regulation 11 of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003 and submitted them to NEMA for consideration for approval. The scoping report and TORs were approved on 7th February 2022 and the consultants began preparation of the ESIA study report.

1.4.2 Data collection

The methods for carrying out the study included site visits and observations, photography, literature review of relevant documents, baseline monitoring of environmental media (air quality, noise levels and soil tests) and public consultations through administration of questionnaires and public consultative meeting. A site visit was undertaken in January 2022 for purposes of area reconnaissance, assessing the baseline environmental conditions of the proposed project site and screening of environmental risks associated with the proposed project as well as the applicable environmental safeguards and standards. Environmental screening criteria was informed by the Second Schedule of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. As per this schedule, the issues considered by the experts included ecological impacts, socio-economic issues, landscape changes, land use character and water (Table 1).

Table 1: Summary of the results from the screening exercise.

Criteria	Results
Ecological impacts	– Excavation will occur – No endangered species of trees and plants found at the site – No endemic species reported on site
Social-economic considerations	– Provision of services for safe management of used oil – Provision of raw materials to used oil recycling facilities – Employment creation – Optimal use of land – Income to the proponent – Revenue to the government through taxes & licenses – No cultural or heritage issues at the site
Landscape impacts	– The proposed project will not impact significantly on the landscape of the area
Land uses	– The project neighborhood features commercial land use
Water	– The construction and subsequent operations of the proposed project will increase water demand and impact on water resources

1.4.1 Baseline environmental data

Baseline environmental data was collected on ambient air and noise levels, and soil in collaboration Lahvens (K) Limited. The results will be used to provide a benchmark for implementing the Environmental Monitoring Plan proposed in the ESIA report. The approaches and methods used for sampling and analysis of baseline environmental media are discussed below.

1.4.1.1 Ambient air quality monitoring

Mobile, static and active monitoring was done by use of real time gas detector-pump suction equipment LB-MS4X (Figure 5) which integrates the main ambient gases and meteorological parameters.

The gas sensitive semiconductor sensor uses proprietary sensing material, built in automatic Correction (ABC) and interference rejection. This combination results in ppb resolution and a highly linear response. The gas sensitive electrochemical sensors generate nano-amp currents proportional to the gas concentration. Aeroqual uses low noise electronics to capture these signals resulting in low detection levels. The non-dispersive infrared sensor uses infra-red light, a narrow band-pass filter and photodiode to measure the intensity of light at the gas absorption band. The light intensity is proportional to the gas concentration.

The laser particle counter for Particulate Matter measurements uses optimized signal processing using low noise electronics added algorithms to correct for interferences. An aerosol particle counter works on the principal of either light scattering or light blocking. An aerosol stream is drawn through a chamber with a light source (either Laser Based Light or White Light). When a particle is illuminated by this light beam, it is redirected or absorbed. Light scattered by a single particle in a specific direction in relation to the original direction has a unique signature which relates to the size of the particle. This allows for sizing and counting of individual particles.

1.4.1.2 Baseline noise levels measurements

Noise emission survey (Figure 5) was achieved via initial examination of existing road traffic and other noise sources of significance. Noise levels was evaluated using a Sound Level Meter Model AWA 5636 IEC 61672 – 1:2013 class 2 with a built-in ⅓octave / octave band filters which does real time 1/1 and 1/3 octave analysis was mounted on at 2.0m above ground level and at least 3.5m

away from any sound reflecting surfaces at a boundary position and measurements taken at timed intervals over 10 minutes and stored in SLM's memory. The sound level meter was placed on the microphone to reduce any wind interference during measurements. The sound level meters, were within its calibration period, at the time of monitoring. In addition, the equivalent noise level (LAeq), the maximum sound pressure level (Lmax) and the minimum sound pressure level (Lmin) during that measurement period were recorded. Factors to consider such as time, duration and predictability of the noise emission, amplitude and frequency of the noise emission, nature of the source, location of noise sensitive receptors, ambient and background noise level, nature and character of the locality, presence of special acoustic characteristics and the incongruity or familiarity of the noise during noise survey and site placement were put into consideration. Furthermore, as each individual measurement was being taken, the nature of the noise climate in the area was assessed and recorded. This comprised an auditory observation by the surveyor, as well as identifying those noise incidents which influenced the sound level meter readings during that measurement period.

Figure 5: Ambient air quality and noise level monitoring at the proposed project site (Lahvens (K) Limited, February 2022).

1.4.1.3 Soil sampling and analysis

Soil samples were obtained at the proposed project site and analyzed for BTEX, Polycyclic Aromatic Hydrocarbons (PAH) & Total Petroleum Hydrocarbon (TPH) and heavy metals (Figure 6). The purpose of soil sampling and analysis was to give a general indication of the existing potential contaminants and for future monitoring of the impact of the proposed project.

Figure 6: Soil sampling at the proposed project site (Lahvens (K) Limited, February 2022).

1.4.2 Stakeholder mapping

Prior to commencement of the ESIA process, the consultants conducted a stakeholder mapping and analysis to determine the individual, groups and institutions that will be affected by and have an interest in the project in consultation with the proponent, the County Government and the Ministry of Interior and Coordination of National Government. The consultants then prepared a comprehensive list of all the stakeholders in consultation with the proponent and categorized them based on the following:

- Low interest, low influence – those to keep informed
- High interest, low influence – those to involve and consult with
- Low interest, high influence – powerful stakeholders to engage
- High interest, high influence – partners to collaborate with

Nine key stakeholder categories were identified. These are;

1. County and National Government Representation
2. Lead Agencies and community organizations operating directly under them
3. Civil Society
4. Conservation Organizations
5. Local Community and Residents' Associations
6. Opinion leaders including political leaders
7. Faith Based Institutions
8. Special Interest Groups
9. Media

The consultant then identified the key contact persons within the stakeholder categories who will be engaged throughout the ESIA study process. The identification of the key contact persons was

done in consultation with the proponent, lead agencies, the County Government of Mombasa, Ministry of Interior and Coordination of National Government, Residents Associations, Community Groups, Non-Governmental Organizations and Conservation groups.

Further, the consultant identified other stakeholders who may not be apparent but needed to be consulted and analyzing the role of each stakeholder in the ESIA study process as well as project implementation. Finally, the consultant determined the tools for engaging with each stakeholder including language of communication to ensure meaningful participation of the stakeholders in the ESIA process.

Following the analysis, a public consultative meeting was held on 18th February 2022 at the project site.

1.5 Project budget

The total estimated cost of the proposed project is KES 10,000,000.

2 ENVIRONMENTAL SETTING OF THE PROPOSED PROJECT SITE

2.1 Introduction

Baseline conditions of the proposed project site were assessed and documented for the purposes of determining the future impacts of the proposed project on the environment and livelihoods of the local community. The baseline survey was done through literature review, site visits and baseline environmental media monitoring in collaboration with Lahvens (K) Limited. This section details on the findings of the survey which will form a basis for impact monitoring plans and improvement of the environmental and social performance of the proposed project during implementation.

2.2 Topography and climatic conditions

Mombasa is a coastal lowland with extensive flat terrain rising gently from the sea level in the East to about 132m above sea level in the mainland. Mombasa is a tropical city which is warm most of the year. The climate of Mombasa is greatly influenced by the Migratory Inter-Tropical Convergence Zone (ITCZ) characterized by monsoon winds which create a bimodal rainfall pattern. The long rain season occurs from April to July and the short rains from October to December. The average annual rainfall for the area has been recorded as 1196mm.

Temperatures are fairly constant throughout the year ranging from 23°C to 28°C. The warmest temperatures are generally recorded during the months of November to April (mean daily temperature of 27°C) while slightly cooler temperatures are experienced from May to October (mean daily temperature of 24.5°C). The average annual evaporation rate within the project area is 2300mm and the climate is generally classified as semi to sub-humid as the ratio of rainfall to evaporation ranges from 57-68% (Figure 7).

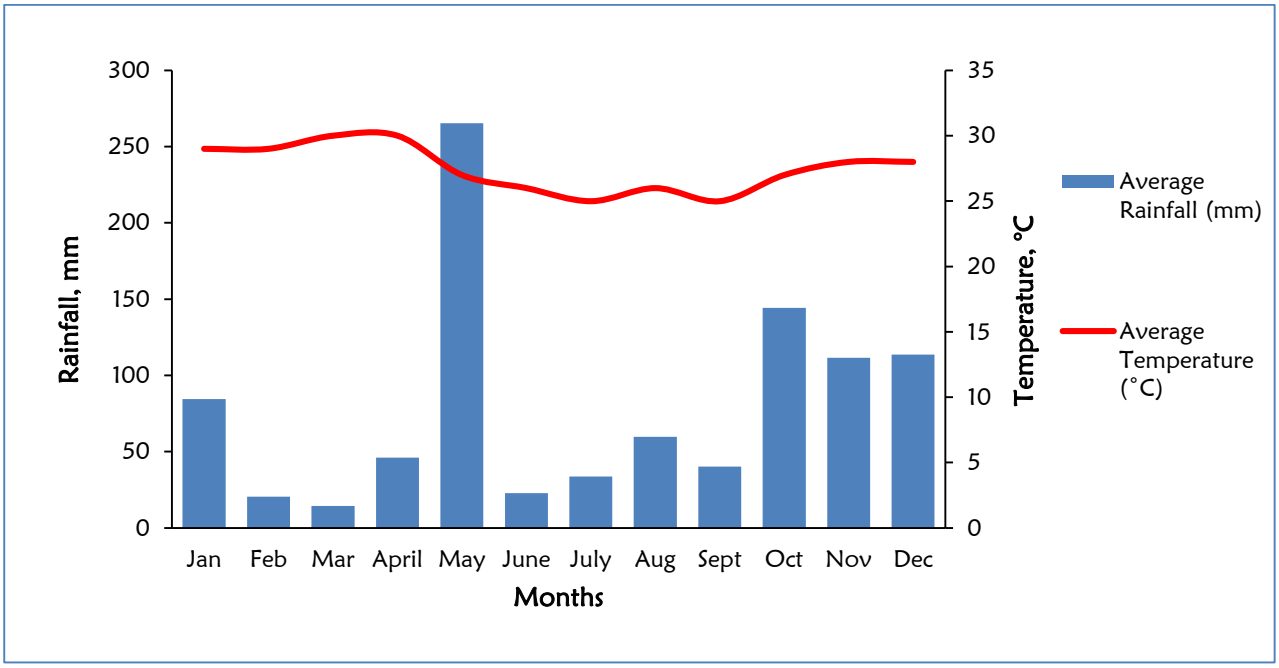

Figure 7: Annual rainfall and temperature distribution for Mombasa County in 2021 (Data Source: World Weather Online, 2022).

2.3 Biodiversity

The above climate dictates the type and species of trees as well as vegetation cover which occurs along the Kenyan Coast. The vegetation of the project site is comprised of grasses, shrubs and tree species which include the *Azadirachta indica* (Neem tree) and common *Casuarina spp.* (Figure 8). The fauna is comprised of birds and lizards.

Figure 8: *Azadirachta indica (Left)* and *Casuarina spp. (Right)* at the proposed project site (Source: site visit, January 2022).

2.4 Demographics

According to the 2019 population and housing census report, Mombasa County has a total population of 1.19 Million people, up from 1 Million people as per the 2009 census. Mvita Sub-County where the proposed project site lies has a population of 154,171 comprised of 75,565 males, 78,601 females and 5 inter-sex people (KNBS, 2019). The main factors attributed to the rapid population growth include increase in fertility rate and improved health services. Rural-urban migration and the continued influx of tourists and foreign investors have also contributed significantly to the growth. Migration from other counties has basically been triggered by employment opportunities in the maritime industry, tourism and the transport sector.

2.5 Water supply in Mombasa County

Mombasa County is served by the reticulated supply from Mombasa Water Supply and Sewerage Company Limited (MWSSCL), which is sourced from Mzima Springs in Taita-Taveta County, Marere Springs and Tiwi Water Supply System through Kaya Bombo Reservoirs. Currently the water demand in the County is at 481,400m^3/day. Due to favorable geology of some parts of the county, the water table is high and sinking of boreholes and wells has led to increased supply of water to supplement the reticulated supply. For the proposed project, water will be supplied by water bowsers.

2.6 Status of sanitation in Mombasa County

Mombasa has three sewerage treatment plants at Kipevu, Kizingo and Tudor. The Kipevu Sewage Treatment Plant is the largest with a capacity of 17,000m^3/day and serves the households, institutions, hotels and industries in the West Mainland area. Kizingo sewage treatment plant has a capacity of 3,000m^3/day and serves the Island area. Tudor sewage treatment plant is a small sewerage scheme that was established to serve the Tudor Estate only.

Currently the sanitation infrastructure in Mombasa County is insufficient to meet the sanitation needs of the growing population and there is need for developing a sanitation system which is environmentally sustainable. Immediate sanitation measures have been developed such as rehabilitation of the existing sewerage system, construction of ablution blocks in public places and sludge handling facilities. The Final Wastewater Master Plan for Mombasa Island describes the development strategy for the long-term sanitation system comprising of a wastewater collection / conveyance system and the treatment / proper disposal of the treated effluent.

The rest of the County depends on privately constructed soak pits and pit latrines which have a potential to pollute water sources. There have been cases of housing estates, industrial establishments and hotels which empty their sewer into storm drains or discharge raw sewage directly into the sea and untreated industrial effluent discharged in the public sewer system. Households in Mombasa generate about 337,000m^3 wastewater per day and the County faces challenges in its disposal (Coast Water Services Board, 2012). Effluent that will be generated at the proposed project site will be managed through a system of septic tanks and soak away pit.

2.7 Solid waste management

Solid waste generation in Mombasa is estimated at 700metric tons per day (Envasses, 2019). The waste comprises of organic and inorganic forms. The main waste generation sources are domestic, commercial ventures, hotels, markets, industries and institutions including health facilities. The types of waste that are generated include: Plastic waste including papers and hard plastics, Organic materials including food remnants and wooden debris, rubber, paper, metals, chemicals, glass, biomedical waste.

Waste materials are collected from point sources or municipal dustbins in mixed form and transported to Mwakirunge dumpsite. All types of waste are transported to the site including hazardous types containing pesticides, heavy metals, oils, batteries, acids, domestic and hospital wastes. The distance to dumpsite and the lack of adequate facilities for waste has created a waste management problem for Mombasa County including proliferation of illegal dumpsites and indiscriminate dumping at the existing transfer stations.

2.8 Infrastructure

2.8.1 Transport Network

Mombasa County is served by a well-established network of all-weather access roads and public service vehicles. The proposed project site lies along Unga Street adjacent to Summit Fibres Limited/Red Plum Enterprises.

2.8.2 Energy Supply

Shimanzi area has proper network of Kenya Power lines. Some developments in the area have also exploited solar energy as an alternative. The proposed project area is connected to the National Grid.

2.8.3 Telecommunication

The proposed project area is well served with communication network including the main mobile phone services such as Safaricom, Airtel and Telkom.

2.9 Baseline environmental data

2.9.1 Ambient air quality measurements

There were notable gaseous concentrations of Sulfur dioxide (SO_2) and Carbon monoxide (CO) and Total Volatile Organic Compound (TVOC) within the project site. Nitrogen dioxide (NO_2) and ozone (O_3) concentrations remained below detection limits (<0.001ppm). Notable levels of particulate matter (PM10 and PM2.5) were also detected. However, the gaseous and particulate parameters measured were all within the stipulated standards under the First Schedule of Environmental Management and Coordination (Air Quality) Regulations, 2014 (Table 2).

Table 2: Baseline air quality measurements for the proposed project site (Source: Lahvens (K) Limited, February 2022).

Project site	NO_2 (ppm)	SO_2 (ppm)	O_3 (ppm)	CO (mg/m^3)	TVOC (mg/m^3)	$PM_{2.5}$ ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
Run 1	<0.001	0.03	<0.001	0.28	0.003	11	19
Run 2	<0.001	0.02	<0.001	0.11	0.003	21	48
Run 3	<0.001	0.01	<0.001	0.13	0.003	17	40
Average	<0.001	0.02	<0.001	0.95	0.003	16.33	35.67
Standard deviation	0.00	0.01	-	0.07	0.0	5.033	14.978
EMCA (Air Quality) Regulations, 2014	**0.5**	**0.191**	**0.12**		**4**	**-**	**100**

2.9.2 Ambient noise level measurements

The results of noise level measurements were within the limits stipulated under the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 (Table 3). The movement of trucks towards the roundabout situated in front of the proposed project gate and neighborhood noise (fugitive noise) from the factories surrounding the project area were the main source of noise.

Table 3: Baseline noise level measurements for the proposed project site (Source: Lahvens (K) Limited, February 2022).

Location	Measured Sound Pressure Level (Noise) (dBA) (1100Hrs-1200Hrs)			EMCA Guidelines (Day time)
	LAeq	Lmin	Lmax	
Proposed project site	55.6	47.4	93.8	60

2.9.3 Soil sampling and analysis

Soil sampling results indicated that Lead, TPH, BTEX and PAH were below 0.01mg/kg (Table 4). Kenya has not developed a specific environmental legislation on soil standards but relies on existing legislation on pollution such as the Environmental Management and Coordination (Water Quality) Regulations, 2006 and the Kenya Constitution 2010 to prosecute environmental crimes on soil contamination.

Table 4: Baseline soil tests for the project site (Source: Lahvens (K) Limited, February 2022).

Test	Test method	Results (mg/kg)	WHO 4th Edition
Oil and grease	ISO 9377-2	Nil	-
Lead as Pb	ISO 8288	<0.01	0.01
TPH			
GRO, C_6-C_{12}	EPA 8015C	<0.01	-
DRO, C_{12}-C_{28}	EPA 8015C	<0.01	-
ORO, C_{28}-C_{44}	EPA 8015C	<0.01	-
TPH, C_6-C_{44}	EPA 8015C	<0.01	-
BTEX			
Benzene	EPA8260B	<0.01	0.01 Max
Toluene	EPA8260B	<0.01	0.7 Max
Ethylbenzene	EPA8260B	<0.01	0.3 Max
Xylene	EPA8260B	<0.01	0.5 Max

PAH			
Naphthalene	EPA 8015C	<0.01	-
Acenaphthylene	EPA 8015C	<0.01	-
Acenaphthene	EPA 8015C	<0.01	-
Fluorine	EPA 8015C	<0.01	-
Phenanthrene	EPA 8015C	<0.01	-
Anthracene	EPA 8015C	<0.01	-
Fluoranthene	EPA 8015C	<0.01	-
Pyrene	EPA 8015C	<0.01	-
Benzo (a) anthracene	EPA 8015C	<0.01	-
Chrysene	EPA 8015C	<0.01	-
Benzo (b) fluoranthene	EPA 8015C	<0.01	-
Benzo (K) fluoranthene	EPA 8015C	<0.01	-
Benzo (a) pyrene	EPA 8015C	<0.01	-

3 IDENTIFICATION OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The proposed project will have both socio-economic benefits and attendant negative environmental and social impacts. The purpose of the ESIA process is to therefore systematically assess the value of the benefits against the environmental concerns and provide measures to avoid, prevent or reduce the magnitude of the impacts. The following section provides details on these impacts and proposed mitigation measures to address the identified negative environmental and social impacts. The mitigation measures are based on the underlying principle of EIA that everyone is entitled to a clean and healthy environment and a duty to enhance and safeguard the environment.

3.1 Positive impacts of the proposed project

The proposed project will have the following benefits;

1. **Provision of services for safe management of used oil**
   The proposed project will provide services for safe management of used oil in accordance to the provisions of the Technical Guidelines on the Management of Used Oil and oil Sludge in Kenya, 2016. These services will prevent the negative environmental and public health risks associated with poor management of used oil.
2. **Provision of raw materials to used oil recycling facilities**
   The proposed project will provide used oil to recycling facilities. Used oil can be recycled through reclamation, reprocessing or regeneration processes to produce clean fuel and base oil respectively. These can be used in industrial furnaces, boilers, kilns and hazardous waste incinerators. Base oil can also be used in manufacture of lubricants.
3. **Provision of employment opportunities**
   The proposed project will provide employment opportunities to both skilled and non-skilled personnel throughout its life cycle. Already the proponent has employed various consultants to develop the storage yard plans and preparation of the ESIA study report. This will in turn improve the local economy and livelihoods.
4. **Income to the proponent**
   The facility through its operations will accrue income to the proponent thus enabling expansion of business and creating more employment opportunities to the locals.
5. **Revenue to the government**
   The proposed project will generate revenue to the government through taxes, licences and fees levied on goods/services. Through the revenues generated, the government will be capable of financing its obligations to the country.

3.2 Anticipated negative environmental and social impacts

Alongside the positive impacts, the proposed project is expected to result in a number of negative environmental and social impacts at the various stages of implementation as discussed below.

3.2.1 Negative impacts at the construction phase of the proposed project

3.2.1.1 Environmental risks of obtaining raw materials

Construction activities will require raw materials such as steel bars, sand, cement and building blocks, among others. These materials will be sourced from the environment and will have a negative impact at their points of origin.

Recommended mitigation measures

1. Source raw materials from sites that are licensed as per the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya
2. Have a procurement plan based on the Bill of Quantities prepared by a Quantity Surveyor to avoid potential oversupply of materials and wastage
3. Re-use construction materials such as wood and metal cuttings which can be salvaged

3.2.1.2 Water demand and effluent generation

During construction, water will be required for concrete mixing, casting and curing works, drinking and sanitation purposes. The total estimated water demand per day is $10m^3$ and will be supplied by water bowsers. Out of these, 10% i.e. $1m^3$ will be used for domestic purposes and will generate $0.7m^3$ of effluent which will need to be disposed. The rest of the water soaks into ground areas within the project site. Poor disposal of the wastewater generated has potential to pollute underground aquifers. The workers will use the existing sanitary facilities at the project site and the effluent will be managed by a system of septic tanks and soak away pits.

Recommended mitigation measures

1. Sensitize the workers on the need to conserve available water resources
2. Install a bio-digester in place of septic tank
3. Comply with the provisions of the Environmental Management and Coordination (Water Quality) Regulations, 2006

3.2.1.3 Solid waste generation and management

Site preparatory and construction activities will generate significant quantities of solid waste such as overburden, rock rubbles, cuttings and rejected materials among others. Workers and visitors to the site will generate domestic wastes such as food left overs, plastics and wrappings among others. These will need to be disposed off appropriately as poor solid waste management can create breeding grounds for disease causing pathogens.

Recommended mitigation measures

1. Procure and strategically place adequate solid waste collection bins with a capacity for segregation within the construction site
2. Procure a sizeable central solid waste collection bin with chambers to accommodate separated waste
3. Sensitize construction workers on the process of solid waste collection, segregation and proper disposal
4. Procure the services of a NEMA licensed waste handler to dispose off the solid waste
5. Comply with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006

3.2.1.4 Occupational safety and health risks

Machinery operations, use of construction tools and the actual construction activities are likely to expose the workforce, visitors and the neighbors to safety and health risks such as falling objects or even falls, moving machinery, air and noise pollution, and COVID-19 among others. It is also expected that there will be accumulation of various streams of waste especially metal cut offs and construction debris which may cause injuries to workers and visitors accessing the site. As a result, the above risks have the potential to cause adverse human health or loss of life.

Recommended mitigation measures

1. Register the site as a workplace with the Directorate of Occupational Safety and Health Services (DOSHS)
2. Obtain insurance cover for the workers at the site
3. Provide adequate and appropriate Personal Protective Equipment (PPE) to workers and visitors to the site and enforce on their use
4. Provide employees with correct tools and equipment for the jobs assigned and train on their use

5. Ensure moving parts of machines and sharp surfaces are securely protected with guards to avoid unnecessary contacts and injuries
6. Provide first aid services and emergency vehicle at the site
7. Regulate the entry of visitors to the construction site by deploying adequate security measures
8. Comply with the set National Government and County Government Directives and guidelines on prevention of the spread of COVID-19
9. Comply with the provisions of the Occupational Safety and Health Act, 2007

3.2.1.5 Air pollution

Air pollution during the construction phase will be in form of dust generated during excavations, concrete mixing activities and exhaust fumes from machinery use and HCVs delivering construction materials to the site. The most relevant pollutant considered is particulate matter because of its potentially significant increase during the construction phase. Respirable particulate matter may present respiratory diseases, cause eye irritation and visual intrusion to workers, visitors to the project site and the neighbors if it is in excess of 100 $\mu g/Nm^3$ as per the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014.

Recommended mitigation measures

1. Procure, provide and enforce the use of dust masks to workers and visitors to the project site
2. Install dust screens around the project site during construction
3. Cover stock piles of construction materials to reduce dust emissions especially during windy conditions
4. Sprinkle water at the excavation areas to suppress dust
5. Use of serviceable machinery/equipment and trucks
6. Monitor fugitive emissions to ensure compliance with the limits set under the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014
7. Comply with Environmental Management and Coordination (Air Quality) Regulations, 2014

3.2.1.6 Noise pollution

The construction works, delivery of raw materials by heavy commercial vehicles (HCVs) and the use of machinery may lead to high levels of noise and vibration within the construction site and the surrounding area. However, the site is located along Unga Street and the background noise from vehicular movement, and loading and offloading of cargo from warehouses is in keeping with that will be generated from the project site. Construction sites such as the proposed project can only emit noise levels of up to 75dB (A) during the day and 65dB (A) at night as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

Recommended mitigation measures

1. Delivery of raw materials, excavation and construction work should be limited to day time hours only between 8am to 5pm
2. Locate machinery that are likely to produce noise as far as practical from neighboring properties
3. Procure, provide and enforce the use of earmuffs to staff who will work within peak noise producing areas and visitors accessing the same areas
4. Sensitize truck drivers to avoid unnecessary hooting and running of vehicle engines

5. Comply with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

3.2.1.7 Asbestos disposal

Currently, there are asbestos sheets stored at the project site. When asbestos-containing materials deteriorate or are damaged, asbestos fibers are released into the air. Fibers that are inhaled can lodge and remain in the lungs, or migrate to other locations in the body. Asbestos fibers have been shown to cause asbestosis, lung cancer and mesothelioma. They are hence classified as carcinogenic under UN Class 12 and CODE H16 and hazardous under both the Fourth Schedule of the Environmental Management and Coordination (Waste Management) Regulations, 2006 and the Factories and Other Places of Work (Hazardous Substances) Rules, 2007.

Recommended mitigation measures

1. Dispose all the asbestos sheets stored at the project site
2. Handling of asbestos sheets should be undertaken by a NEMA licensed contractor to comply with the Environmental Management and Coordination (Waste Management) Regulations, 2006 and the National Guidelines on the Safe Management and Disposal of Asbestos, 2011 by NEMA
3. All personnel involved in handling of the asbestos should be provided with the following Personnel Protective Equipment (PPE), trained on their use and compliance on use enforced by the supervisors. The PPE will include;
    i. P2 disposable mask or a full-face respirator
    ii. Disposable overalls with a hood suitable to the task, e.g. European Standards Type 5 and Type 6
    iii. Gloves with wrist taped
    iv. Gumboots or non-laced footwear with disposal slippers over
4. The sheets should be wrapped with a High-Density Polyethylene (HDPE), marked as hazardous and secured ready for transportation
5. Transport vehicles used must have a NEMA licence for transportation of hazardous wastes.
6. Disposal should be at a NEMA licensed site with a capacity to handle hazardous wastes

3.2.2 Negative impacts at the operational phase of the proposed project

3.2.2.1 Waste oil leaks and spills

There is potential of oil spills especially during offloading, and transfer of waste oil into the storage tanks and into the interceptor. Oil/ lubricant leakages may result from the delivery tankers. These products contain detrimental elements which should not be exposed to the environment since they contain traces of heavy metals such as lead, sulphur and mercury among others and would thus contaminate ground water and soil.

Recommended mitigation measures

1. Pave the loading and offloading area with an impervious material to prevent any spills from contaminating ground water and soil
2. Construct a bund wall around the storage tanks, and loading and offloading area to prevent accidental oil leaks and spills from flowing to other areas
3. Ensure that adequate spill containment is provided at all times in case of severe leakage of oils. The containment should be of at least 20% the capacity of the storage tanks
4. Regularly desludge and maintain the oil interceptor in good working condition
5. Conduct regular tests on the waste oil tanks to curb possible tank failure
6. Comply with the Technical Guidelines on the Management of Used Oil and oil Sludge in Kenya, 2016

3.2.2.2 Oil sludge management

Oil sludge is the viscous, non-flowing, semi-solid material which is generated as a result of long storage of oils. The sludge is hazardous and thus special attention and utmost care in handling and disposal should be accorded. Sludge will be generated from the oil water interceptor and cleaning of the storage tanks.

Recommended mitigation measures

1. The sludge should be managed through incineration in in accordance with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006
2. Comply with the Technical Guidelines on the Management of Used Oil and oil Sludge in Kenya, 2016

3.2.2.3 Fire risks and emergencies

Waste oil contains hydrocarbons which are volatile and their vapors in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise. Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Fire occurrence may lead to death, financial losses and loss of livelihoods for the workers and neighbors.

Recommended mitigation measures

1. Develop and implement a fire and emergency response plan
2. Procure and provide adequate firefighting equipment and place them strategically within the facility
3. Firefighting equipment should be serviced quarterly by fire service providers
4. Train employees on the use of fire-fighting equipment
5. Designate a fire assembly point within the facility
6. Display fire safety and warning signage within the facility
7. Enforce a 'no smoking' rule
8. Conduct fire drills biannually and fire safety audits annually

3.2.2.4 Occupational safety and health risks

There are potential safety and health risks associated with operations of the facility. These include dermal contact with waste oil and inhalation of vapors during handling of such products, accidental falls, musculoskeletal injuries and general exhaustion. All these risks have potential to cause injuries, permanent disability or even death and hence the management should be committed to ensuring safety and health of workers and visitors to the facility.

Recommended mitigation measures

1. Develop and implement a safety and health policy, and emergency response plan for the facility
2. Sensitize employees to adhere to work procedures to minimize accidents
3. Provide adequate and appropriate PPE to workers and enforce on their use
4. Display precautionary signage at appropriate sections within the facility
5. Conduct first aid training among the workers and provide well-stocked first aid kit
6. Provide and keep an accident/incident register occurring on the facility including near misses and actions taken to prevent future occurrences
7. Conduct annual occupational safety and health audits
8. Comply with the provisions of the Occupational Safety and Health Act, 2007

3.2.2.5 Air and noise pollution

Waste oil storage facilities can be a potential source of air pollution. The main sources of emissions to air include evaporative losses of volatile organic compounds (VOCs) of waste oil from storage, particularly during bulk deliveries. Other sources include exhaust fumes from the waste oil delivery tankers. On the other hand, noise pollution will emanate from vehicular movement in and out of the facility. However, the background noise within the area is in keeping with that will be generated by the vehicles accessing the facility.

Recommended mitigation measures

1. Provide appropriate and adequate PPE to all workers and enforce on their use
2. Sensitize the drivers to avoid unnecessary hooting and running of vehicle engines
3. Conduct air quality monitoring in collaboration with a NEMA designated laboratory
4. Comply with the provisions of the Environmental Management and Coordination (Air Quality) Regulations, 2014 and (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

3.2.2.6 Water demand and effluent generation

Water will be required for sanitation and drinking purposes and will be supplied by water bowsers. Water demand is estimated at 1 m^3 per day. Seventy percent (70%) of the domestic water use will be generated as effluent from sanitation facilities and will be managed by the existing system of septic tank and soak away pit. Additionally, wastewater will be generated at the interceptor during the separation process of the sludge.

Recommended mitigation measures

1. Create awareness among the staff on water conservation
2. Monitor the quality of the domestic effluent and the discharge from the oil/water interceptor to ascertain conformity to the standards stipulated under the Third Schedule of Environmental Management and Coordination (Water Quality) Regulations, 2006
3. Apply for and obtain an Effluent Discharge License (EDL) from NEMA
4. Comply with the provisions of the Environmental Management and Coordination (Water Quality) Regulations, 2006

3.2.2.7 Solid waste generation and management

The facility will generate different types of solid wastes i.e. from the office comprising of mainly paper from administrative activities, glass and plastics for office supplies; and from the used oil operations of the facility in the form of rags, used seals and packaging materials. Poor disposal of solid waste degrades environmental quality. Adequate measures should be put in place to ensure that oil contaminated wastes are not mixed with regular wastes.

Recommended mitigation measures

1. Provide adequate solid waste collection bins with a capacity for segregation within the facility
2. Sensitize workers on the process of solid waste collection, segregation and proper disposal
3. Procure a sizeable central solid waste collection bin with chambers to accommodate separated waste
4. Procure the services of a NEMA licensed waste handler to dispose off the solid waste
5. Comply with the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006

3.2.2.8 Traffic congestion

The site is located along the Unga street and the day-to-day activities of the facility may increase the vehicular count along the street but will not enormously impact on the normal traffic.

Recommended mitigation measures

1. Develop and implement a traffic management plan
2. Control entry and exit of vehicles to and from the facility
3. Ensure that all the vehicles accessing the facility are parked within the premises
4. Comply with the Traffic Act, 2016

3.2.2.9 Energy demand

The facility will use energy resources from the environment such as electricity and fuel. Electrical energy will be used for lighting the offices, operation of electronic equipment and other daily operations. The primary energy source will be the National Grid.

Recommended mitigation measures

1. Sensitize workers to switch off lights when not in use
2. Harness solar energy
3. Ensure regular servicing and maintenance of electrical appliances

3.2.3 Impacts at possible decommissioning phase

A decommissioning phase is possible in the event of end of project life, closure by government agencies due to non-compliance with environmental and health regulations, an order by a court of law due to non-compliance with existing regulations, natural calamities and change of user of land. The proponent will prepare and submit a due diligence decommissioning audit report to NEMA for approval at least three (3) months in advance. For the purposes of prediction and information, the environmental and social concerns which may arise during decommissioning include;

The following environmental and social concerns will manifest at this phase;

1. Loss of used oil storage facility
2. Economic decline
3. Waste generation
4. Safety and health risks

3.2.3.1 Loss of used oil storage facility

The proposed project will provide services for safe management of used oil including collection, transportation, storage and handling in accordance to the provisions of the Technical Guidelines on the Management of Used Oil and oil Sludge in Kenya, 2016. These services will prevent the negative environmental and public health risks associated with poor management of used oil. A decommissioning phase would mean loss of these services.

Recommended mitigation measures

1. Look for an alternative site to ensure safe management of used oil

3.2.3.2 Economic decline

In the event of the decommissioning of the sludge handling facility, the proponent will incur huge financial loses and the employees will also lose their livelihoods. In addition, the government will lose revenue earned from the operations of the facility.

Recommended mitigation measures

1. Train employees on alternative livelihoods prior to decommissioning
2. Prepare and issue recommendation letters to employees to seek alternative employment opportunities
3. Comply with labor laws by paying the employees their terminal dues

3.2.3.3 Waste generation

Demolition activities will result in generation of waste including building rubbles, oil sludge and effluent among others. If not properly managed, these generated waste will pose safety and health risks and environmental pollution.

Recommended mitigation measures

1. Contract NEMA licensed waste handler to dispose off the solid waste, oil sludge and effluent generated from the demolition activities
2. Recover the reusable and recyclable components of the facility
3. All recyclable materials should be collected and sent to NEMA licensed recyclers
4. Comply with the Waste Management and Water Quality Regulations, 2006

3.2.3.4 Safety and health risks

Safety and health risks are likely to emanate from accidental falls and cuts and injuries from machinery use. Noise and air pollution from decommissioning activities may also pose safety and health and safety risks to workers, neighbors and visitors to the site.

Recommended mitigation measures

1. Contract a licensed construction company to carry out demolitions
2. Provide adequate PPE and enforce on their use throughout the demolition works
3. Avail first aid kits on site throughout the entire period
4. Ensure the process of demolition is supervised by competent personnel
5. Comply with the provisions of the Environmental Management and Coordination (Air Quality) Regulations, 2014 and (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009
6. Comply with the provisions of the Occupational Safety and Health Act, 2007

3.3 Impact analysis

Potential project impacts are predicted and quantified to the extent possible. The magnitude of impacts on resources such as water and air or receptors such as people, communities, wildlife species and habitats is defined. Magnitude is a function of the following impact characteristics;

1. Type of impact (direct, indirect, induced)
2. Size, scale or intensity of impact
3. Nature of the change compared to baseline conditions (what is affected and how)
4. Geographical extent and distribution (e.g. local, regional, international)
5. Duration and/or frequency (e.g. temporary, short-term, long term, permanent)

Magnitude describes the actual change that is predicted to occur in the resource or receptor. It takes into account all the various impact characteristics in order to determine whether an impact is negligible or significant. Some impacts can result in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes can be regarded as essentially having no impact and are characterized as having a negligible magnitude (Table 5).

1. **Negligible impact (very low) -** Where a resource or receptor would not be affected by a particular activity or the predicted effect is deemed to be imperceptible or is indistinguishable from natural background variations.
2. **Less than significant impact (Low**) - Is a minor impact where a resource or receptor would experience a noticeable effect but the impact magnitude is sufficiently low (with or without mitigation) and /or the resource or receptor is of low sensitivity. In either case, a less than significant impact must be sufficiently below applicable standard threshold limits.
3. **Potentially significant impact (moderate) -** A moderate impact that meets applicable standards but comes near the threshold limit. The emphasis for such moderate impacts is to demonstrate that the impact has been reduced to a level that is as minor as reasonably practicable so that the impact does not exceed standard threshold limits.
4. **Significant impact (high) -** One where an applicable standard threshold limit would or could be exceeded or if a highly valued or very scarce resource would be substantially affected.

Table 5: Risk and impact significance matrix for the proposed sludge handling facility.

Environmental impact	Magnitude of impact at construction phase	Magnitude of impact at operational phase	Magnitude of impact at possible decommissioning phase
Environmental risks of obtaining raw materials	2	0	0
Water demand	2	2	1
Effluent generation	2	2	2
Solid waste generation	2	2	2
Occupational safety and health risks	3	3	3
Air pollution	2	2	2
Noise pollution	2	2	2
Asbestos disposal	2	0	0
Waste oil leaks and spills	1	3	2
Oil sludge management	0	2	
Fire risks and emergency preparedness	0	2	0
Traffic congestion	2	2	1
Energy demand	1	2	1
Loss of used oil storage facility	0	0	3
Economic decline	0	0	3

Magnitude	Impact score
Negligible	0
Low	1
Moderate	2
High	3

3.4 Public consultations and findings

Public and stakeholders participation in the ESIA process is a legislative requirement under Part 2, Section 69 (1d) of the Kenya Constitution 2010 and Regulation 17 of the Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003. The aim of

public and stakeholders consultations was to obtain and document comments, views and concerns that the neighbors and stakeholders have regarding the proposed project. For the proposed project, public and stakeholders consultations were undertaken using two strategies i.e. administration of questionnaires and consultative meetings and specifically;

1. Administration of questionnaires to the neighbors and stakeholders
2. Stakeholder consultative meeting held on 18th February 2022 at the project site

Brief details of the comments obtained during administration of questionnaires and consultative meetings are discussed below. The filled in questionnaires and proceedings of the meeting are annexed to this report.

3.4.1 Summary of comments obtained during administration of questionnaires

A total of 21 questionnaires were administered between 9th and 18th February 2022 and the main comments are summarized in Table 13 below. Due to the prevailing COVID-19 pandemic, the questionnaires were filled in by the interviewers where possible. Only three of the respondents interviewed objected to the proposal citing main reasons as pollution of environmental media and contamination of tea products. The rest of the respondents cited the main positive impacts as;

1. Creation of employment opportunities
2. Enhancement of infrastructure
3. Promoting business within the area
4. Source of revenue to the government
5. Availability of oil sludge disposal site

The main potential negative impacts cited included;

1. Oil spills
2. Safety and health risks
3. Fire outbreaks
4. Contamination of tea products
5. Air and noise pollution
6. Traffic congestion

Notably, the ESIA has proposed measures to ensure that the proposed project possess minimal or no environmental and social impacts cited by the local communities. The measures proposed aim at;

- Preventing oil spills
- Preventing health and safety risks
- Preventing fire risks
- Prevention of environmental pollution
- Minimizing air and noise pollution
- Minimizing traffic congestion

Table 6: Summary of comments obtained from neighbors and stakeholders to the proposed project site.

	Respondents profile			Comments
	Name	Telephone contact	ID No.	
1.	Ramadhan Sindano	0720338491	8455292	• Creation of employment opportunities
2.	Mwinyi Mwamuye	0787919787	765972	• No objection to the proposed project • Creation of employment opportunities • Enhancement of infrastructure

	Respondents profile			Comments
	Name	Telephone contact	ID No.	
				• Traffic congestion • Air pollution
3.	Masoud Ramadhan Gassambi (Bryson Limited)	0713420592	27195502	• No objection to the proposed project • Creation of employment opportunities • Promote business within the area etc. hotels and shops • Improvement of security within the area • Traffic congestion
4.	Johnstone Ochieng Aloo	0722628854	3966386	• Traffic congestion • Oil spills resulting to contamination of tea products
5.	Chrispinus Maina	0706611248	21682171	• No objection to the proposed project • Creation of employment opportunities
6.	Hamisi shaban	0711396367	13455214	• No objection to the proposed project • Creation of employment opportunities
7.	Hassan Mwahema	0729 282744	24697902	• No objection to the proposed project • Creation of employment opportunities • Enhancement of infrastructure
8.	Salim Omar	0113509724	28040963	• No objection to the proposed project • Creation of employment opportunities • Air pollution • Traffic congestion
9.	Andrew Mtigo	0720987633	10394141	• No objection to the proposed project • Creation of employment opportunities. • Traffic congestion
10.	Issa Odour	0728820926	5533700	• No objection to the proposed project • Promote business within the area • Air pollution
11.	Chula Julius		30140392	• No objection to the proposed project • Creation of employment opportunities • Source of revenue generation to the government • Fire outbreaks • Traffic congestion • Oil spills resulting to soil pollution • Safety and health risks
12.	Lilian Ageri	0708 932892	30140392	• Creation of employment opportunities • Source of revenue to the government • Oil spills resulting to water pollution • Intensification of the greenhouse effect, acid rain and water quality degradation • Contribute to biodiversity loss as well as destruction of unique ecosystems

	Respondents profile			Comments
	Name	Telephone contact	ID No.	
13.	Walster Oketch	0724653271	21700044	• Oil sludge is hazardous and shouldn't be handled near food processing industries • Air pollution • Potential soil and water contamination • Risk of fire explosion • Creation of employments opportunities • Protect the environment from oil contamination • Source of revenue generation to the government
14.	Grief East Africa Limited			• No objection to the proposed project • Creation of employment opportunities
15.	Monica Wanjiru	0757282598		• No objection to the proposed project • Creation of employment opportunities • Promote business within the area
16.	George Kidelo	0787106299		• No objection to the proposed project • Creation of employment opportunities • Enhancement of infrastructure • Traffic congestion • Air pollution
17.	Andrew Barasa	0712747732	30181070	• No objection to the proposed project • Availability of oil sludge disposal site from KPA operated machinery • Compliance for waste management by companies neighboring the Port • Air pollution • Noise pollution • Traffic congestion
18.	National Construction Authority	0719875885		• No objection to the proposed project • Creation of employment opportunities • Reduction of illegal hawking of sludge in the area
19.	National Construction Authority	0727825071		• No objection to the proposed project • Creation of employment Opportunities • Reduction of illegal hawking of sludge within the vicinity
20.	Grief East Africa Limited	0412004919		• No objection to the proposed project • Creation of employment opportunities • Source of revenue to the government • Sludge spills on roads by delivery trucks

	Respondents profile			Comments
	Name	Telephone contact	ID No.	
21.	State Department Of Public Works	0720321292		• No objection to the proposed project • Creation of employment opportunities • Promote business within the area • Pollution • Fire outbreaks • Outbreak of diseases associated with toxic sludge by-products

3.4.2 Stakeholder consultative meeting

The stakeholder consultative meeting was held on 18th February 2022 at the project site (Figure 9). The proceedings of the meeting involved a detailed presentation of the ESIA study report followed by questions, comments and reactions by the participants. Table 7 summarizes the issues identified by the stakeholders and the response from the proponent.

Table 7: Issues identified by the stakeholders and response from the proponent.

Issues identified by the stakeholders	Response from the proponent
Negative environmental and social impacts associated with the proposed project	– The tank farms will be cemented with trenches and surrounded by bund walls in order to minimize oil spillage – The combustion rate of sludge is low thus fire risk is minimal – All safety measures will be put in place prior to operations – Asbestos sheets will be disposed at a licensed yard in Maungu
The maximum number of trucks that will be accessing the facility	– An approximate of 1 – 3 trucks in a week. However, this depends on the availability of sludge
Management of wastewater from the interceptor	– The wastewater will be disposed via the sewer line
Sludge odor and if separation process of the sludge will involve combustion	– The sludge is odorless and that the recovery process doesn't involve combustion
Contamination of tea products and pest management	– Baseline air quality monitoring has been conducted by the consultant in collaboration with Lahvens (K) Limited and that they will be carrying out annual air quality monitoring
Obtaining a compliance certificate prior to construction and operational licenses	– Consultations with the Authority prior to operations
Commencement of the proposed project and the number of employees	– The project will commence once they acquire approval from the National Environment Management Authority and will employ approximately ten (10) employees

The detailed proceeding of the stakeholder consultative meeting is annexed to this report.

Figure 9: The Area Chief, Mr. Felix Wesonga, addressing the stakeholders during the meeting (Source: Public consultative meeting, February 2022).

3.4.3 Grievances Redress Mechanism

3.4.3.1 Introduction

The affected persons by the proposed project may raise their grievances and dissatisfactions about actual or perceived impacts in order to find a satisfactory solution. These grievances, influenced by their physical, situational and/or social losses, can emerge at the different stages of the project cycle. Not only should the affected persons be able to raise their grievances and be given an adequate hearing, but also satisfactory solutions should be found that mutually benefit both the affected persons and the project. It is equally important that the affected persons have access to legitimate, reliable, transparent and efficient institutional mechanisms that are responsive to their complaints.

3.4.3.2 Grievances prevention

Grievances cannot be avoided entirely, but much can be done to reduce them to manageable numbers and reduce their impacts. This will be achieved by;

1. Providing sufficient and timely information to communities. Many grievances arise because of misunderstandings; lack of information; or delayed, inconsistent or insufficient information. Accurate and adequate information about a project and its activities, plus an approximate implementation schedule, should be communicated to the communities, especially affected parties, regularly.
2. Conduct meaningful community consultations. The project proponent should continue the process of consultation and dialogue throughout the implementation of the project. Sharing information, reporting on project progress, providing community members with an opportunity to express their concerns, clarifying and responding to their issues, eliciting communities' views, and receiving feedback on interventions will benefit the communities and the project management.
3. Overall good management of the facility will ensure a reduction in potential conflicts with the local community and other stakeholders.

3.4.4 Grievances Redress Mechanism Tool

The facility will have a more prompt and efficient resolution on individual and collective complaint and provision of feedback on any grievances and dissatisfaction from stakeholders during operations. The flow chart below (Figure 10) shows a complaint and proposal consideration mechanism for the facility that provides an accessible channel for submission of complaints and feedback to stakeholders.

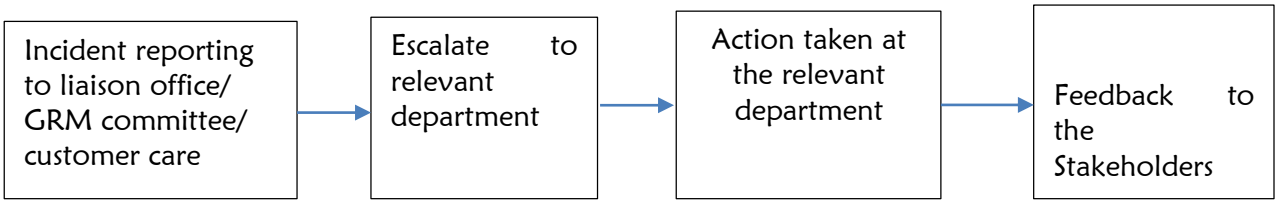

Figure 10: Grievances Redress Mechanism Tool flow chart (Source: Consultant's gallery, 2021).

3.5 Analysis of project alternatives

Analyzing project alternatives is important as it allows the proponent to evaluate possible project options that could mitigate the environmental risks identified during the ESIA process through prevention, elimination of the risks all together or reduction of the severity of an impact. The analysis will also assist NEMA and lead agencies in decision making by either approving the project as proposed or advising the proponent on the need for a particular alternative such as an alternative site or technological and design changes. In the current proposal, the alternatives identified are discussed in detail below.

3.5.1 The 'No project' alternative

The 'No Project' alternative has the advantage of retaining the status quo, meaning that the predicted environmental impacts will not occur and is ideally the best case scenario for mitigation. This alternative is however not viable owing to the fact that the sludge handling facility will provide a safe storage for waste oil/sludge thus preventing the negative environmental and public health risks associated with poor management of used oil. Additionally, the status quo denies the proponent a viable investment opportunity and thereby income generation translating into profits, denies the local community employment opportunities and also denies both the County and National Government revenue.

The 'No project' alternative is therefore not considered viable in the light of the benefits and deprivations of the project.

3.5.2 The "Yes Project" alternative

This option envisages that the proposal will be implemented thus was considered as the most viable because of the following reasons;

1. Provision of services for safe management of used oil
2. Provision of raw materials to used oil recycling facilities
3. Creation of employment opportunities
4. Source of income to the proponent

3.5.3 Alternative project site

An alternative site could be considered for the proposed project if the proposed project would present serious environmental challenges that cannot be effectively managed. However, the proposed mitigation measures are considered adequate to minimize the impacts to levels that do not warrant significant environmental damage. In addition, there is availability of adequate piece of land for the development. This alternative is therefore not viable.

4 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE PROPOSED PROJECT

The preceding section has analyzed and identified the potential environmental and social impacts of the proposed project as well as the mitigation measures to address the impacts. Under this section, three Environmental and Social Management Plans (ESMPs) are proposed to guide the proponent in implementing the mitigation measures. These are ESMPs for the construction, operational and possible decommissioning phases. Each of the ESMP is organized into five sections comprising of the environmental concerns, recommended mitigation measures, implementing party, timeframe and a budget.

The approach for mitigation follows the precautionary principle which aims at first avoiding the impact, minimizing the impact by limiting the degree or magnitude of the action, rectifying the impact by repairing, rehabilitating, or restoring the affected environment, reducing or eliminating the impact over time and lastly compensating for the impact by replacing or providing substitute resources or environments.

4.1 Environmental and Social Management Plan for the construction phase

For the construction phase EMP (Table 8), the main environmental issues include environmental risks of obtaining raw materials, water demand and effluent generation, solid waste generation and management, occupational safety and health risks, air and noise pollution and asbestos disposal.

4.2 Environmental and Social Management Plan for the operational phase

The main environmental concerns at this phase include waste oil leaks and spills, oil sludge management, fire risks and emergencies, occupational safety and health risks, air and noise pollution, water demand, waste generation and management, traffic congestion and energy demand (Table 8).

4.3 Environmental and Social Management Plan for the decommissioning phase

The decommissioning ESMP is important in the event of end of project cycle, natural calamities and non-compliance with environmental and health regulations among others. The key issues of concern at this stage will be loss of used oil storage facility, economic decline, waste generation, and safety and health risks (Table 8).

Table 8: Environmental Management plan for the construction, subsequent operation and possible decommissioning phase of the proposed project.

Environmental concerns	Recommended mitigation Measures	Implementing party	Timeframe	Cost (KES)
Construction phase				
Environmental risks of obtaining raw materials	Source raw materials from sites that are licensed by NEMA	Proponent/contractor	During construction	Nil
	Have a procurement plan based on the Bill of Quantities	Proponent/contractor	During construction	Nil
	Re-use construction materials which can be salvaged	Proponent/contractor	During construction	Nil
	Comply with the Waste Management Regulations, 2006	Proponent/contractor	Continuous	Nil
Water demand and effluent generation	Sensitize the workforce on the need to conserve the available water resources	Proponent/contractor	Continuous	Nil
	Install a bio-digester in place of septic tank	Proponent/contractor	During construction	100,000
	Comply with Water Quality Regulations, 2006	Proponent/contractor	Continuous	Nil
Solid waste generation and management	Procure and strategically place adequate solid waste collection bins with a capacity for segregation	Proponent/contractor	Prior to commencement	80,000
	Procure a sizeable central solid waste collection bin with chambers to accommodate separated waste	Proponent/contractor	Prior to commencement	100,000
	Sensitize construction workers on proper waste management	Proponent/contractor	Continuous	Nil
	Procure the services of a NEMA licensed waste handler to dispose off the solid waste	Proponent/contractor	Prior to commencement	Tender
	Comply with the Waste Management Regulations, 2006	Proponent/contractor	Continuous	Nil
Occupational safety and health risks	Register the site as a workplace with the DOSHS	Proponent/contractor	Prior to commencement	5,000
	Obtain insurance cover for the workers at the site	Proponent/contractor	Prior to commencement	1,000,000
	Provide adequate and appropriate PPE to workers and visitors to the site and enforce on their use	Proponent/contractor	Throughout construction	200,000
	Provide employees with correct tools and equipment for the jobs assigned and train on their use	Proponent/contractor	During construction	Nil
	Ensure moving parts of machines and sharp surfaces are securely protected with guards	Proponent/contractor	Throughout construction	Nil
	Provide first aid services and emergency vehicle at the site	Proponent/contractor	Throughout construction	1,000,000
	Regulate the entry of visitors to the construction site by deploying adequate security measures	Proponent/contractor	Throughout construction	Nil

Environmental concerns	Recommended mitigation Measures	Implementing party	Timeframe	Cost (KES)
	Comply with the set National Government and County Government Directives and guidelines on prevention of the spread of COVID-19	Proponent/contractor	Continuous	Nil
	Comply with the Occupational Safety and Health Act, 2007	Proponent/contractor	Continuous	Nil
Air pollution	Procure, provide and enforce the use of dust masks to workers and visitors to the project site	Proponent/contractor	Throughout construction	50,000
	Install dust screens around the project site during construction	Proponent/contractor	Throughout construction	1,000,000
	Cover stock piles of construction materials to reduce dust emissions especially during windy conditions	Proponent/contractor	During construction	Nil
	Sprinkle water at the excavation areas to suppress dust	Proponent/contractor	Daily	10,000
	Use of serviceable machinery/equipment and trucks	Proponent/contractor	During construction	Nil
	Monitor fugitive emissions	Proponent/contractor	Quarterly	30,000
	Comply with the Air Quality Regulations, 2014	Proponent/contractor	Continuous	Nil
Noise Pollution	Delivery of raw materials, excavation and construction work should be limited to day time	Proponent/contractor	Throughout construction	Nil
	Locate machinery that are likely to produce noise as far as practical from neighboring properties	Proponent/contractor	Throughout construction	Nil
	Procure, provide and enforce the use of earmuffs to staff who will work within peak noise producing areas and visitors accessing the same areas	Proponent/contractor	Throughout construction	50,000
	Sensitize truck drivers to avoid unnecessary hooting and running of vehicle engines	Proponent/contractor	Throughout construction	Nil
	Comply the Noise and Excessive Vibration Pollution (Control) Regulations, 2009	Proponent/contractor	Continuous	Nil
Asbestos disposal	Dispose all the asbestos sheets stored at the project site	Proponent/contractor	Immediately	Tender
	Handling of asbestos sheets should be undertaken by a NEMA licensed contractor	Proponent/contractor	During asbestos handling	Tender
	All personnel involved in the removal and handling of the asbestos should be provided with PPE, trained on their use and compliance on use enforced by the supervisors	Proponent/contractor	During asbestos handling	TBD
Operational phase				
Waste oil leaks and	Pave the loading and offloading area with an impervious	Proponent/contractor	During construction	In project

Environmental concerns	Recommended mitigation Measures	Implementing party	Timeframe	Cost (KES)
spills	material to prevent any spills from contaminating ground water and soil			costs
	Construct a bund wall around the storage tanks, and loading and offloading area to prevent accidental oil leaks and spills from flowing to other areas	Proponent/contractor	During construction	In project costs
	Ensure that adequate spill containment is provided at all times in case of severe leakage of oils	Proponent	During construction	In project costs
	Regularly desludge and maintain the oil interceptor in good working condition	Proponent	Monthly	Nil
	Conduct regular tests on the waste oil tanks to curb possible tank failure	Proponent	Quarterly	Nil
	Comply with the Technical Guidelines on the Management of Used Oil and oil Sludge in Kenya, 2016	Proponent	Throughout operations	Nil
Oil sludge management	The sludge should be managed through incineration in accordance with Waste Management Regulations, 2006	Proponent	Throughout operations	Tender
	Comply with the Technical Guidelines on the Management of Used Oil and oil Sludge in Kenya, 2016	Proponent	Continuous	Nil
Fire risks and emergencies	Develop and implement a fire and emergency response plan	Proponent	Prior to operations	10,000
	Procure and provide adequate firefighting equipment and place them strategically within the facility	Proponent	Prior to operations	200,000
	Firefighting equipment should be serviced by fire service providers	Proponent/fire service providers	Quarterly	Tender
	Train employees on the use of fire-fighting equipment	Proponent	Bi-annually	20,000
	Designate a fire assembly point within the facility	Proponent	Prior to operations	Nil
	Display fire safety and warning signage within the facility	Proponent	Prior to operations	20,000
	Enforce a 'no smoking' rule	Proponent	Throughout operations	Nil
	Conduct fire drills	Proponent	Bi-annually	Nil
	Undertake fire safety audits	Proponent	Annually	Nil
Occupational safety and health risks	Develop and implement a safety and health policy, and emergency response plan for the facility	Proponent	At operations	20,000
	Sensitize employees to adhere to work procedures to minimize accidents	Proponent	Throughout operations	Nil

Environmental concerns	Recommended mitigation Measures	Implementing party	Timeframe	Cost (KES)
	Provide adequate and appropriate PPE to workers and enforce on their use	Proponent	Throughout operations	200,000
	Display precautionary signage at appropriate sections within the facility	Proponent	Throughout operations	Nil
	Conduct first aid training among the workers and provide well-stocked first aid kit	Proponent	Bi-annually	20,000
	Provide and keep an accident/incident register occurring on the facility	Proponent	Throughout operations	Nil
	Conduct annual occupational safety and health audits	Proponent	Annually	50,000
	Comply with the Occupational Safety and Health Act, 2007	Proponent	Continuous	Nil
Air and noise pollution	Provide appropriate and adequate PPE to all workers and enforce on their use	Proponent	Throughout operations	100,000
	Sensitize the drivers to avoid unnecessary hooting and running of vehicle engines	Proponent	Throughout operations	Nil
	Conduct air quality monitoring in collaboration with a NEMA designated laboratory	Proponent/NEMA Licensed Laboratory	quarterly	100,00
	Comply with Air Quality Regulations, 2014 and (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009	Proponent	Continuous	Nil
Water demand and effluent generation	Create awareness among the staff on water conservation	Proponent	Throughout operations	Nil
	Monitor the quality of the domestic effluent and the discharge from the oil/water interceptor	Proponent/NEMA Licensed Laboratory	Quarterly	20,000 per sample
	Apply for and obtain an EDL from NEMA	Proponent	Annually	30,000
	Comply with the Water Quality Regulations, 2006	Proponent	Continuous	Nil
Solid waste generation and management	Provide adequate solid waste collection bins with a capacity for segregation within the facility	Proponent	Prior to operations	100,000
	Sensitize workers on the process of solid waste collection, segregation and proper disposal	Proponent	Throughout operations	Nil
	Procure a sizeable central solid waste collection bin with chambers to accommodate separated waste	Proponent	Prior to operations	100,000
	Procure the services of a NEMA licensed waste handler to dispose off the solid waste	Proponent	Prior to operations	Tender
	Comply with the Waste Management Regulations, 2006		Continuous	Nil

Environmental concerns	Recommended mitigation Measures	Implementing party	Timeframe	Cost (KES)
Traffic congestion	Develop and implement a traffic management plan	Proponent	At operations	Nil
	Control entry and exit of vehicles to and from the facility	Proponent	Throughout operations	Nil
	Ensure that all the vehicles accessing the facility are parked within the premises	Proponent	Throughout operations	Nil
	Comply with the Traffic Act, 2016	Proponent	Continuous	Nil
Energy demand	Sensitize workers to switch off lights when not in use	Proponent	Continuous	Nil
	Harness solar energy	Proponent	At operations	Tender
	Ensure regular servicing and maintenance of electrical appliances	Proponent	Throughout operations	Nil
Decommissioning phase				
Loss of used oil storage facility	Look for an alternative site to ensure safe management of used oil	Proponent	Prior to decommissioning	TBD
Economic decline	Train employees on alternative livelihoods prior to decommissioning	Proponent	3 months prior to decommissioning	Nil
	Prepare and issue recommendation letters to the workers to seek alternative employment opportunities	Proponent	Prior to decommissioning	Nil
	Comply with labor laws by paying the employees their terminal dues	Proponent	Prior to decommissioning	TBD
Waste generation	Contract NEMA licensed waste handler to dispose off the waste generated from the demolition activities	Proponent	Prior to decommissioning	Tender
	Recover the reusable and recyclable components of the facility	Proponent/contractor	During decommissioning	Nil
	All recyclable materials should be collected and sent to NEMA licensed recyclers	Proponent/contractor	During decommissioning	Nil
	Comply with the Waste Management and Water Quality Regulations, 2006	Proponent/contractor	Throughout decommissioning	Nil
Safety and health risks	Contract a licensed construction company to carry out demolitions	Proponent/contractor	Prior to decommissioning	TBD
	Provide adequate PPE and enforce on their use	Proponent/contractor	Throughout decommissioning	100,000
	Avail first aid kits on site	Proponent/contractor	Throughout	15,000

Environmental concerns	Recommended mitigation Measures	Implementing party	Timeframe	Cost (KES)
			decommissioning	
	Ensure the process of demolition is supervised by competent personnel	Proponent/contractor	Throughout decommissioning	Nil
	Comply with the Air Quality Regulations, 2014 and (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009	Proponent/contractor	Throughout decommissioning	Nil
	Comply with the Occupational Safety and Health Act, 2007	Proponent/contractor	Throughout decommissioning	Nil

5 ENVIRONMENTAL MONITORING PLANS

5.1 Introduction

A suite of Environmental Monitoring Plans is required to ensure full and systematic implementation of the Environmental Management Plan. It entails assessment of environmental performance of the proposed project by documenting, tracking and reporting any changes in environmental parameters in space and time. The objective of the monitoring plans is to enhance the environmental performance of the project by providing data and information on compliance with legislative standards and determining the levels of deviation from the values obtained during the baseline monitoring. This in turn informs the corrective measures if any that need to be implemented to comply with the legislative standards. For the proposed project, five monitoring plans are proposed. These are;

1. Occupational safety and health monitoring plan
2. Wastewater quality monitoring plan
3. Solid waste monitoring plan
4. Air quality monitoring plan
5. Noise monitoring plan

5.2 Occupational safety and health monitoring plan

5.2.1 Introduction

Potential safety and health risks during construction and subsequent operational phases will emanate from the use of machinery, noise and air pollution, asbestos handling, potential fire outbreaks and explosions, dermal contact with waste oil and inhalation of vapors during handling of such products. All these have a potential to cause injures, permanent disability or even death to workers, neighbors and visitors to the site. The purpose of safety and health monitoring plan is to assess existing controls alongside potential safety and health risks in order to develop an effective action plan and to ensure compliance with Occupational Safety and Health Act (OSHA), 2007.

5.2.2 Monitoring strategy

The proponent should be committed to ensuring, as far as is reasonably practicable, the safety and health of the workers, visitors to the site and neighbors is not put at risk during the construction phase and from the operations of the facility. This will be achieved by;

- Conducting occupational safety and health reviews and reports.
- Hazard identification by analyzing activities that can be an immediate threat or cause harm over a period of time.
- Ensuring that all accidents and incidents occurring at the site are promptly reported and investigated.
- Keeping statistics of accidents, incidents and dangerous occurrences and ensuring that reportable cases are filed with the health, safety and environment officer.
- Administration of safety awareness and motivation scheme.
- Routine inspections of the facility and equipment.
- Visual inspection as well as interviewing key personnel to identify areas of improvement.
- Undertaking and reviewing of fire, energy and risk assessment reports.
- Review of safety awareness, fire drills and fire safety training requirements.
- Evaluation of the effectiveness of health and safety training to the workforce.
- Action plans related to significant findings of the risk assessment.
- Having emergency evacuation plans and emergency routes and safety signage among others.
- Assessment of risks involving hazardous substances i.e. receipt, storage & handling.

The responsibility for implementing this monitoring plan will be vested in the Department of Occupational Safety and Health Services and overall the management.

5.2.3 Indicator of success

The ideal indicators of success will include zero accidents and fatalities and reduction in the number of incidents and accidents at the site.

5.3 Wastewater quality monitoring plan

5.3.1 Introduction

The proponent should put in place a consistent wastewater quality monitoring plan targeting the quality of effluent discharging from the proposed bio-digester and oil/water interceptor. The objective of the monitoring plan is to provide data and information to improve water quality and management of the effluent in order to comply with the standards prescribed under the Third Schedule of the Environmental Management and Coordination (Water Quality) Regulations, 2006.

5.3.2 Monitoring parameters

Effluent from the proposed bio-digester and oil/water interceptor should be monitored pursuant to the Third Schedule of the Environmental Management and Coordination (Water Quality) Regulations, 2006 (Table 9).

Table 9: Water quality monitoring parameters and the standards prescribed under the Third Schedule of Environmental Management and Coordination (Water Quality) Regulations, 2006.

Parameter	EMC (Water Quality) Regulations, 2006 Standards
PH Value	6.5-8.5
BOD; mg/L	30max
COD; mg/L	50 max
Total Suspended Solids; mg/L	30 max
Ammonia-NH+; mg/L	100 Max
Total Dissolved Solids; mg/L	1200 Max
E. Coli Colonies; count/100ml	Nil
Total coliform; count/100ml	1000/100ml

5.3.3 Monitoring location

Effluent sampling should target the last discharge point of the proposed bio-digester and the water outlet chamber of the interceptor.

5.3.4 Monitoring frequency

The frequency of wastewater monitoring should be quarterly in collaboration with a NEMA designated laboratory.

5.3.5 Indicator of success

Apart from implementing measures to meet the legal standards, obtaining an EDL from NEMA will also form part of the indicators of success of the water quality monitoring plan.

5.4 Solid waste monitoring plan

5.4.1 Introduction

Solid waste will emanate from construction activities and during the operational phase of the proposed facility. Poor disposal of the waste will cause odour problems, environmental pollution and therefore a health risk to the workers, visitors to the facility and neighbors. The purpose of the monitoring plan is to therefore ensure solid waste is managed in such a way that it protects both the public health and the environment.

5.4.2 Monitoring frequency

The frequency of solid waste monitoring will differ from the collection to the disposal stage in order to ensure reduced odours and accumulated heaps of waste. Table 10 describes the outline for which the activity will be monitored but can be adjusted depending on the amount generated.

Table 10: Sample outline for solid waste monitoring plan.

Activity	Frequency	Critical levels (Tons)	Target	Responsibility
Collection	Daily			
Storage	Daily			
Management	Daily			
Disposal	Weekly			

5.4.3 Monitoring strategy

The solid waste monitoring plan will document the collection, storage and disposal of solid waste from the proposed facility. There is need to code each of the collection points, note the capacity and critical levels, frequency of disposal and the personnel and contractor responsible. In addition, it will be important to characterize the waste streams at the collection points to inform investments in segregation infrastructure.

5.4.4 Indicator of success

Indicators of success will include timely collection and disposal of waste by the contractors, waste disposal tracking documents and certificates issued at the disposal sites in case of hazardous waste.

5.5 Air quality monitoring plan

5.5.1 Introduction

At construction phase, air pollution will emanate from dust during excavations, concrete mixing activities and exhaust fumes from machinery use and HCVs delivering construction materials to the site. At operational phase, evaporative losses of volatile organic compounds (VOCs) of waste oil from storage, particularly during bulk deliveries and exhaust fumes from the waste oil delivery tankers will be the main source of air pollution. Air pollution above acceptable limits are toxic to ecological systems and to human health. The purpose of the air quality monitoring plan is to ensure the concentrations air emissions from the construction and subsequent operations of the facility are within the stipulated standards set under the Environmental Management and Coordination (Air Quality) Regulations, 2014. In addition, the results will be used to evaluate if the adopted air pollution controls and management are effective.

5.5.2 Monitoring parameters

The parameters to be monitored are listed under the First Schedule of Environmental Management and Coordination (Air Quality) Regulations, 2014 (Table 11).

Table 11: Ambient air quality tolerance limits as per the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2014.

Pollutant	Time weighted average	Industrial area
Sulphur oxides (SO_x)	Annual Average*	80 $\mu g/m^3$
	24 hours**	125 $\mu g/m^3$
Oxides of Nitrogen (NO_x)	Annual Average*	80 $\mu g/m^3$
	24 hours	150 $\mu g/m^3$
Nitrogen Dioxide	Annual Average	150 $\mu g/m^3$
	24 hours	100 $\mu g/m^3$
Suspended Particulate Matter (SPM)	Annual Average	360 $\mu g/m^3$
	24 hours	500 $\mu g/m^3$
Respirable particulate matter (< 10μm) (RPM)	Annual Average*	70 $\mu g/m^3$
	24 Hours**	150 $\mu g/Nm^3$
$PM_{2.5}$	Annual Average	35 $\mu g/m^3$
	24 Hours	75 $\mu g/m^3$
Lead (Pb)	Annual Average*	1.0 $\mu g/Nm^3$
	24 hours**	1.5 $\mu g/m^3$
Carbon monoxide/ Carbon dioxide	8 hours	5.0 mg/m^3
	One hour	10 mg/m^3
Hydrogen Sulphide	24 hours**	150 $\mu g/m^3$
Non methane hydrocarbons	Instant Peak	700ppb
Total VOC	24 Hours**	600 $\mu g/m^3$
Ozone	One hour	200 $\mu g/m^3$
	8 hour (Instant Peak)	120 $\mu g/m^3$

5.5.3 Monitoring location
Air quality monitoring should be carried out within the project site.

5.5.4 Monitoring frequency
Air quality sampling and analysis will be carried out in collaboration with a NEMA designated laboratory on a quarterly basis.

5.6 Noise monitoring plan
5.6.1 Introduction
Potential sources of noise pollution will emanate mainly during construction activities, machinery use and from vehicular movement in and out of the facility. Noise may lead to hearing impairments which will reduce the workmanship of the employees. The purpose of noise monitoring plan is to therefore ascertain the extent of the impact due to the construction and subsequent operation of the facility in compliance with the Environmental Management and Coordination (Noise and Excessive Vibrations pollution) (control) Regulations, 2009 (Tables 12 and 13).

5.6.2 Monitoring location
Noise monitoring should be carried out within the project site.

5.6.3 Monitoring frequency
Noise monitoring should be done on a quarterly basis in collaboration with a NEMA designated laboratory. Noise levels will be measured in dB (A).

Table 12: Maximum permissible levels for construction sites as stipulated under the Second Schedule of Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

Zone		Maximum Noise Level Permitted (Leq) in db(A)	
		Day	Night
(i)	Health facilities, educational institutions, homes for disabled etc.	60	35
(ii)	Residential	60	35
(iii)	Areas other than those prescribed in (i) and (ii)	75	65

Table 13: The Maximum permissible intrusive noise levels as stipulated under the First Schedule of Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

Zone		Sound Level Limits dB (A) Leq, 14 h		Noise Rating Level (NR) Leq, 14 h	
		Day	Night	Day	Night
A	Silent Zone	40	35	30	25
B	Place of worship	40	35	30	25
C	Residential: Indoor Outdoor	45 50	35 35	35 40	25 25
D	Mixed Residential (with some commercial and places of entertainment)	55	35	50	25
E	Commercial	60	35	55	25

Day: 6.01 a.m. – 8.00 p.m. (Leq, 14 h) Night: 8.01 p.m. – 6.00 a.m. (Leq, 10h)

6 GOVERNANCE FRAMEWORK

6.1 Introduction

The Third Schedule of EIA/EA Regulations requires that environmental guidelines and standards which include Kenya government policies and strategies, national legislation and the institutional arrangements to render them should be incorporated in an ESIA report. The legal and institutional frameworks provide important safeguards for protection and conservation of fragile environments and vulnerable communities and enhance the implementation of the Environmental and Social Management Plans. Under this section, the ESIA will therefore review the applicable sets of laws, and institutions which environmental compliance requirements for the proposed sludge handling facility.

Further, in enhancing commitments towards mitigating climate change, the United Kingdom hosted the 26th United Nations Climate Change Conference of the Parties (COP26) in Glasgow on 31st October – 13th November 2021. The goals of the summit was to secure global net zero carbon emissions by 2050 and keep 1.5°C within reach, adapt to protect communities and natural habitats, mobilize finance and work together to deliver.

6.2 Policy Framework

6.2.1 National Environment Policy, 2013

The National Policy aims to provide a framework for an integrated approach to sustainable management of Kenya's environment and natural resources. In particular, it proposes to strengthen:

- Legal and institutional framework for good governance
- Integrate environmental management with economic growth, poverty reduction and improving livelihoods
- Research and capacity development
- Promote new environment management tools
- Promote collaboration and cooperation and partnerships in environment management
- Promote domestication, co-ordination and maximization of benefit from Strategic Multilateral Environment Agreements

Chapter 6 of the policy elaborates on environmental quality and health and the need to ensure a clean and health environment for all.

6.2.2 The National Health Policy 2014 - 2030

The goal of the Policy is to attain the highest possible standard of health in a responsive manner. The health sector aims to achieve this goal by supporting equitable, affordable, and high-quality health and related services at the highest attainable standards for all Kenyans. This Policy has six objectives which include; to eliminate communicable conditions, to halt and reverse the rising burden of non-communicable conditions and mental disorders, to reduce the burden of violence and injuries, to provide essential healthcare, to minimize exposure to health risk factors and to strengthen collaboration with private and other sectors that have an impact on health. This policy takes into account the functional responsibilities between the two levels of government (county and national) with their respective accountability, reporting and management lines. It proposes a comprehensive and innovative approach to harness and synergise health services delivery at all levels.

6.2.3 The National Energy and Petroleum Policy, 2018

This Policy aims to ensure sustainable, adequate, affordable, competitive, secure and reliable supply of energy at the least cost geared to meet national and county needs while protecting and conserving the environment. It has twenty objectives that include but not limited to providing an environment conducive for the development and provision of energy services and ensuring that

prudent environmental, social, health and safety considerations, as well as issues of climate change are factored in energy and petroleum sector developments.

6.2.4 The National Land Policy, 2009

The National Land Policy guides the country towards efficient, sustainable and equitable use of land for prosperity and posterity. The Mission of the Policy aims at: promoting positive land reforms for the improvement of the livelihoods of Kenyans through the establishment of accountable and transparent laws, institutions and systems dealing with land. The overall objective of the Policy is to secure rights over land and provide for sustainable growth, investment and the reduction of poverty in line with the Government's overall development objectives. Specifically the policy offers a framework of policies and laws designed to ensure the maintenance of a system of land administration and management that will provide: a) All citizens with the opportunity to access and beneficially occupy and use land; b) Economically viable, socially equitable and environmentally sustainable allocation and use of land; c) Efficient, effective and economical operation of land markets; d) Efficient and effective utilization of land and land-based resources; and e) Efficient and transparent land dispute resolution mechanisms. Sustainable land use practices are key to the provision of food security and attainment of food self-sufficiency.

6.3 Legislative Framework

6.3.1 The Constitution of Kenya, 2010

The Constitution of Kenya 2010 is the supreme law of the land. Under Chapter IV, article 42 provides for the right to a clean and healthy environment for all. Further, Chapter V of the Constitution deals with Land and Environment. Specifically, Part 2 elaborates on the obligations of the proponent in respect to protection of the environment and enforcement of environmental rights.

Relevance to the proposed project

- The proponent is entitled to a fair administrative decision-making process from NEMA and other State organs.
- The proponent must ensure that the development is carried out in an ecologically, economically and socially sustainable manner.
- The proponent should ensure that construction and operations of the facility do not infringe on the right to a clean and healthy environment for all.

6.3.2 The Climate Change Act, 2016

The Climate Change Act provides a regulatory framework for the development, management, implementation and regulation of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya. It provides for mainstreaming of climate change responses into development planning, decision making and implementation as well as resilience and adaptation in all governance sectors. The global per capita Carbon (IV) oxide emission averaged 4.47metric tons per person in 2020.

The United Kingdom hosted the 26th United Nations Climate Change Conference of the Parties (COP26) in Glasgow on 31st October – 13th November 2021. The summit brought parties together to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change. It was the first since COP21 that expected parties to make enhanced commitments towards mitigating climate change; the Paris Agreement requires parties to carry out a process colloquially known as the 'ratchet mechanism' every five years to provide improved national pledges. The goals of the summit was to secure global net zero carbon emissions by 2050 and keep 1.5°C within reach, adapt to protect communities and natural habitats, mobilize finance and work together to deliver.

Relevance to the proposed project

- The proponent should develop a Climate Change Action Plan and implement measures to ensure low carbon footprint at the facility through incorporating low carbon technologies in order to reduce emission intensity.
- The proponent should install renewable energy infrastructure for lighting, energy efficient machines and ensure compliance with the Environmental Management and Coordination (Air Quality) Regulations, 2014.

6.3.3 The Environmental Management and Co-ordination Act (EMCA) Cap. 387 of the Laws of Kenya

The Act is the framework environmental law and aims to improve the legal and administrative co-ordination of the diverse sectoral initiatives in the field of environment so as to enhance the national capacity for its effective management. The Act harmonizes the sector specific legislations touching on the environment in a manner designed to ensure greater protection of the environment in line with the National Environment Policy, 2013.

Relevance to the proposed project

Section 58 of the Act requires proponents of a development likely to have deleterious effects on the environment to prepare and submit an EIA report to NEMA for consideration for decision making. This ESIA report is prepared to comply with the provisions of this section.

6.3.4 Regulations under the EMCA Cap. 387 of the Laws of Kenya

To operationalize EMCA, several Regulations have been gazetted since its enactment in 1999 and its amendment in 2015. These relevant ones are;

1. **Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003**

   These Regulations guide the preparation of EIA including how experts should conduct the EIA process and guidelines and standards to be met by the reports. The Regulations were reviewed in 2016 to align them to the Kenya Constitution 2010. They were also recently amended (2019) to address challenges that have been reported since they were gazetted. This report complies with the provisions of these Regulations.

2. **Environmental Management and Coordination (Water Quality) Regulations, 2006**

   These Regulations address the challenges of pollution of water resources and conservation. It consists of VI parts and eleven schedules dealing with protection of sources of water for domestic use to miscellaneous provisions. For the proposed development, the proponent and contractor should implement measures to prevent water pollution from construction activities, effluent discharge and oil spills at operational phase. Once the facility is operational, the proponent should apply for and obtain an Effluent Discharge Licence from NEMA.

3. **Environmental Management and Coordination (Waste Management) Regulations, 2006**

   The Regulations focus on the management of solid waste, industrial waste, hazardous waste, pesticides, toxic substances and radioactive substances. In compliance with these Regulations, the proponent should ensure proper solid waste disposal throughout the project cycle and procure the services of a NEMA licensed contractor for solid waste management.

4. **Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009**

These Regulations were gazetted to manage noise levels to levels that do not cause a disturbance to the public. The operations at the facility especially during construction and from machinery use and vehicles accessing the site during operations are likely to generate noise above the acceptable limits. Appropriate PPE should be provided to employees.

5. **Environmental Management and Coordination (Air Quality) Regulations, 2014**
   These regulations were aimed at controlling, preventing and abating air pollution to ensure clean and healthy ambient air. The activities of the proposed project will have a potential to pollute the air from construction works and operational activities. The proponent should undertake quarterly air quality monitoring and provide workers with appropriate PPEs.

6.3.5 Technical Guidelines on the Management of Used Oil and Oil Sludge in Kenya, 2016

These guidelines were developed to promote safe management of used oil in Kenya. The guidelines will contribute to reduction of pollution because they provide direction on safe management of waste oil and oil sludge. In particular, they expound on the requirements stipulated in Part IV and specified in the fourth schedule of the Environmental Management and Coordination (Waste Management) Regulations, 2006 on management of hazardous waste.

Relevance to the proposed project

The proponent should comply with the following Guidelines for Used Oil/Sludge Transfer Stations;

a) Requirement for the site

1. Every person intending to establish a transfer station shall undertake an Environmental Impact Assessment (EIA) and obtain EIA licence before commencement of construction works,
2. The facilities shall undertake annual Environmental Audits,
3. All transfer stations must obtain an operational license issued under the Waste Management Regulation to own or operate a transfer station from the Authority,
4. All used oil from transfer stations shall be transferred to licensed recycling facilities,
5. A transfer station shall not process the used oil in any way except dewatering,
6. All transfer stations shall be provided with adequate and functional oil interceptors and other pollution control measures e.g. spillage control kit,
7. At each site the operator is to have a minimum amount of storage capacity of $90M^3$ on site to allow for discharge from the largest capacity of a vehicle that may be received, in the event of a contaminated load,
8. The loading and offloading area must have paved surfaces with an impervious material to prevent any spills from contaminating the soil,
9. The offloading and loading area should be bunded and must equal or exceed the volume of the largest compartment of any vehicle to be discharged,
10. All transfer stations shall provide valid physical addresses, contact details, telephone numbers, email contacts and GPS coordinates of their locations,
11. All transfer stations should have in place an Emergency Response Plan (spill control equipment, a fire control plan, an evacuation plan) in case of incidents, spillages, fires, explosions etc,
12. The transfer stations shall only sell used oil to licenced recycling facilities and energy recovery users,
13. All used oil to and from a transfer station shall be transported by licenced used oil transportation vehicles,
14. The transfer station shall have a waste management plan and
15. Establish a complaint management system (twenty-four (24) hour complaint contact telephone number) and ensure verbal response is provided to the complainant within two (2) hours.

b) Tank farm

1. All oil tanks shall meet the KS 200: Part 1: 2002 on specifications for storage tanks for petroleum industry,
2. All oil tanks shall be bunded appropriately with a bund wall of size stipulated under the KS 1967:2006,
3. All tanks are to be made from steel,
4. All tanks compartments should be padlocked when not in use,
5. All tanks are to be bunded. The bund must equal or exceed the volume of the largest tank in that bunded area,
6. The bunded area must be paved with concrete or asphalt, not soil, clay or gravel
7. All tanks are to be inspected on a regular basis for worthiness in accordance with KS 1938,
8. All tanks are to have some method to determine the volume in each tank,
9. All tank maintenance is to be recorded and kept for five years and
10. Haulage of 5% must be left when the tank is full.

6.3.6 The Occupational Safety and Health Act, 2007

The OSHA, 2007 commenced on 26th October 2007. It is an Act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces. Although the OSHA, 2007 repealed the Factories and Other Places of Work Act Cap. 514 of the Laws of Kenya, it inherited all the subsidiary legislation issued under Cap. 514. Examples of subsidiary legislation inherited include:

- Docks Rules L.N. 306 of 1962
- Eyes Protection Rules L.N. 44 of 1978
- Building Operations and Works of Engineering Construction Rules L.N. 40 of 1984
- Electric Power Special Rules L.N. 340 of 1979
- First Aid Rules L.N. 87 0f 1964
- Cellulose Solutions Rule L.N. 87 of 1964
- Health and Safety Committee Rules L.N. 31 of 2004
- Medical Examination Rules L.N. 24 of 2005
- Noise Prevention and Control Rules L.N. 25 0f 2005
- Fire Risk Reduction Rules L.N. 59 0f 2007
- Hazardous Substances Rules L.N. 60 of 2007

Relevance to the proposed project

Under OSHA, the proponent should register the site as a workplace with the DOSHS and ensure timely renewal of the same. In addition, the proponent should provide the workers with adequate and appropriate PPE and enforce their use at work, and carry out occupational safety and health audit annually.

6.3.7 Public Health Act, 2012

The Act aims at prohibiting activities that may be injurious to the general public. It outlines the responsibilities for the County Government to maintain a safe and clean environment by controlling the development activities during the construction and subsequent operational phases.

Relevance to the proposed project

The proponent should ensure compliance with the Act by providing clean, healthy and safe environment during construction and subsequent operation of the sludge handling facility.

6.3.8 The Water Act, 2016

The Constitution acknowledges access to clean and safe water as a basic human right and assigns the responsibility for water supply and sanitation service provision to the 47 established counties. The purpose of the 2016 Water Act is to align the water sector with the Constitution's primary objective of devolution. The Act establishes several organs to ensure development and sustainable use of water resources. These include the Water Resources Authority (WRA), the Water Sector Trust Fund (WSTF), Water Resources Users Associations (WRUAs), Water Services Providers (WSPs) and Water Works Development Agencies among others.

Relevance to the proposed project

The Water Act provides for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water, to provide for the regulation and management of water supply and sewerage services.

6.3.9 The Energy Act, 2019

It's an Act of Parliament to consolidate the laws relating to the production, supply and use of energy and for connected purposes.

Relevance to the proposed project

The proponent should ensure energy audits are carried out at least once every three years.

6.3.10 The National Construction Authority Act, 2014

The Act aims at improving and regulating the construction industry in Kenya. The NCA is mandated to clear builders and contractors as a way of eliminating rogue contractors in Kenya and malpractices in the building and construction industry. The authority is tasked with the responsibility of inspecting construction and building projects around the country to ensure high quality of work and close projects posing health risks and collapse hazards.

Relevance to the proposed project

The proponent will ensure compliance with the provisions of the Act throughout the construction process.

6.3.11 The Physical and Land Use Planning Act, 2019

The Act provides for the planning, use, regulation and development of land and for connected purposes. It was enacted to ensure that every person engaged in physical and land use planning shall promote sustainable use of land and livable communities which integrates human needs in any locality. The Act allows the County Government to prepare a local physical and land use development plan in respect of a city, municipality, town or unclassified urban area.

Relevance to the proposed project

The proponent should obtain approvals of the plans for the facility and operational licenses from the County Government of Mombasa.

6.3.12 The Occupiers Liability Act Cap. 34

The Act regulates the duty that an occupier of premises owes to his visitors in respect of dangers due to the state of the premises or to things done or omitted to be done on them.

Relevance to the proposed project

The act requires that the occupier warn the visitors of the likelihood of dangers within his premises to enable the visitor to be reasonably safe.

6.3.13 The Energy Act, 2019

The Act stipulates the electrical supply requirements one has to meet and offenses related to supply and use of electricity.

Relevance to the proposed project

The proponent is required to ensure that the energy supplied is consumed in accordance to the provisions of the Act and energy audits carried out after every three years.

6.3.14 The County Government Act, 2012

The new constitution grants County Governments the powers to grant or to renew business licenses or to refuse the same. To ensure implementation of the provisions of the new constitution, the County Governments are empowered to make by-laws in respect of all such matters as are necessary or desirable for the maintenance of health, safety and well-being of the general public.

Relevance to the proposed project

The Act gives right to access private property at all times by the County Government officers and servants for inspection purposes.

6.4 Institutional arrangements

To implement the above legal framework the government has established a number of institutions with varying mandates of implementation. These include;

1. The National Environment Management Authority to implement the Environmental Management and Coordination Act and associated Regulations.
2. The Directorate of Occupational Safety and Health Services to implement the Occupational Safety and Health Act alongside the subsidiary legislation.
3. The Water Resources Authority to implement the Water Act.
4. The County Government of Mombasa to implement the County Government Act, its by-laws, the Public Health Act, the Physical and Land Use Planning Act and the Occupiers Liability Act.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The proposed project is considered important and beneficial to the economy as it will ensure safe management of used oil, provide raw materials to used oil recycling facilities promote socio-economic growth of the area through employment creation and revenue generation to the government. The key concerns that will result from the implementation of the proposed project include waste oil leaks and spillages, oil sludge management, fire risks and management, occupational safety and health risks, air and noise pollution, water demand, waste generation and management and traffic congestion. The ESIA study proposes a suite of comprehensive Environmental and Social Management and Monitoring Plans to address the anticipated negative impacts during the entire project cycle and improve the environmental performance of the proposed project. It is on this basis that we recommend that the project be allowed to proceed alongside conditions which will ensure compliance with the provisions of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya.

7.2 Recommendations

The main recommendation of the ESIA is the need for concerted implementation of the Environmental Management and Monitoring Plans by the proponent. The specific key ones include;

1. Register the site as a workplace with DOSHS
2. Provide and enforce appropriate PPE among workers and visitors to the site
3. Dispose all the asbestos sheets stored at the project site
4. Pave the loading and offloading area with an impervious material to prevent any spills from contaminating ground water and soil
5. Construct a bund wall around the storage tanks, and loading and offloading area to prevent accidental oil leaks and spills from flowing to other areas
6. Ensure that adequate spill containment is provided at all times in case of severe leakage of oils. The containment should be of at least 20% the capacity of the storage tanks
7. Regularly desludge and maintain the oil interceptor in good working condition
8. Conduct regular tests on the waste oil tanks to curb possible tank failure
9. Put adequate measures to prevent fire outbreaks
10. Prior to decommissioning, the proponent should prepare and submit a due diligence decommissioning audit report to NEMA for approval at least three (3) months in advance.
11. Comply with all pieces of regulations as documented in this study report.

On the basis of a commitment by the proponent to implement the proposed mitigation measures and the Environmental Management Plan, we recommend the issuance of an EIA License as per the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya and Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003.

8 REFERENCES

1. Government of Kenya (2019). 2019 Kenya Population and Housing Census, Kenya National Bureau of statistics.
2. Government of Kenya Policies
   - National Environment Policy, 2013
   - National Health Policy, 2014 – 2030
   - National Energy and Petroleum Policy, 2018
   - National Land Policy, 2009
3. Republic of Kenya Statutes:
   - Environmental Management and Coordination (Air Quality) Regulations, 2014
   - Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003
   - Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulation, 2009
   - Environmental Management and Coordination (Waste Management) Regulations, 2006
   - Environmental Management and Coordination (Water Quality) Regulations, 2006
   - Environmental Management and Coordination Act Cap 387 of the Laws of Kenya
   - The Constitution of Kenya, 2010
   - The Climate Change Act, 2016
   - Technical Guidelines on the Management of Used Oil and Oil Sludge in Kenya
   - The County Government Act, 2012
   - The Energy Act, 2019
   - The Occupational Safety and Health Act, 2007
   - The Occupiers Liability Act, 2012
   - National Construction Authority Act, 2014
   - The Physical and Land Use Planning Act, 2019
   - The Public Health Act, 2012
   - The Water Act, 2016

9 LIST OF ANNEXTURES

1. Copy of Certificate of Incorporation
2. Copy of Pin Certificate
3. Copy of the Title deed for the proposed project site
4. Copy of approval of the scoping report and Terms of Reference for the ESIA study
5. Copies of the baseline monitoring reports for air quality, noise level measurements and soil tests
6. Letters of invitation and evidence of receipt by the neighbors and stakeholders to obtain comments and concerns regarding the proposed project
7. Copy of the stakeholders' consultative meeting programme
8. Proceedings of the stakeholders' meeting to obtain comments and concerns regarding the proposed project held at the project site on 18th February 2022
9. Copies of the public consultation questionnaires
10. Copy of the NEMA practicing license for the Firm, Envasses Environmental Consultants Limited
11. Copy of the NEMA practicing licenses for Lead Expert, Mr. Simon Nzuki