

Coordinates: S 3°54'46.19628, E 39°31'4.683

**ENVIRONMENTAL IMPACT ASSESSMENT
STUDY REPORT**

FOR

**THE PROPOSED USED OIL TRANSFER STATION ON
PLOT L.R NO. KILIFI/KALIANGOMBE/JIMBA/16 IN
KOKOTONI AREA, OFF MOMBASA-NAIROBI
HIGHWAY, KILIFI COUNTY**

PROPONENT

**STEEN AGENCIES LIMITED
P.O BOX 42588– 80100
MOMBASA**

JUNE 2023

CERTIFICATION

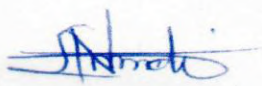
Certification by EIA Expert

I certify that this Environmental Impact Assessment Study report has been done under my supervision and that all due diligence has been taken in assessment criteria, methodology and report writing and that it conforms to the requirements of the Environmental Management and Coordination Act, 1999 and Legal Notice No. 101 of June 2003 (Environmental Impact Assessment and Audit Regulations).

EIA Expert;

Edgar Eredi


Practicing License No. 1921

Signature: 

Date: 13.06.2023

Certification by Proponent: Steen Agencies Limited

NAME: MOSES NJUGUNA

SIGNATURE OF PROPONENT: 

DATE: 13/06/2023

ACRONYMS

| | |
|------------|---|
| AIDS | Acquired Immune Deficiency Syndrome |
| CPP | Consultative Public Participation |
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Plan |
| ERC | Energy Regulatory Commission |
| NEMA | National Environment Management Authority |
| EMCA, 1999 | Environmental Management and Coordination Act, 1999 |
| GOK | Government of Kenya |
| LR | Land Registration |
| PR | Project Report |

EXECUTIVE SUMMARY

The project Proponent Steen Agencies Limited proposes to set up a Used Oil Transfer Station in Kokotoni area, within Kilifi County. Mikayi Systems and Environment Limited has been contracted by Steen Agencies Limited to conduct an Environmental Impact Assessment Study for the proposed development of waste oil storage and transfer station on Plot L.R No. Kilifi/Kaliangombe/Jimba/16 in Kokotoni area (S 3°54'46.19628, E 39°31'4.683) off Mombasa – Nairobi highway, Kilifi County.

The Project site is strategically located within an area zoned for commercial/industrial use with easy access the major road, the rail network and the port of Mombasa. This full study report provides an in-depth analysis and evaluation of impacts likely to be experienced during both construction and operational phase of the project. The project proponent is **Steen Agencies Limited** and the plot is owned by Sikukuu Keya Martin in Kokotoni area, off Mombasa – Nairobi Highway part in Kilifi County. The proposed project entails civil works associated with construction of a yard to ensure compliance with legal and regulatory requirements applicable to the facility. These activities include construction of the following: reinforced concrete slab in the working area, bund walls to serve as secondary containment for the waste oil storage tanks, concrete storm water drainage channels incorporating oil/water interceptors, an office block and washrooms. Activities to be undertaken during operation phase of the proposed project include transportation of waste oil from the port of Mombasa to the yard for processing (decanting) and selling to third parties for reuse or recycling. The technology to be used in the processing of waste oil entails separation of oil from water without an addition of any chemical.

The design of the processing facility consists of a chamber with a mechanical screen (sieve) on top, a long channel and a six stage underground oil separator chambers arranged in series. These are simply decanting chambers that have connecting pipes which allow water to pass from one chamber to the next. The project proponent will be required to apply and acquire licenses for transportation of waste oil and operating the used oil transfer station. The total cost of the proposed project is eight million Kenya shillings (Ksh.8, 000,000.00).

Pursuant to section 58 of the Environmental Management and Coordination Act, (EMCA) 1999, the National Environment Management Authority (NEMA) requires project proponents to carry out Environmental Impact Assessments (EIA) and prepare related reports for developments that have the potential of resulting to negative social and environmental impacts.

It is against this background that the project proponent commissioned preparation of the full EIA study report for the proposed project. The Terms of Reference for undertaking the full EIA study was submitted to NEMA and approved on 25th May 2023. The TOR approval number is NEMA/TOR/5/2/571.

The objective of the EIA study was to facilitate in depth evaluation of the potential impacts and a wider public consultation with respect to the proposed project. The EIA study was undertaken using a combination of methods including; ground surveys, review of existing literature pertinent to the proposed project and consultative public participation with relevant stakeholders. The potential negative environmental impacts identified are those associated with the following aspects: dust, noise, elevated and overhead work, indiscriminate disposal of waste, general health and safety aspects, increased traffic, spillage of waste oil on the ground surface, management of hazardous waste and gaseous emissions. The findings of this study indicate that the positive impacts associated with the proposed project far much out-weighs the negative impacts.

The EIA team has developed an Environmental Management Plan (EMP), which when adopted and adhered to, will ensure that the proposed project is implemented in an environmentally sustainable manner. The project proponent has committed himself to implementing the EMP and further mitigation measures that may be recommended by NEMA from time to time during the operation phase of the project.

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CHAPTER ONE

1.0 BACKGROUND OF THE PROPOSED PROJECT & EIA PROCESS

1.1 Project Objective

The proposed project entails construction and operation of a used oil transfer station by Steen Agencies Limited. The objective of the proposed project is to procure waste oil from the port of Mombasa and transport it to the site for processing (decanting) and selling to third parties for reuse and recycling.

1.2 Project Justification

Kenya Vision 2030 is the country's new development blueprint covering the period 2008 to 2030. It aims to transform Kenya into a newly industrialized, "middle-income country providing a high quality life to all its citizens by the year 2030". The Vision 2030 recognizes the fact that the informal sector must be supported in ways that will raise productivity and distribution and increase jobs, owner's incomes and public revenues. The informal economy currently employs approximately 75% of the country's workers. Therefore, by supporting the informal sector, the desired accelerated economic growth will be achieved.

It is against this background that the project proponent intends to construct a used oil transfer station on Plot L.R No. Kilifi/Kaliangombe/Jimba/16 in Kokotoni area off Nairobi-Mombasa highway in Kilifi County. The proposed project will contribute towards employment creation and income generation both during construction and operation phases thereby improving the living standards of construction staff, project consultants and the project proponent. In addition, the project will contribute to revenue generation through the licensing process and tax remittance thereby improving the economy of Kilifi County and Kenya as a whole. However, the project must conform to the set national environmental standards in order for the perceived economic benefits to be realized.

1.3 Screening of the Proposed Project

The second schedule to EMCA, 1999 provides a list of projects that should undergo EIA study. According to this schedule, the proposed project falls under category 8 (i) which is oil refineries and petro-chemical works. The EIA study report for the proposed used oil transfer station has been prepared to comply with section 58 of EMCA, 1999 which stipulates that projects listed under the second schedule must be subjected to EIA study.

This was preceded by the terms of reference for the EIA study which were submitted to NEMA and approved on 25th May 2023, with its approval number being NEMA/TOR/5/2/571.

1.4 Objective of Conducting the EIA Study

The overall objective of carrying out EIA study for projects listed under the second schedule of EMCA, 1999 is to ensure that environmental concerns are integrated in the design and implementation of the respective projects thereby contributing to sustainable development. The specific objectives of conducting the EIA study with respect to the proposed project were to:

- Examine, in depth, the likely adverse environmental aspects and associated impacts
- Propose sufficient mitigation measures for the significant negative impacts
- Carry out wider public consultations and
- Develop an Environmental Management Plan (EMP) with mechanisms for monitoring and evaluating compliance and environmental performance of the proposed project.

1.5 Scope of the EIA Study

The EIA study was undertaken with respect to the proposed used oil transfer station on Plot L.R No. Kilifi/Kaliangombe/Jimba/16 in Kokotoni area off Nairobi-Mombasa highway, Kilifi County. The EIA study report was prepared to conform to the guidelines provided under the Environmental (Impact Assessment and Audit) Regulations, 2003. The guidelines provide that the EIA study report has to capture the following salient features:

- a. The proposed location of the project
- b. A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project
- c. The objectives of the project
- d. The technology, procedures and processes to be used, in the implementation of the project
- e. The materials to be used in the construction and implementation of the project
- f. The products, by-products and waste generated by the project
- g. A description of the potentially affected environment

- h. The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated
- i. Alternative technologies and processes available and reasons for preferring the chosen technology and processes
- j. Analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies
- k. An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment; including the cost, time frame and responsibility to implement the measures
- l. Provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the case of carrying out activities or major industrial and other development projects
- m. The measures to prevent health hazards and to ensure security in the working environment for employees and for the management of emergencies
- n. An identification of gaps in knowledge and uncertainties which were encouraged in compiling the information
- o. An economic and social analysis of the project
- p. An indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures and
- q. Such other matters as the Authority may require including public consultation with various stakeholders through focus group meetings.

Detailed terms of reference for carrying out the EIA study were submitted to NEMA and approved on 25th May 2023. Approval number is NEMA/TOR/5/2/571.

1.6 EIA Methodology

The EIA study process entailed the following steps:

- Meeting with the project proponent to discuss and agree on the terms of reference
- Preparation of the terms of reference, submission, review and approval by NEMA
- Desk top study (literature review) pertinent to the proposed project including review of the project report for identification of gaps

- Field survey to collect baseline information through direct observations, interviews and focus group discussions with relevant stakeholders and
- Preparation of the EIA study report to conform to the Environmental Impact (Assessment/Audit) Regulations of 2003.

Upon submission of the EIA study report to NEMA, a wider public consultation will be carried out by publishing a public notice with respect to the proposed project in one of the local newspapers and the Kenya gazette once in a week for two consecutive weeks and conducting public barazas to address any issues of concerns.

1.7 EIA Team*The key personnel that carried out the EIA study for the proposed project are listed in the table 1 below.*

Table 1: Details of EIA Team

| Name | Qualification | Affiliate |
|----------------------------------|--|---|
| Edgar Ambaza (1916) | Lead Auditor/Trainer ISO, Lead Expert – Natural Resource Management | Global EHS Consulting |
| Edgar Eredi Muyesu (1921) | Lead Auditor/Trainer ISO, Lead Expert – Natural Resource Management | Mikayi Systems and Environment Limited |
| Victor Kirima Lihenzero | Lead Expert | Mikayi Systems and Environment Limited |
| Evans Totona | Lead Expert | CEMEA Firm |
| Stephen Ndibui Kamau | Quantity Surveyor | Ndibui S.K & Associates |
| Venlensa Odhiambo Global | Associate Expert | EHS Consulting |
| Sharon Kerubo Ondieki | Bsc. Environmental Science | Mikayi Systems & Environment Limited |
| Pority Mukami Kariuki | Bsc. Environmental Studies (Community Development) | Global EHS Consulting |

CHAPTER 2

2.0 PROJECT COMPONENTS, ACTIVITIES AND COST

2.1 Components of the Proposed Project

The proposed project will comprise of the following:

- Office block
- Gate
- Washroom
- Interceptor
- Storage tanks
- O/W interceptor
- Store
- Security
- Parking Space

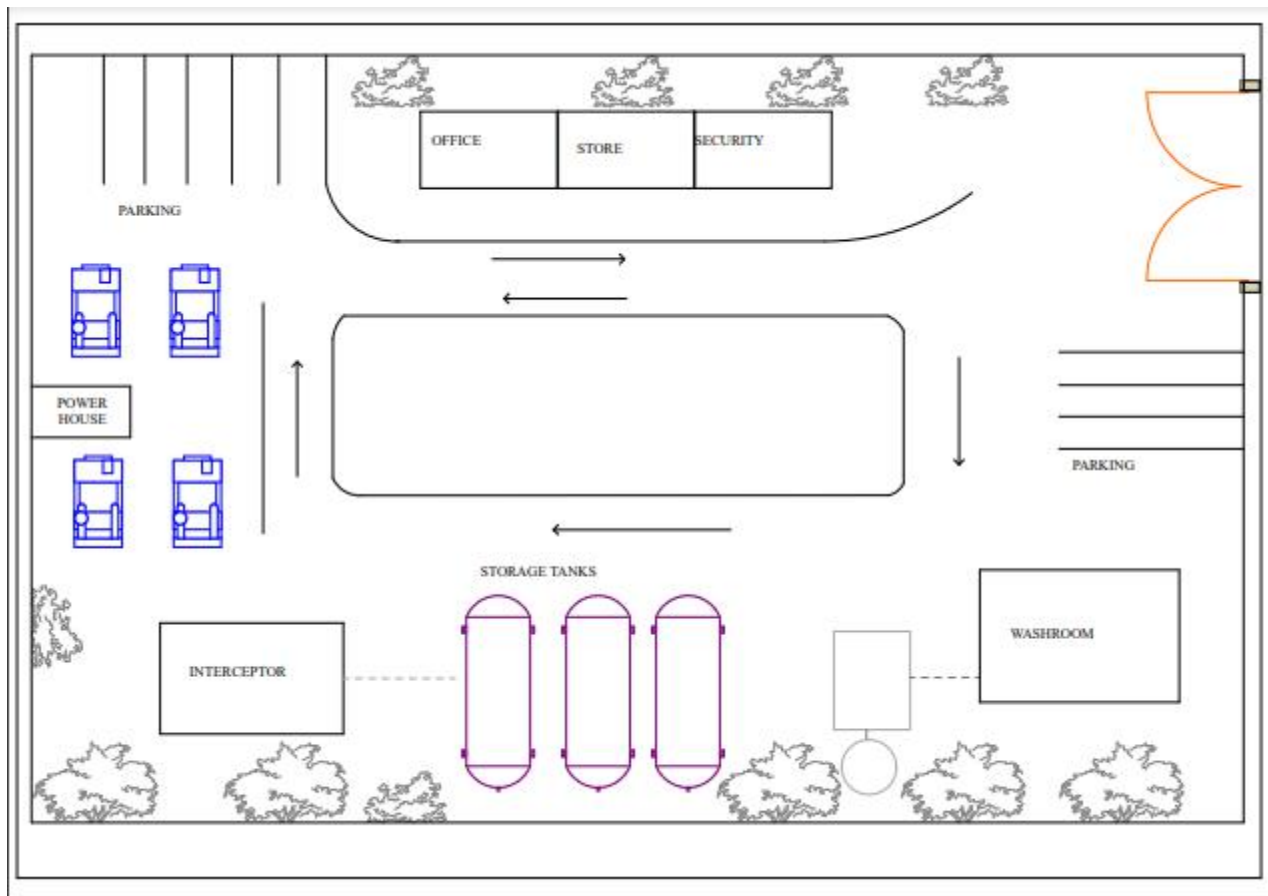


Figure 1: Site Layout

2.1.1 Office block

The project proponent proposes to put up a permanent building that will provide working space for the workforce during operation phase of the project.

2.1.2 Washrooms

The proponent intends to construct adequate toilet and washing facilities for use by the workforce during operation phase of the proposed project.

2.1.3 Storage Tanks

The project proponent intends to install five waste oil storage tanks incorporating concrete bund walls to serve as secondary containment for spillage.

2.1.4 Store

The proponent will include a store room to provide a designated space for the safe and organized storage of various equipment, tools, and supplies that are essential for the operation and maintenance of the facility.

2.1.5 Parking Space

The parking space will be used as a parking area for the trucks that will be delivering waste oil to the site or collecting processed oil from the site. The proponent proposes to provide the entire yard with a concrete slab.

2.1.6 O/W interceptor

The design of the yard will incorporate concrete drainage channel complete with oil/water interceptors.

2.1.7 Perimeter Fence

The project proponent plans to build a concrete perimeter fence around the site incorporating a steel gate.

2.1.8 Security

The proponent will provide a security room to serve as a centralized location for monitoring and controlling access to the facility. It will also serve as a hub for storing important documents, records, and communication equipment related to the site's security protocols.

2.2 Project activities

Activities related to implementation of the proposed project are summarised in the following sub-sections.

2.2.1 Activities during Construction Phase

The proponent intends to upgrade the proposed project site to acceptable national environmental and safety standards. The following will be the activities to be undertaken during this phase.

- Hiring of construction workforce
- Mobilization of construction equipment to the site
- Site clearing, excavation, leveling, grading and compaction of the ground
- Delivery of construction materials to the site
- Concrete mixing

- Construction of concrete slab, bund walls, washrooms and office block
- Preparation of pipe and cable bridges/racks, service ways, ducts and trenches
- Installation of above ground fuel storage tanks and associated piping works
- Laying down of concrete storm water drainage channel incorporating oil/water interceptors.
- Plumbing works
- Construction of decanting chambers
- Setting up the septic tank and soakage pit
- Power supply installation
- Power supply connection
- Erection of a masonry stone wall perimeter fence and
- Site finishing works including plastering, painting, decoration, grading, protection and hard landscaping

2.2.2 Activities during Operation Phase

Activities during operation phase of the proposed project will entail the following:

- Purchase of waste oil from the port of Mombasa
- Delivery of waste oil to the site using oil tankers
- Offloading and storage of waste oil in above ground storage tanks
- Processing of waste oil in the decanting chambers
- Storage and/or transfer of processed oil in designated above ground storage tanks
- Selling and transfer of processed oil into awaiting oil tankers ready for transportation for reuse or recycling by third parties

The flow diagram of the above activities is shown in figure 1 below.

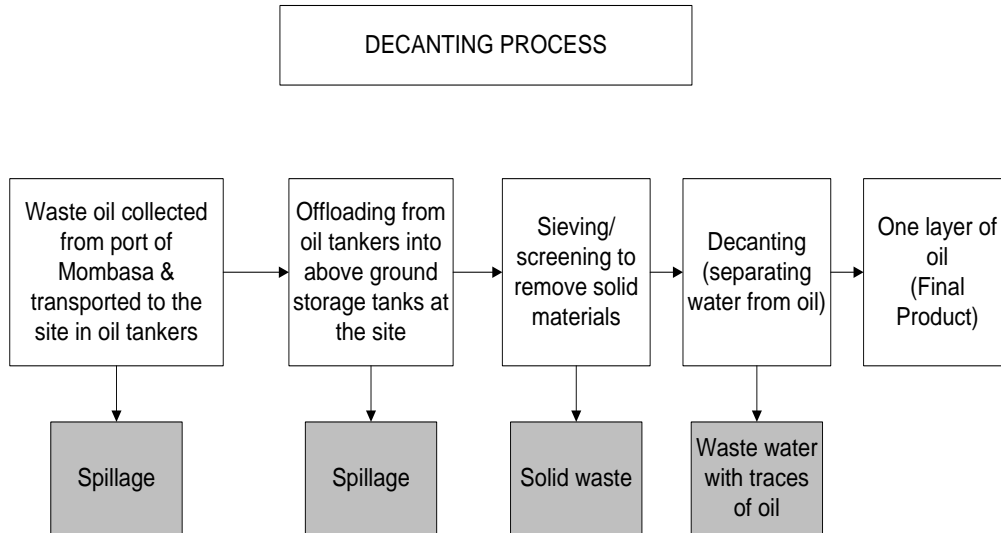


Figure 2: Flow Diagram of Decanting Process

Waste Oil Processing

This is a physical process, which is comparatively simple and requires no chemicals. It involves the following steps:

i. Sieving/Mechanical Screening

The waste oil delivered at the site will be stored in above ground storage tanks. This oil will be allowed to flow to the first chamber by opening the valve. The sieve incorporated in this chamber will remove solid materials from the oil. The sieved oil will then be permitted to flow to the second chamber where it will be allowed to settle.

ii. Settling

In the second chamber, the oil water mixture is allowed to settle. The mixture separates in two distinct layers one on-top of the other. Water being denser than oil sinks to the bottom, while the waste oil floats on top. The process of settling takes from a few hours to several days depending on the composition of the waste oil.

iii. Separation (decanting)

The water is then allowed to drain by gravity to the next chamber by opening the valves of the interconnecting pipes thereby leaving oil behind. The process of settling and separation is repeated in all the other chambers until all the water is removed from the waste oil. The water is then drained into the last chamber where it is contained until it is disposed off.

iv. Disposal of oily water (supernatant) and solid waste

The water removed from the waste oil will contain a layer of oil hence making it unsuitable for direct discharge into the environment. The proposal is to contract licensed waste handler who will ensure sound disposal of the water hence preventing the potential for polluting soil and water resources. Solid waste will be placed in labelled waste bins which shall be emptied by a hired waste handler registered by NEMA.

v. Storage of waste oil

The separated oil is the final product of the separation process. It will be pumped from any of the first five decanting chambers into a storage tank or directly into a collecting oil tanker belonging to a third party.

2.2.3 Activities during Decommissioning Phase

Decommissioning is the last phase of project life. It involves terminating project activities and operations and rehabilitation site to or close to its original state. The project proponent will be required to prepare a decommissioning plan on how the proposed used oil transfer station would be demolished if need arises and how the site would be rehabilitated to its original state or close to original state.

Considerations

In decommissioning the proposed used oil transfer station, there are two main options that could be considered. These are:

- Either to sell the facility intact or;
- to remove all installed equipment and close operations.

In the event that operations at the waste oil handling yard must come to a close, then the following would be done: -

- i. Dismantling of the equipment
- ii. Laying off employees
- iii. Emptying of the storage tanks and chambers
- iv. Removal of electrical and water infrastructure
- v. Demolition of structures
- vi. Sampling of soils and ground water

vii. Site rehabilitation

viii. Disposal of land

i) Dismantling and disposal of the Equipment

Equipment to be dismantled will include computer systems, air conditioners and generator. The mode of disposal will depend on the functionality of the equipment at the time of decommissioning. Some equipment will be sold or retained for future use. Those which will be grounded would be sold as scrap or spare parts for reuse.

ii) Laying Off Employees

Employees would need to be informed in advance of the closure so as to be mentally prepared to face the new way of life. Where possible the proponent would be required to enter into a buy-off scheme with similar business establishments or if not the case, pay them their work /terminal benefits according to labour laws.

iii) Emptying and Disposal of Storage Facilities

When emptying the storage facilities, caution would be taken on environmental and safety issues. Some of the facilities would be sold to other companies with similar undertakings and the remaining ones given out to local workshops.

iv) Removal of Electrical and Water supply Installation Infrastructure

Relevant departments within Kilifi County government must be involved in the removal exercise. These would include Kenya Power & Lighting and Kilifi Water & Sewage Company Ltd.

v) Demolition of Structures on Site

The management would enter into a dialogue with the owner of the plot on which the facility is situated with a view to selling the structures to him/her. If this will not be possible then the structures including the office block, toilet, decanting chambers, concreted yard and washrooms would be demolished. The following would be taken into consideration: -

- All employees involved in the demolition exercise must be in proper protective gear;
- Demolition should be done during day time only;

- Care must be taken to avoid destruction of trees and other vegetation on site during the exercise; and
- Waste resulting from demolition must be disposed of at designated waste disposal sites through NEMA licensed waste handlers.
- The proponent will need to follow the safety guidelines issued in the Kenya gazette supplement No. 18, Legislative supplement No. 13, Legal Notice No. 40, parts IX and X during the demolition process.

vi) Site rehabilitation

Once demolition is completed, rehabilitation of affected site should be undertaken to its original state or close to original state. Site rehabilitation will include the following: -

- Sewage facilities such as cess-pits must be emptied first;
- Levelling of the ground;
- Test and analysis of soil from site before rehabilitation begins. If found to be contaminated, then decontamination exercise must be carried out.
- Re-vegetation as may be agreed upon by the land owner

vii) Disposal of land

The land on which the waste oil facility will be built is leased. Therefore, once site rehabilitation is completed the land will be surrendered to the owner for a similar or different use.

2.3 Project Budget/Cost

The cost of the proposed project is eight million Kenya shillings broken down as shown in the table 2 below:

Table 2: Breakdown of the cost of the project

| Index | Project Item | Cost in Ksh |
|--------------|---|----------------------|
| a. | Yard Paving & construction of storm drain | 3,300,000 |
| b. | Mounting of storage tanks inside bund walls | 500,000 |
| c. | Provision of fire protection system | 500,000 |
| d. | Perimeter fence | 2,000,000 |
| e. | Construction of office block & washrooms | 400,000 |
| g. | Construction of interceptor chambers | 1,150,000 |
| | Total Cost | 7,850,000.000 |

2.4 Project Implementation Schedule

Implementation of the proposed project is expected to take 24 months as summarised in the table below.

Table 3: Project Implementation Schedule

| No. | PROJECT ITEM | DURATION |
|------------|---|------------------|
| 1. | Provision of Fire extinguishers, First Aid Kit, PPE's & Training | Three (3) months |
| 2 | Yard Paving | Six (6) months |
| 3. | Construction of Drainage for Storm water and renovation of the decanting chambers | Four (4) months |
| 4. | Mounting of Storage Tanks Inside Bund Walls | Four (4) months |
| 5. | Setting up an office | Four (4) months |
| 6. | Construction of wash room and concrete fencing | Three (3) months |
| | Total Duration | 24 months |

CHAPTER 3

3.0 RELEVANT POLICY, LEGISLATIVE AND ADMINISTRATIVE FRAMEWORK

3.1 General Overview

The current legal provisions for natural resource management in Kenya are contained in various sector-specific statutes. For a long time, the country lacked an umbrella legislative guide for harmonious and holistic environmental management. As such resources were managed sectorally in accordance with the statutes that were in place. However, at many times these statutes were contradictory. In 1999, the government enacted the Environmental Management and Co-ordination Act (EMCA) which is an umbrella legal framework under which the environment is being managed. The Act establishes the institutional framework under which environmental management is to be coordinated. EMCA prevails over all other sectoral laws relating to the environment, in cases of conflict or contradictions. It also grants the public a *locus standi* in matters of the environment. Kenya is also a signatory to various international environmental laws including the Ramsar Convention, the Vienna Convention, United Nations Framework Convention on Climate Change, the Montreal protocol and the Kyoto Protocol.

3.1.1 The Environment Management and Coordination Act (EMCA), 1999

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

Section 58 of the Act makes it a mandatory requirement for an Environmental Impact Assessment study to be carried out by proponents intending to implement projects specified in the second schedule of the Act. Such projects have the potential of causing significant impacts on the environment. Similarly, section 68 of the same Act requires operators of existing projects or undertakings to carry out environmental audits as a way of determining the level of conformance with statements made during the EIA study. The proponent is required to submit the EIA and environmental audit reports to NEMA for review and necessary action.

The project proponent submitted to NEMA, the EIA project report for the proposed project under file reference No. NEMA/PR/5/2/11,729. Consequently, he has commissioned a team of experts to

undertake EIA study for the proposed project in order to comply with the requirements of EMCA, 1999 and its subsidiary legislations. As part of monitoring the environmental performance of the project, environmental audits will be undertaken on an annual basis and reports submitted to NEMA for review, issuance of improvement orders and compliance purposes.

3.1.2 The Environmental Management and Co-ordination (Water Quality) Regulations, 2006)

These Regulations were published in the Kenya Gazette Supplement No. 68, Legislative Supplement No. 36, Legal Notice No. 120 of 29th September, 2006. The Regulations provides for sustainable management of water resources including prevention of water pollution and protection of water sources (lakes, rivers, streams, springs, wells and other water sources). It is an offence under Regulation No. 4 (2), for any person to throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution. Regulation No. 11 further makes it an offence for any person to discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment.

The project proponent will be required to ensure sound management of waste associated with implementation and operation of the proposed project in order to prevent pollution of surface and underground water resources. Such measures shall include installation of oil/water interceptor along the storm water drain, provision of secondary containment and monitoring of the quality of waste water discharged from the decanting chambers.

3.1.3 The Environmental Management and Co-ordination (Waste Management) Regulations, 2006.

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

- domestic waste
- industrial waste,

- hazardous and toxic waste
- pesticides and toxic substances
- biomedical wastes and
- radioactive waste

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

Regulation 5 (1) provides categories of cleaner production methods that should be adopted by waste generators in order to minimize the amount of waste generated and they include:

- i. Improvement of production process through-
 - a. Conserving raw materials and energy
 - b. Eliminating the use of toxic raw materials and wastes
 - c. Reducing toxic emissions and wastes
- ii. Monitoring the product cycle from beginning to end by-
 - a. Identifying and eliminating potential negative impacts of the product
 - b. Enabling the recovery and re-use of the product where possible, and
 - c. Reclamation and recycling and
- iii. Incorporating environmental concerns in the design and disposal of a product

Regulation 6 requires waste generators to segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal. Regulation 15 prohibits any industry from discharging or disposing of any untreated waste in any state into the environment. Regulation 17 (1) makes it an offence for any person to engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by NEMA.

Adequate number of solid waste containers will need to be provided both during construction and operation phases of the project for use by employees and visitors to the site. The solid waste containers shall be labelled accordingly to facilitate waste segregation. Efforts to minimize waste generation at

the source and reuse of some waste will need to be promoted both during the construction and operation phase of the proposed project. The project proponent will also be required to apply to NEMA for a license of handling used oil.

3.1.4 The Environmental Management and Coordination Act (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

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

- i. Prohibition of excessive noise and vibration
- ii. Provisions relating to noise from certain sources
- iii. Provisions relating to licensing procedures for certain activities with a potential of emitting excessive noise and/or vibrations and
- iv. Noise and excessive vibrations mapping

According to regulation 3 (1), no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Regulation 4 prohibits any person to (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source.

Regulation 5 further makes it an offence for any person to make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property. Table 4 shows the permissible noise levels as per the First Schedule of EMCA 1999.

Table 4: First Schedule - Maximum Permissible Noise Levels

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

Time Frame:**Day:** 6.01 am - 8.00 p.m (Leq, 14 h)**Night:** 8.01 p.m – 6.00 am (Leq, 10 h)

Regulation 12 (1) makes it an offence for any person to operate a motor vehicle which- (a) produces any loud and unusual sound; and (b) exceeds 84 dB(A) when accelerating. According to sub-regulation 2 of this regulation, No person shall at any time sound the horn or other warning device of a vehicle except when necessary to prevent an accident or an incident. Regulation 13 (1) provides that except for the purposes specified in sub-Regulation (2) there under, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations which is shown in table 5 below.

Table 5: Second Schedule - Maximum Permissible Noise Levels for Construction Sites (Within Facility)

| Facility | | 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 |

Time Frame:**Day:** 6.01 a.m. – 6.00 p.m. (Leq, 14 h)**Night:** 6.01 p.m. – 6.00 a.m. (Leq, 14 h)

Regulation 19 (1) prohibits any person to carry out activities relating to fireworks, demolitions, firing ranges or specific heavy industry without a valid permit issued by the Authority. According to sub-regulation 4, such permit shall be valid for a period not exceeding three months.

The main contractor for civil works will be required to ensure compliance with the above mentioned regulations in order to promote a healthy and safe working environment throughout the construction phase. This shall include regular inspection and maintenance of equipment and prohibition of unnecessary hooting of vehicles. The project proponent will also need to comply with the above mentioned provisions during operation phase of the proposed project by warning oil tankers delivering waste oil or collecting cleaned oil to avoid unnecessary hooting.

3.1.6 The Constitution of Kenya, 2010

According to article 42 of the Kenyan Constitution, every person has the right to a clean and healthy environment, which includes the right to have:

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

The obligations contemplated under article 69 of the constitution and which the Kenyan Government shall endeavour to fulfil through participation of the citizens and organizations includes: achieving and maintaining a tree cover of at least ten per cent of the land area of Kenya; encouraging public participation in the management, protection and conservation of the environment and eliminating processes and activities that are likely to endanger the environment;

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

The main contractor will be required to ensure health and safety of all workers, neighbours and visitors throughout construction phase of the proposed project. The same shall apply during the operation phase of the proposed project.

3.1.7 The Water Act 2002

The water act No. 8 of 2002 provides for the management, conservation, use and control of water resources and for acquisition and regulation of rights to use water; to provide for the regulation and management of water supply and sewerage services. Section 18 of this Act provides for national monitoring and information systems on water resources. Following on this, sub-Section 3 mandates the Water Resources Management Authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a site operator and the information thereof furnished to the authority.

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

Appropriate measures to prevent potential for contaminating water resources will need to be put in place throughout the project cycle. These will include use of septic tank to dispose sewage and waste water from the washroom. The level of effluent in the septic tank will be monitored on a regular basis to ensure that it is exhausted prior to overflowing on the ground surface.

3.1.8 The Public Health Act (Cap. 242)

This is an Act of Parliament to make provision for securing and maintaining health. Section 115 of this act prohibits causing nuisance or other condition liable to be injurious or dangerous to health. Section 118 provides a list of nuisances including any noxious matter, or waste water, flowing or discharged from any premises, wherever situated, into any public street, or into the gutter or side channel of any watercourse, irrigation channel or bed thereof not approved for the reception of such discharge.

The project proponent will be required to put in place suitable facilities for waste disposal in order to prevent public nuisances.

The Public Health (Drainage and Latrine) Rules

Rule 85 provides that every owner or occupier of every workshop, workplace or other premises where persons are employed shall provide proper and sufficient latrines for use by employees. Rule 87 requires every contractor, builder or other person employing workmen for the demolition,

construction, reconstruction or alteration of any building or other work in any way connected with building to provide in an approved position sufficient and convenient temporary latrines for use by such workmen. Rule 91 provides that no person shall construct a latrine in connection with a building other than a water closet or a urinal, where any part of the site of such building is within 200 feet of a sewer belonging to the local authority which is at a suitable level, and where there is sufficient water supply.

The main contractor for civil works will be required to construct suitable pit latrines or water closets for use by workers and visitors to the site during the construction phase of the proposed project.

3.1.9 The Local Government Act (Cap. 265)

Section 160 of the act empowers municipal authorities to establish and maintain sanitary services for the removal and destruction of, or otherwise deal with all kinds of refuse and effluent and where such service is established, compel its use by persons to whom the service is available.

Similarly, section 163 (e) empowers the local Authorities to prohibit businesses which by reason of smoke, fumes, chemicals, gases, dust, smell, noise, vibration or other cause, may be or become a source of danger, discomfort or annoyance to the neighbourhood, and to prescribe conditions subject to which such business shall be carried on. It is in this vein that section 165 mandates the council to grant or to renew business licenses or to refuse the same. In order to discharge its duties effectively, section 170 of the act allows the right of access to private property at all times by local authorities, its officers and servants for purposes of inspection, maintenance and alteration or repairs of sewers.

Appropriate measures to avoid or reduce environmental pollution will have to be put in place throughout the project cycle in order to comply with the above mentioned provisions.

3.1.10 The Penal Code (Cap. 63)

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

The main contractor for civil works and the proponent will be required to ensure strict adherence to the Environmental Management Plan throughout the project cycle in order to mitigate against any possible negative impact associated with dust, noise and effluent.

3.1.11 The Occupational Safety and Health Act, 2007

This is an act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. The Act was published in the Kenya Gazette Supplement No. 111 (Acts No.15). It received presidential assent on 22nd October, 2007 and became operational on 26th October, 2007.

The key areas addressed by the Act include:

- i) General duties including duties of occupiers, self-employed persons and employees
- ii) Enforcement of the act including powers of an occupational safety and health officer
- iii) Registration of workplaces
- iv) Health General Provisions including cleanliness, ventilation, lighting and sanitary conveniences
- v) Machinery safety including safe handling of transmission machinery, hand held and portable power tools, self-acting machines, hoists and lifts, chains, ropes & lifting tackle, cranes and other lifting machines, steam boilers, air receivers, refrigeration plants and compressed air receiver
- vi) Safety General Provisions including safe storage of dangerous liquids, fire safety, evacuation procedures, precautions with respect to explosives or inflammable dust or gas
- vii) Chemical safety including the use of material safety data sheets, control of air pollution, noise and vibration, the handling, transportation and disposal of chemicals and other hazardous substances materials
- viii) Welfare general provisions including supply of drinking water, washing facilities, and first aid
- ix) Offences, penalties and legal proceedings

Under section 6 of this act, every occupier is obliged to ensure safety, health and welfare of all persons working in his workplace. The occupier shall achieve this objective by preparing and as often as may be appropriate, revising a written statement of his general policy with respect to the safety and health at work of his employees and the organization and arrangements for the time being in force for carrying out that policy (Section 7). He is also required to establish a safety and health committee at the workplace in a situation where the number of employees exceeds twenty (section 9) and to cause a thorough safety and health audit of his workplace to be carried out at least once in every period of twelve months by a registered safety and health Advisor (Section 11). In addition, any accident, dangerous occurrence, or occupational poisoning which has occurred at the workplace needs to be reported to the occupational safety and health officer of the respective area by an employer or self-employed person (section 21).

According to section 44, potential occupiers are required to obtain a registration certificate from the Director for all premises intended for use as workplaces. Such places shall be maintained in a clean state during the operation phase (section 47). To ensure machinery safety, every hoist or lift – section 63 and/or all chains, ropes and lifting tackles – section 64 (1d), shall be thoroughly examined at least once in every period of six months by a person approved by the Director of Occupational Health and Safety Services. Similarly, every steam boiler - section 67 (8) and/or steam receiver - section 68 (4) and all their fittings and/or attachments shall be thoroughly examined by an approved person at least once in every period of twelve months whereas every air receiver shall be thoroughly cleaned and examined at least once in every period of twenty-four months or after any extensive repairs - section 69 (5).

In relation to fire safety, section 78 (3) requires spillage or leaks of any flammable liquid to be contained or immediately drained off to a suitable container or to a safe place, or otherwise treated to make it safe. Furthermore, a clear and bold notice indicating that smoking is prohibited should be conspicuously displayed in any place in which explosive, highly flammable or highly combustible substances, are manufactured, used, handled or stored-section 78 (5). In addition, necessary precautions for dealing with fire incidents should be implemented including provision of means for extinguishing fire and means for escape, in case of fire, for the persons employed in any workplace or workroom – section 81. As far as disaster preparedness and emergency response program is concerned, section 82 (1) makes it a mandatory requirement for every occupier of a workplace to design evacuation procedures to be used during any emergency situation and to have them tested at regular intervals.

To promote health and safety of employees who are at risk of being exposed to chemical substances, section 84 (3) and 85 (4) requires every employer to maintain at the workplace material safety data sheets and chemical safety data sheets respectively for all chemicals and other hazardous substances in use and ensure that they are easily available to the employees.

The employers' positive contribution towards the welfare of the employees include provision and maintenance of adequate supply of wholesome drinking water - section 91 and a first aid box or cupboard of the prescribed standard – section 95 at suitable point (s) conveniently accessible to all employees. Other precautionary measures include: issuance of a permit to work to any employee, likely to be exposed to hazardous work processes or hazardous working environment, including such work processes as the maintenance and repair of boilers, dock work, confined spaces, and the maintenance of machinery and equipment, electrical energy installations, indicating the necessary precautions to be taken – section 96 (1); provision and maintenance for the use of employees, adequate, effective and suitable protective clothing including suitable gloves, footwear, goggle and head coverings in any workplace where employees are likely to be exposed to wet, injurious or offensive substance – section 101 (1).

The main contractor for civil works and the proponent will be required to comply with the above mentioned provisions throughout the project cycle. This will include provision of first aid kits and personal protective equipment, maintaining at the site emergency preparedness and response plans and ensuring that contractors' site meetings are conducted on a regular basis.

3.1.12 The Factories and Other Places of Work (Hazardous Substances) Rules 2007

Rule 12 (3) provides that every employer who uses any hazardous substances at work shall be in possession of a copy of material safety data sheet for each type of substance in use at his premises. Rule 13 (1) stipulates that every employer shall ensure that the quantity of waste from hazardous substances in his use are kept at reasonable minimum levels and that such waste is disposed of in a manner less harmful to human and the environment.

Rule 15 (1) provides that every employer shall facilitate the training of his worker on safety by a) instructing the workers how to obtain and use the information provided on labels and chemical safety data sheets and b) using the chemical data sheets along with information specific to the workplace, as a basis for the preparation of instructions to workers, which should be written if appropriate.

The main contractor and the project proponent will be required to comply with the above requirements during the construction and operation phases of the proposed project. This shall include provision of appropriate training to the workforce.

3.1.13 The Factories (Building Operations and Works of Engineering Construction) Rules, 1984.

Rule 7 requires every contractor who employs more than twenty persons to appoint a safety supervisor who should be experienced in the works being carried out at the site. Rule 48 (1) prohibits any timber or material with projecting nails to be placed or be allowed to remain in any place at a site where they are a source of danger to persons employed. Rule 55 (C) provides that properly maintained scaffolds or; where appropriate, ladders or other means of support which shall be sufficient and suitable for the purpose shall be provided, placed and kept in position for use where work cannot be safely done on or from the ground or from part of a building or other permanent structure.

Rule 109 (1) prohibits any crane, crab or winch to be used unless it has been tested and thoroughly examined by a competent person within the previous four years and no pulley block, gin wheel or sheer legs shall be used in the raising or lowering of a load weighing one tone or more unless it has been tested and thoroughly examined by a competent person.

Rule 132 provides that where a contractor has more than five persons in his employment on a site, he shall provide and keep clean and in good repair a sufficient number of suitable first aid boxes, which shall, while work is going on, be reasonably accessible to all positions on the site where persons in his employment are working.

The main contractor for civil works shall be required to comply with the above mentioned provisions throughout the construction phase of the project in order to ensure safety of workers and visitors to the site.

3.1.14 The Energy Act, 2006

Section 90 (1) of the energy act, 2006 provides that any person intending to construct a pipeline, refinery, bulk storage facility or retail dispensing site shall, before commencing such construction, apply in writing to the Energy Regulatory Commission (ERC) for a permit to do so. According to section 90 (2) such an application shall among other things be accompanied by three copies of plans and specifications and an Environmental Impact Assessment report. Processing of this application and issuance of a permit will take a maximum of forty five days as provided for by section 90 (3). *The*

project proponent will be required to apply for the permit to operate the used oil transfer station as provided for by the act.

3.1.15 The Work Injury Benefits Act, 2007

According to section 7 (1) of the act, every employer is required to obtain and maintain an insurance policy, with an insurer approved by the Minister in respect of any liability that the employer may incur under the act to any of his employees. In addition, every employer carrying on business in Kenya shall within the prescribed period and in the prescribed manner register with the Director - section 8 (1). Pursuant to section 10 (2) of the act, it is the duty of every employee to ensure his/her safety at the place of work and hence where an accident, not resulting in serious disablement or death, is caused by the deliberate and wilful misconduct of the employee, such an employee is not entitled to compensation. However, according to section 12 if an employee is injured in an occupational accident or contracts an occupational disease while the employee, with the consent of the employer, is engaged in any organized first aid, ambulance or rescue work, fire-fighting or other emergency service, the accident or disease is for the purposes of this Act, deemed to have arisen out of and in the course of the employee's employment. In a circumstance where an accident occurs in the course of employment, section 21 makes it a requirement for a written or verbal notice of such an accident to be given by or on behalf of the employee concerned to the employer who shall send a copy of the notice to the Director within twenty-four hours of its occurrence in the case of a fatal accident.

In line with section 22 (1), an accident that has occurred should be reported to the Director by the employer in the prescribed manner within seven days from the date of receiving a notice of the accident or having learned that an employee has been injured in an accident. Similarly, it is the responsibility of the employee to report to his/her employer the occurrence of an accident not later than 12 months from the date of such an accident or else the right to benefits, in accordance with section 27 (1), shall lapse if the accident is not reported within such a period of time (12 months). According to section 46 (1), the employer shall be responsible for availing necessary means of transport where an employee is injured in an accident, which necessitates his conveyance to a hospital medical facility and from a hospital or medical facility to his residence.

The main contractor for civil works and the project proponent will be required to comply with the above mentioned provisions throughout the project cycle.

3.1.16 The Factories and Other Places of Work (Fire Risk Reduction) Rules, 2007

Rule 6(1) requires occupiers to ensure that highly flammable substances are stored:

- a) In suitable fixed storage tanks in safe positions, or
- b) In suitable closed vessels kept in a safe position in the open air, and where necessary, protected against direct sunlight; or
- c) In suitable closed vessel kept in a storeroom which is either in a safe position or in a fire resisting structure;

Rule 23(1) requires fire drills to be conducted at least once in a year and records kept available for inspection. According to Rule 24, the proponent will be required to identify a location in the workplace where every worker shall assemble in the event of fire. Rule 29 obligates him/her to provide adequate means of extinguishing fire at the facility.

3.1.17 The Employment Act 2007

This act provides that no employer will discriminate directly or indirectly, against an employee or prospective employee or harass an employee on the grounds of race, colour, sex, language, religion, political or other opinion, nationality, ethnic or social origin, disability, pregnancy, and mental status or HIV status. The act further stipulates that an employer shall pay his employees equal remuneration for work of equal value.

Rights and duties of employment

Part IV and VI constitute basic minimum and conditions of contract of service. The employer shall regulate the hours of work of each employee in accordance with provisions of this Act and any other written law. Section 27 subsection 2 states that an employee shall be entitled to at least one rest day in every period of seven days and not less than twenty-one working days of leave after every twelve consecutive months. *The project proponent will be required to comply with this requirement throughout operation phase of the project.*

3.1.18 The Labour Institutions Act 2007

Section 34 of this Act stipulates that an authorized officer may either alone or in the presence of another person, enter any premises or place where persons are, or may be employed for the purpose of performing his duties as specified under the Act or any other labour law.

The Act also stipulates that the labour officer may, for the purpose of monitoring or enforcing compliance with any labour law require the production of wages sheets or other employment records kept by an employer; enter, inspect and examine all latrines and other sanitary arrangements or water supply and order that all buildings and premises where employees are housed or employed be kept in a clean and sanitary condition.

The project proponent will be required to comply with this requirement throughout operation phase of the project.

3.2 Proponents Responsibility to Ensure Compliance

The project proponent will be required to recruit a responsible person with a background on safety and environmental management. This person shall carry out monitoring of environmental and safety performance of the facility and recommend measures for continual improvement thereby ensuring compliance with applicable legal and regulatory requirements. In the long run, the company will avoid penalties or closure of the facility as a result of non-compliance.

CHAPTER 4

4.0 CURRENT ENVIRONMENTAL CONDITIONS & BASELINE INFORMATION

4.1 Site Location

The proposed project will be located on Plot L.R No. Kilifi/Kaliangombe/Jimba/16 in Kokotoni area off Nairobi-Mombasa highway, Kilifi County. The geographic coordinates of the (S 3°54'46.19628, E 39°31'4.683). The site to be set up has been zoned as industrial/commercial area by the County Government of Kilifi.



Figure 3: The undeveloped site

4.2 Land Use

The main land use in the area is industrial, with various industries within vicinity including Corrugated sheets, standard Rolling Mills, SSMetha and Sons, and Bridgecon as per Kilifi County Master planning. The proposed project will cause significant changes to land use as it will involve construction of structures such as storage tanks, pipelines, transfer pumps, and containment systems for managing spills or leaks. The report will provide specific guidelines and requirements for establishing the facility while minimizing negative effects to land.

4.3 Climate

Generally, the Kenyan coastal region is characterized with a tropical and monsoon climate. The temperatures are usually high throughout the year. Maximum and minimum temperatures range between 26.5-34°C and 22.5-24.5 °C respectively. The region experiences more than 6 hours of sunshine on a daily basis with the period between October and March exceeding 8 hours. Winds follow a typical monsoon pattern; during December to February they blow from the east and east-north east. By March they start to shift towards the south and by April, the start of the monsoon season, they're predominantly from south-southwest. The predominant wind direction continues to be from the south from May until October with gradual eastwards shift beginning which becomes more pronounced by November and by December the cycle begins again.

The rainfall pattern is bimodal with rainfall averaging between 900-1200mm annually. The long rains come between March and July while the short one is experienced between November and December.

4.4 Topography, Geology and Soils

Topography

The project site is characterized by a slightly undulating terrain that slopes towards the Ocean. The land rises gradually from sea level to 900m on the south-western side of the district. Kilifi County features a varied topography that includes coastal plains, rolling hills, and inland plateaus. The coastal region is characterized by sandy beaches, mangrove forests, and coral reefs. As you move inland, the terrain becomes more undulating, with hills and valleys. The county also includes parts of the Eastern Rift Valley, where the land rises to higher elevations.

Geology

The geology of Kilifi County is influenced by its location along the East African Rift System. The coastal area is predominantly composed of sedimentary formations, including coral limestone, sandstones, and clay deposits. These sedimentary rocks are the result of ancient marine and terrestrial processes. Inland regions may contain volcanic rocks and granitic formations due to past volcanic activity and tectonic movements.

Soils

The soils were observed to be mainly composed of rock outcrop with patches of brown loamy soil. The soils are poor in fertility except where indigenous vegetation remains and a layer of fertile loam soil has developed. The soils can be grouped into three major units namely coastal plain, coastal uplands and erosional plain. In general terms, the lithology of Kilifi District is composed of sedimentary rocks of the Mesozoic and cainozoic eras. The sedimentary rocks consist of a variety of sandstones, siltstones, shales and limestone.

4.5 Demographic characteristics

4.5.1 Population

The population of Kilifi especially in its urban centers has been on the rise mainly due to rural urban migration, tourism and the influx of foreigners. In the Kenyan Coast as a whole, population distribution in the hinterlands is mainly affected by rainfall distribution, altitude, agro-ecological zones and administrative policy through which a number of settlement schemes have been created. The 2019 population census figures show that the County had 1,453,787 persons of which 704,089 are males, 749,673 are females and 25 are intersex persons. There are 298,472 households, with 4.4 persons per household on average, and a population density of 116 people per square kilometer.

The Coastal population in Kenya is culturally heterogeneous. The largest indigenous ethnic group being the Mijikenda which is comprised of nine sub-tribes namely: Giriama, Digo, Rabai, Duruma, Kauma, Chonyi, Kambe, Ribe, and Jibana. Other indigenous Coastal ethnic groups are: Taita, Pokomo, Bajuni, Orma, Sagala, and Swahili. Due to its socio-economic dynamics which offer great opportunities for livelihoods and leisure, the Kenyan Coast and Mtwapa in particular has over the years attracted a multiplicity of ethnic and racial groups.

4.5.2 Settlement patterns

Settlement patterns in Kilifi District are influenced by infrastructure network (roads, water, and electricity) and high agricultural potential zones. High population densities are found in Bahari, Kikambala and Kaloleni divisions along the tarmac road of Mombasa-Malindi and Mombasa-Nairobi up to Miritini urban town. These areas are also well supplied with piped water and electricity. High population clusters are also found in Chonyi division and some parts of Kaloleni division where there are high potentials for agricultural production. Sparsely populated divisions in the district are Ganze,

Vitengeni, Bamba and some parts of Kaloleni division. These areas are rangelands and are less productive agriculturally. The two larger towns in the county are (Kilifi & Mtwapa) have a total population of 164,947 (2019), which represents 11.3 % of the total county population.

4.5.3 Poverty Status

The immediate cause of poverty in the Kilifi District has been attributed to landlessness, high and increasing cost of living, inaccessibility to credit facilities, lack of entrepreneurial skills, unemployment, low incomes and HIV/AIDS and discrimination at places of work. In general, poverty has led to over-use and destruction of natural resources where short-term development goals are pursued at the expense of long-term environmental sustainability. Therefore, there is need to ensure that environmental concerns are integrated into development planning and that development plans lead to empowerment of local communities to engage in sustainable livelihood activities.

4.6 Environmental quality

4.6.1 Water availability

Kilifi District is generally water scarce both in terms of surface and ground water and largely depend on piped water from the Mzima springs and Baricho water. The only permanent river is the Sabaki River which feeds the Baricho water works and crosses the northern part of Kilifi district. The others are temporary due to few catchment areas, sandy soils which have high infiltration rates and high evapo-transpiration rates. Ground water resources are exploited along the coastline through shallow wells and bore holes but diminish as one move inland. This is because inland boreholes have to be deep and in most cases the water quality is poor; hard, mineralized and saline.

4.6.2 Solid waste and sewerage management issues

The main waste generation sources are domestic, commercial ventures, hotels, markets, industries and institutions including health facilities. The types of waste that are generated can be classified as follows.

- **Mixed heavy plastics** -Soft drink bottles, detergent bottles, cooking oil/fat bottles, household plastics etc
- **Mixed light plastics** - Shopping bags, wrapping films, waste collection bags
- **Rubber** - Old tires, shoe soles etc
- **Mixed paper** - Books, office paper, newspapers carton pieces etc
- **Metals** -Pieces and sheets of aluminum, steel and other metals

- **Mixed glass** - Coloured and non-coloured, broken or whole glass bottles, panes, household glass items etc
- **Organics** - Food remnants, wooden debris, yard waste etc
- **Biomedical waste**- waste from hospitals, dispensaries and medical clinics.

All types of waste are transported to the designated disposal site. These include hazardous types containing pesticides, heavy metals, oils, batteries, acids, domestic and hospital wastes. It is against this background that the private sector has initiated ways to address the problem of waste management through construction of compost pits in areas where collection is limited and providing waste disposal services to complement those provided by the County Council.

The entire Mombasa County Council has no sewerage infrastructure hence the common methods for disposal of human wastes is through pit latrines and septic tank and soak pit systems. The proposed project will make use of septic tanks and soakage pit for disposal of sewage and waste water.

4.7 Protected areas

Gazetted forests, kayas and marine parks constitute the protected areas in Kilifi County. The gazetted forests include a section of the Arabuko Sokoke forest and mangrove forests mainly found at Takaungu, Kilifi creek, Mtwapa creek and part of the Mida creek in Uyombo, with an area of approximately 880 Ha. The kayas (sacred forests) include Chonyi, Kambe, Ribe, Jibana, Kauma and Kaya fungo. The marine parks and reserves include, part of the Mombasa marine and National Reserve, Watamu-Malindi Marine National park and Reserve (coral gardens) and part of the Malindi Marine and National Reserve. The part of Arabuko Sokoke forest which falls in Kilifi District constitutes 19,000 Ha out of the 37,000 Ha. The forest is situated between Kilifi creek and The Sabaki River. The forest has a very high biological diversity. It is one of the important sites for bird conservation in Kenya (Ksley and Langton). Six of the bird species listed as rare in the ICBP/IUCN Bird red data book occur in this forest. Two of these bird species, the Sokoke Owl (*Otus arena*) and the clerk's weaver (*Ploceus golangi*) are found nowhere else in the world except in this forest. In addition to the endemic bird species, Arabuko Sokoke is also home to other terrestrial fauna. For instance it is the only known home for the endangered *Cephalophus adersi*, the frog *Leptopelis flavomacculatus*, and two butterfly species, the *Charaxes protocles* and the *Charaxes lasti*.

The Marine Parks and Reserves in the coastal zone are made up of several different ecosystems each with a high degree of faunal and floral diversity. The ecosystems include coral reefs, mangroves, tidal and estuarine ecosystems. The coral reef runs parallel to the coast at distances ranging from 500m- 2 km from the shoreline. There are ten main coral reefs along the Kenyan coast of which Bamburi reef, Vipingo-Kanamai reef and Watamu-Malindi reefs are found along the shores of Kilifi District.

The coral reefs are one of the examples of biologically productive and taxonomically diverse ecosystems. About 140 species of soft and hard corals have been identified along the Kenyan coast. They are very important in that they form breeding grounds for various marine fauna, they serve as a barrier against the force of the sea and the lagoons they protect provides stable environment for breeding and feeding of marine biota.

4.8 Flora and Fauna

Human interference and particularly agriculture have greatly modified the original floral and faunal status of the District. Several vegetation types including coastal dunes, woodlands, bush lands and savannas are encountered from the shoreline inland. It is likely that prior to the maize and coconut cultivation, Kilifi district was covered in bush land. Currently, 30% of the district is covered under maize, coconut trees and citrus plants. The remaining 70% of the site comprises of bush land. The site has a few trees that the proponent may consider maintaining and establishing others to make the site more aesthetic.



Figure 4: Vegetative cover on the site

4.9 Infrastructure

4.9.1 Roads

Most rural areas at the coast are served with a dilapidated and narrow road network contrary to most urban centers such as Mombasa, Kilifi and Kwale which are well served by both classified and non-classified roads. The road networks are greatly influenced by existence of important industrial, tourism and commercial centers. Except for the Mombasa-Nairobi highway most of the roads in Kokotoni are earth roads. The proposed site has a good road network and adequate transport linkages.

4.9.2 Telecommunications

All mobile networks are available and fixed landlines provided by Telkom Kenya.

4.9.3 Energy supply

The main source of energy supply in the area is electricity from the Kenya Power and Lighting Company. However, this is mostly supplemented with diesel powered generators in times of power blackouts. A number of facilities have also ventured into harnessing solar energy by use of solar panels and accumulators. Wind energy has also been sparsely used especially in pumping water from boreholes in the remote parts of the District. In the rural areas, main energy sources are fuel wood, charcoal and paraffin. The proposed development will be connected to the nearby 240kV KPLC line.

4.10 Health Profile

Kilifi has a total of 73 health facilities distributed across the district. Accessibility of health services is, however low and 57% of the population live over 5kms to the nearest health facility. The doctor patient ratio stands at 1:100,000 which in itself is a manifestation of staff shortages in the District. The most prevalent diseases include Malaria, Pneumonia and diseases of the digestive system. HIV/AIDs is a major health and development problem in the district. The prevalence in the district is estimated to be 10% and bed occupancy by people affected with HIV/AIDs related illnesses in the various health institutions is about 50%. The impact of HIV/AIDS is already evident in the District.

CHAPTER 5

5.0 PROJECT ALTERNATIVES

This section identifies potential alternatives to the proposed project. Alternatives with respect to site processing technology and design have been compared and based on the analysis, the best alternative has been arrived at. ‘The No action’ alternative has also been considered.

5.1 Alternative Project Site

Waste oil separation and recycling is being done in several areas within Kilifi and Mombasa Counties. Some of these areas are, Miritini and Mikindani. However, after much consideration of these alternative sites, the proposed project site was preferred because of the following: -

- There exists already a Land Agreement between one of the company directors and the owner of the plot on which the proposed project will be situated;
- The area is designated as a light industrial area and this fits within the proposed project requirements;
- The neighbourhood of the site is well served with public infrastructure including a major road network (Nairobi-Mombasa Highway) making it ideal for setting up the facility



Figure 5: Site location, off the Mombasa Nairobi Highway

5.2 Alternatives Technology

There are alternative technologies to choose from when implementing the proposed project.

5.2.1 Alternative Separation Process (Decanting)

Separation of water from the waste oil can either be carried out manually or automated. There are different types of machines in the market that separate waste oil from waste water. An example of this machine is shown in the plate 4 below. However, these machines have to be imported hence making them expensive to own.



Plate 1: Spent Oil Recycling Machine

The proposed decanting process has been preferred as it is relatively cheap and uses locally available technology.

5.3 Alternative Design:

5.3.1 Alternative Design of paving the Yard

The alternative considered in this case include use of cabro blocks as opposed to reinforced concrete slab to cover the entire yard. Use of cabro blocks was not considered since this would allow seepage of spilt oil and the cost of purchasing and transporting to the site is expensive. The preferred design in this case was use of reinforced concrete slab to pave the yard.

5.3.2 Installation of waste oil storage tanks

The designs considered include installation of above ground as opposed to underground waste oil storage tanks. The proponent preferred to use above ground waste oil storage tanks since the site already contains two (2 No) above ground tanks installed. It is also easier to monitor leakages and to manage spillage when using above ground storage tanks considering the fact that bund walls will be incorporated.

5.4 The ‘No action’ Alternative

The alternative to have the project implemented ‘yes project’ and that of abandoning the proposed project ‘no project’ alternative were compared.

5.4.1 “No Project” Alternative

From an environmental conservation perspective, this alternative will be beneficial in the sense that any potential negative impacts associated with the project will be avoided. Such impacts include the following:

- Increased traffic congestion;
- Fire hazard;
- Noise and Dust pollution; and
- Oil spillage which could result in contamination of water resources and a generally dirty environment.

5.4.1 The ‘Yes Project’ Alternative

This option was considered viable as opposed to the ‘no project’ option because:

- The proposed project lies within zoning specifications of Mombasa County Council which is a light industries zone; (Attached **Appendix 6**)
- More jobs will be created during the construction and operational phases of the proposed project. This will be in line with the current government policy on employment and wealth creation which aims at creating five hundred thousand jobs annually. If the ‘no project’ option was to be considered, then this government target may not be realized;
- Proposed project will facilitate re-use and re-cycling of waste oil; thus saving the country some foreign exchange;
- Proposed project will contribute to the general development of the area through increased income by both employees and business community;
- There will be increased revenue generation in form of taxes to the government. The additional revenue can be used by the government to fund its public projects such as free primary education, health care and road construction and maintenance and

- The project will provide the proponent with an opportunity of investing in the said project in Mombasa County. The 'no project' option will mean that the project proponent will have to invest elsewhere hence denying the county of some revenues;

The "No Action Alternative" should not be adopted, as we need to encourage development as so long as it is undertaken in an environmentally sustainable manner.

CHAPTER 6

6.0 PUBLIC CONSULTATIONS

6.1 The need for public consultation

EIA process is largely determined by effective Consultation and Public Participation (CPP) which basically provides the cornerstone for project planning and successful implementation. Consultation and Public participation helps to:

- i) Facilitate involvement and participation of affected persons throughout the project cycle.
- ii) Ensures a sense of responsibility and commitment towards implementing the Environmental Management Plan (EMP).

CPP should be undertaken mainly during project planning, in implementation and decommissioning phases. It should involve the affected persons, lead agencies, private sector, among others. The methodology for CPP may include: meetings and technical workshops with affected communities; interpersonal contacts; Dialogue with user groups and local leaders; Questionnaire/survey/interview; and Participatory Rural Appraisal or Rapid Rural Appraisal (PRA/RRA) techniques. It is the responsibility of the project proponent to adequately ensure effective distribution of the information to the affected persons to mitigate against unnecessary delays in decision making and project implementation.

6.2 Objectives of Public Participation

Public participation is essential for good governance and may empower local communities. Public consultation and participation in EIA is multi-purposive, aiming specifically to:

- Invite the affected and interested public into the decision-making process to foster justice, equity and collaboration
- Inform and educate the stakeholders including the proponent, public, lead agencies and NEMA on the planned intervention and its consequences;
- Gather data and information from the local community about their human (including cultural, social economic and political dimensions) and biophysical environment, as well as about the relations (Including those related to traditional and local knowledge) they have with their environment

- Seek input from the public on the planned intervention, including its scale, timing and ways to reduce its negative impacts, to increase its positive outcomes or to compensate impacts, which may not be mitigated and
- Contribute to better analysis of the proposed project leading to more creative development, more sustainable interventions and consequently greater public acceptance and support than would otherwise be the case

6.3 Mode of Consultation

Consultation with the neighbours especially those from the immediate neighbourhood of the proposed project site was conducted through administration of questionnaires. The questionnaire survey was carried out to achieve the following main objectives:

- To inform the immediate neighbours of the proposed development within their locality;
- To explain to the neighbours the nature of the proposed project, its objectives and scope;
- To give local community especially those drawn from the proposed project site an opportunity to present their views, concerns and issues regarding the proposed project;
- To gather suggestions on ways of effectively mitigating potential negative impacts and how the local community can be part of the proposed project; and
- To gather views on reducing conflicts between the proposed project and its neighbours.

Each respondent was required to state among other things how the proposed development is likely to affect him or her positively and negatively, to suggest what can be done to reduce possible negative effects and enhance positive effects and to state any other concerns. Not all the questionnaires distributed were completed; however those which were filled and returned, are appended in **Appendix 7**.

6.3.1 Views and Concerns of Neighbours

Almost all the respondents raised concerns on the similar issues. These were as mentioned below:

Positive Impacts

The neighbours felt that the proposed project will contribute towards the following positive impacts:

- Jobs will be created for the people in the neighbourhood, especially during the construction phase;
- Increased customers for businesses in the neighbourhood, especially those dealing in food;
- Improved security;
- Increased income for the government through tax;
- Availability of a learning opportunity on technology for pupils in neighbouring schools.
- Project will contribute to general development of the area through increased income by both employees and business community.

Negative Impacts

The neighbours had the following concerns;

- Increased traffic flow in the area leading to congestion and obstruction of local road;
- It was noted that there is a likelihood of the proposed project resulting in noise and dust disturbance to the neighbours especially during construction phase;
- Oil spillage
- Potential fire hazard
- Potential increase in road incidents
- Damage to water pipes by heavy trucks

The EIA experts have provided mitigation measures for the concerns raised in the environmental management plan.



Figure 6: Public Participation Barraza held to capture neighbours views

6.4 Wider Public Consultation

To ensure wider public consultation, the project proponent will publish a notice in one of the local newspapers and the Kenya Gazette once for two consecutive weeks. This will happen upon submission of the EIA study report to NEMA. The EIA team will respond to the issues raised by the stakeholders as appropriate and submit an addendum to NEMA.

CHAPTER 7

7.0 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This section provides a summary of the potential environmental impacts associated with the proposed project during the construction, operation and decommissioning phases, along with recommendations for management of the negative impacts. Potential impacts were identified through discussions with the proponent, site visits, public consultation and literature review.

7.1 Potential Positive Socio-economic Impacts

Potential positive socio-economic impacts associated with the proposed project during construction and operation phase are as highlighted below.

7.1.1 Positive Impacts During Construction Phase:

The proposed project has the potential of contributing towards the following positive impacts during operation phase.

i. Employment opportunities

Construction sites are a major source of employment. Almost all cadres of personnel in the construction industry will be needed. Although the jobs will not be permanent, a considerable number of casuals and contractors will benefit from the proposed project if implemented.

ii. Increased income to suppliers and transporters of construction materials

Transporters, suppliers of construction materials and other service providers are likely to benefit during the construction phase of the proposed project. Income earned will contribute towards economic development through tax remittance.

iii. Stimulation of business activities in the neighbourhood

As a result of spill-over effects brought about by increased spending power by the workers, local businesses will enjoy increased sales thus enhancing the living standards of the operators. This is also likely to spur the local development.

7.1.2 Positive Impacts During Operational Phase

Implementation and operation of the proposed project will contribute towards the following positive impacts.

i. Creation of jobs in the used oil transfer station.

Drivers, tank feed operators, decanting chamber operators, receptionist and cleaners will be needed during operation phase of the project thus employment creation. This will contribute towards achieving the target of Kenya vision 2030

ii. Opportunity for waste oil recycling and reuse

Waste oil separation process, if carried out in conformity to national environmental and health standards, has the potential of providing an opportunity for reusing and recycling used oil hence preventing environmental pollution. The business venture provides ships and garages with a better alternative of disposing of waste oil generated by their operations;

iii. Source of income.

People who will be employed at the facility will have an opportunity of earning an income which they will be able to spend on basic needs such as food, shelter and clothing thereby enhancing their living standards;

iv. Increased business activities in the neighbourhood

The workforce will create demand for goods and services in the neighbourhood and hence more businesses are likely to come up as a result of competition to meet the increasing demand.

v. Additional revenue to the government.

Once implemented, the proposed project will increase revenue to the central government and Mombasa County Council. This will be in form of permits, licence fees, income tax and other government taxes.

7.2 Potential Negative Impacts & Mitigation Measures

Potential negative impacts and mitigation measures during project construction, operation and decommissioning phases are discussed in following subsections.

7.2.1 Potential Negative Impacts and Mitigation Measures During Construction Phase

The potential negative social and environmental impacts during construction phase of the proposed project are those associated with the following aspects: dust, noise, elevated and overhead work, indiscriminate disposal of waste, general health and safety risks, increased traffic, and spillage of hazardous materials on the ground surface as discussed below:

i) Increased Traffic

Delivery of construction materials to the construction site has the potential of interfering with the smooth flow of traffic along the access roads leading to the site. This can result to road accidents, waste of time for other road users and increased fuel use for vehicles held in a jam.

Proposed Mitigation Measures

- **Use of appropriate traffic signs**

The main contractor shall be required to post at the entrance to the site, appropriate traffic signs and notices including ‘slow down, heavy vehicles turning’.

- **Controlling traffic flow**

Vehicles delivering materials to the site should be directed by the security guards and/or appointed flag men

- **Scheduling of deliveries**

Delivery of materials to the site should be scheduled at times of light traffic load to minimize chances of congestion and/or accidents

- **Maintaining a record of incidents and accidents at the site**

The main contractor should maintain a record of accidents and incidents at the site. Based on this record, incidents and accidents should be investigated and appropriate actions taken.

- **Provision of designated parking**

- Trucks delivering construction materials are to be parked inside the yard to prevent obstruction.

- **Define speed limit**

Speed limit within the yard to be defined and enforced and any driver found not complying to be warned.

ii) **Noise Generation**

Noise is unwanted sound - the wrong sound at the wrong time or place. Use of earth moving equipment during construction phase will be associated with noise emission that has the potential of interfering with the activities of people nearby. Besides this, unnecessary hooting of motor vehicles can also be a source of noise. This sound may become noise, especially in the evening and during normal sleeping hours. Noise generated during the construction phase of the proposed project will have the potential of creating nuisance to neighbours to the site. The neighbours may suffer loss of enjoyment of their property or worse, their health may suffer due to loss of sleep or due to anxiety. Noise emitted above the recommended limit, can also result to hearing impairment.

The noise levels of common construction noise sources are well-known and they are as summarised in the table 6 below:

Table 6: Noise Levels from Common Construction Equipment

| EQUIPMENT | SOUND LEVEL AT OPERATOR | |
|----------------------------------|-------------------------|-------------|
| | Average dB(A) | Range dB(A) |
| <i>Earth Moving:</i> | | |
| Front End Loader | 88 | 85-91 |
| Back Hoe | 86.5 | 79-89 |
| Bull Dozer | 96 | 89-103 |
| Roller | 90 | 79-93 |
| Scraper | 96 | 84-102 |
| Grader | <85 | |
| Truck | 96 | 89-103 |
| Paver | 101 | 100-102 |
| <i>Material Handling:</i> | | |
| Concrete Mixer | <85 | |
| Concrete Pump | <85 | |
| Crane | 100 | 97-102 |
| Derrick | <85 | |
| <i>Power Units:</i> | | |
| Generators | <85 | |
| Compressors | <85 | |
| <i>Impact:</i> | | |
| Pile Driver (diesel and pneum) | 98 | 82-105 |

| | | |
|--------------------------------|------|--------|
| Pile Driver (gravity, bored) | 82.5 | 62-91 |
| Pneumatic Breaker | 106 | 94-111 |
| Hydraulic Breaker | 95.5 | 90-100 |
| Pneumatic chipper | 109 | |
| <i>Other Equipment:</i> | | |
| Poker Vibrator | 94.5 | 87-98 |
| Compressed Air Blower | 104 | |
| Power Saw | 88.5 | 78-95 |
| Electric Drill | 102 | |
| Air Track Drill | 113 | |

Source: Workers Compensation Board of British Columbia

Machines may get noisier because of the following reasons:

- i. Worn or chipped gear teeth – will not mesh properly. The shiny wear marks are often visible on the teeth.
- ii. Worn bearings - bearing wear creates vibration and noise, as flat spots or cracks appear in the balls.
- iii. Slackness between worn or loose parts – causes rattling noises, squealing from slack drive belts, "piston slap" in motors, air leaks, etc.
- iv. Poor lubrication – causes squeaking noises due to friction or impact noise in dry and worn gears or bearings.
- v. Imbalance in rotating parts – imbalances with fan impellers or motor shaft will show up as excess vibration.
- vi. Obstruction in airways - a build-up of dirt or a bent/damaged piece of metal in an airway or near a moving part, e.g., a bent fan guard, can cause whistling or other "air" type noises.
- vii. Blunt blades or cutting faces - blunt or chipped saw teeth, drill bits, router bits etc, usually make the job noisier as well as slower.
- viii. Damaged silencers - silencers for air-driven machines or mufflers for engines may become clogged with dirt, rusted out or damaged, so losing their ability to absorb noise and
- ix. Removal of noise-reducing attachment like mufflers, silencers, covers, guards, vibration isolators etc. which reduce noise

Proposed Mitigation Measures

- Increased attention to maintenance of tools and equipment will reduce worksite noise levels. Maintaining the plant and equipment in good order not only increases its life, but makes it safer to use and quieter. In many cases, a noise hazard will be created or made worse by lack of maintenance. Parts may become loose, creating more noise because of improper operation or scraping against other parts. Grinding noises may also occur as the result of inadequate lubrication. It is especially important to provide proper maintenance of noise control devices which are added or built into machinery. Loose and worn parts should be fixed as soon as possible.
- Machines or equipment should be inspected to find out if there are any problems starting to appear. Check for signs of wear or if the machine's performance is down. Some problems will appear as looseness or increased vibration. Listen for new noises, especially tonal ("whining") sounds, repeated impacts, or high frequency ("screech") sounds. Also, slipping belts will cause a screech at start-up, while a damaged bearing may appear as a "clunk" during run-down. Ideally, the worksite should have a system in place for checking and servicing the various machines and power tools.
- Other measures for noise reduction include reduction of idling time of vehicles which are not in use, warning drivers to avoid unnecessary hooting of vehicles, enclosure of noisy equipment with temporary barriers and carrying out construction activities between 8.00 a.m and 5.00 p.m. However, good planning and design of operations and activities, and a common sense consideration of others should avoid most noise problems.
- Where high noise levels exceeding 85 dB(A) cannot be avoided, workers should be provided with appropriate hearing protectors and their use enforced.

iii) Dust Emission

During site preparation, transportation of construction materials (such as cement, sand and ballast) to the site, offloading of the materials and concrete mixing, there will be the potential for dust emission. Dust or particulates released into the air can cause significant environmental impacts such as soiling of property or surfaces, impaired visibility and personal discomfort (for example, gritty eyes). In

addition, dust has the potential of creating nuisance and respiratory ailments to construction staff and the neighbours to the site. The construction staff will be much affected by dust as opposed to the road users and the people staying or working in the neighbourhood.

Proposed Mitigation Measures

Dust emission can be managed by implementing the following mitigation measures

- **Enclosing the concrete mixer**

Temporary enclosure of the concrete mixer incorporating dust nets can reduce the amount of cement particles released into the atmosphere.

- **Providing workers with personal protective equipment:**

Workers on site should be issued with personal protective equipment including dust masks, coveralls and eye goggles to avoid inhalation of dust particles.

- **Use of water sprays**

Water sprays should be applied on all exposed earth surface as frequent as possible. This will suppress emission of dust particles to the atmosphere. Earth mounds should also be sprayed with water to reduce the quantity of air blown particles.

- **Enclosing the construction site with iron sheet perimeter fence**

Enclosure of the entire site with 3m high iron sheet perimeter fence will greatly reduce wind-blown dust emission to the neighbouring developments.

- **Covering of trucks transporting loose materials**

All trucks transporting loose materials like sand to and from the site should be covered with canvas to prevent the materials from being blown by wind.

iv) Exhaust Emissions

Fuel powered construction equipment including bull dozers, excavators, graders and trucks emit pollutant fumes into the atmosphere as a result of combustion of hydrocarbon fuels. This condition worsens especially when the equipment is not serviced on a regular basis. The exhaust fumes comprise

of carbon dioxide, carbon monoxide, nitrogen oxide as (NO_x) and Sulphur dioxide as (SO_x). Such emissions are potentially hazardous to workers and the public because they have a potential of contributing to respiratory ailments. Carbon dioxide and nitrous oxide (N₂O) contribute significantly to the greenhouse effect. In addition, combination of nitrogen and Sulphur oxides (NO_x and SO_x) with atmospheric water vapour results to formation of acid rain. NO_x and SO_x when combined with water vapour, form nitric and sulphuric acids that return to the earth as acid rain, snow or fog. This contributes to the acidification of soils and surface water bodies. Acid rain threatens biodiversity and also causes damage to buildings.

Proposed Mitigation Measures

Gaseous emissions can be controlled by ensuring that all fuel powered construction equipment are serviced and maintained on a regular basis.

v) Spillage of Hazardous Materials

There is a likely hood that fuel for emergency purposes will be stored at the construction site. In addition, minor servicing of equipment including oil change might be undertaken at the site. Refuelling of construction equipment and oil change can result to accidental spillage of fuel or oil onto the ground surface. Other potential sources of spillage include paints stored on site in bulk. This has the potential of causing soil and surface water contamination.

Mitigation Measures

- Document spill prevention procedure & response plan
- Major maintenance operations to be carried out offsite
- Maintain appropriate spill response kits at the site
- Use of drip trays for minor servicing of equipment
- Hazardous materials to be stored in closed containers placed on water proofed surface and protected from direct sunlight and rainfall
- Minimize the quantity of hazardous materials stored at the site

Action to be taken in the event of spillage should include:

- taking immediate steps to avoid the spillage spreading and contaminating a wider area;
- keeping other people and vehicles away from the site;
- wearing protective clothing appropriate to the use of the hazardous material involved;
- soaking up the hazardous material with absorbent material such as dry sand, soil or wood shavings in the case of a liquid, and removing the contaminated matter with a brush and shovel and storing securely in a bag to be disposed of safely
- If there is a risk of the spillage becoming airborne, some damp sand should be scattered before attempting to decontaminate;
- decontaminating any remaining traces of spillage including that on vehicles or equipment by washing down and draining the contaminated water to a safe place, or soak-up; bathing or thoroughly washing immediately afterwards

vi) **Elevated and overhead work**

Elevated and overhead work during construction phase of the proposed project will entail construction of the walls, erection of the roofs on buildings, fixing of windows, and finishing. Workers operating at height have the potential of accidental falling on the ground surface or concrete floor hence exposing themselves to injuries. Falling objects from high levels have also the potential of causing injuries to staff and/or visitors to the site.

Proposed Mitigation Measures

- Provide safety nets/traps prior to commencing work at height
- Use of appropriate notices and signage to warn workers against falling objects
- Restrict access to the site by unauthorized personnel
- Ensure statutory inspection of all lifting equipment (Chain blocks and cranes)
- Ensure cranes are operated only by trained and experienced personnel
- Lifting equipment should not be overloaded

- Provide safety harnesses and scaffolding while working at high levels
- Provision of appropriate personal protective equipment (helmets, safety boots, coveralls)
- Provide appropriate number of first aid kits which should be restocked on regular basis
- Adequate number of workers to be trained on first aid administration
- Names of trained first aiders to be conspicuously displayed at the site
- Maintain a record of incidents & accidents on site
- Document the procedure for working at heights

vii) Waste Generation and Disposal

Waste that is likely to be generated during construction phase of the proposed project include sewage, waste water, soil, used oil, empty cement bags, empty paint containers, timber, scrap metals, rags, polythene papers and cable cuttings. Indiscriminate disposal of waste water, sewage and used oil has the potential of contaminating soil and surface water resources as a result of cumulative effect. Besides pollution, waste can also cause aesthetic degradation and nuisance to employees and visitors to the site when they are not properly managed. When empty containers accumulate water during rainy season, they serve as a collateral harbor of mosquitoes which would result to spread of malaria.

Proposed Mitigation Measures

- **Provision of suitable solid waste containers**

The main contractor shall be required to provide suitable containers for temporary accumulation of solid waste.

- **Segregation of waste**

The main contractor should identify the various waste categories and segregate them as necessary. For instance hazardous waste should be separated from non-hazardous waste and recyclable from non-recyclable. This measure will be enhanced by appropriate labelling of solid waste containers provided.

- **Contracting a licensed solid waste transporter**

The main contractor should contract a waste transporter with a valid license from NEMA to collect solid waste from the site for dumping at an approved site

- **Constructing pit latrines**

The main contractor will be required to construct suitable pit latrines for use by construction workers on site.

- **Selling of used oil to licensed companies**

Used oil should be accumulated in suitable labelled containers for recycling during project operation phase.

- **Source reduction of waste**

The main contractor should put in place necessary measures to reduce the quantity of waste at the source of generation. This will ensure a reduction in the volume of waste to be handled at the site hence minimizing potential impacts on the environment.

- **Sell scrap metals to licensed dealers**

Scrap metals and empty paint containers to be temporarily accumulated at a safe place on site for reuse or for selling to licensed scrap metal dealers

viii) Fire

Fire at the construction site is likely to occur as a result of an electric fault or poor storage of fuel within the site. Fire has the potential of causing loss of life and/or property.

Proposed Mitigation Measures

- Provide appropriate fire fighting equipment
- Train workers on fire fighting
- Ensure inspection of the fire equipment
- Designate a smoking zone

- Post No smoking signs at the storage area for the fuel and/or oil

ix) Occupational health and safety risks

General health and safety risks associated with the proposed project include poor workmanship on the part of the workers and their employer (Contractors). Poor workmanship has the potential of causing injuries and to the worst extent loss of life.

Proposed Mitigation Measures

- Construction of a site office for coordinating construction activities
- Appoint a responsible person to be oversee all health and safety issues
- Document appropriate emergency response procedures
- Conduct mandatory safety inductions for all visitors to the site
- Document and display at the site emergency phone contacts of the nearest ambulance service provider, police post and dispensary
- Obtain indemnity cover for all the workers on site
- Provision of wholesome drinking water to workers
- Use of permits to work for critical tasks such as electrical installations and hot works (welding)
- Maintain a register of workers on site
- Designate an emergency assembling point
- Hold pre-job safety meetings with the hired workers to discuss safety issues pertinent to the job, such as site specific emergency plans and job-specific hazards.
- Hold toolbox and monthly meetings to discuss general safety concerns, review incidents, and determine actions needed to implement job safety.

7.2.2 Potential Negative Environmental Impacts & Mitigation Measures During Operation Phase

Potential negative impacts during operation phase of the project are those associated with fire, general safety, spillage of materials, increased traffic, direct contact with hazardous materials and waste disposal as discussed below:

i. Fire

Collection of recycled oil by trucks from the site has the potential of causing fire where this is not properly handled. Fire can cause loss of life and/or property.

Proposed Mitigation Measures

- Smoking and use of naked flame within the site should be prohibited using appropriate signs.
- Provide suitable and adequate number of firefighting equipment at strategic points within the facility and ensure they are maintained in good working order for use during emergencies.
- Document and display at strategic points, emergency fire evacuation procedures
- Designate a fire assembling point at a safe place
- Provide at least two sand buckets at the oil storage area
- Train staff on firefighting techniques to ensure adequate preparedness in times of fire emergencies
- Maintain a well-stocked first aid kit at the facility and ensure it is located at an easily accessible place
- Train staff on basic first aid techniques and ensure they undertake refresher course at defined intervals
- Annual fire audit to be carried out and recommendations implemented
- Conduct regular fire drills

ii) Occupational Safety and Health Risks

General safety and health risks during operation phase are those to do with security, operation of equipment and storage of recycled oil. The risks have the potential of resulting to damage to equipment, injuries and loss of property and/or life.

Proposed Mitigation Measures

- Employ security guards from reputable firms
- Maintain at the site standard first aid kits
- Train adequate number of staff on basic first aid administration
- Carry out annual statutory health and safety audit
- Train staff on equipment operation
- Establish a workplace Health and Safety Committee where the number of employees exceed twenty (20)
- Register the facility as a workplace
- Carry out health and safety committee meetings on a regular basis
- Enclose the site with a concrete perimeter wall incorporating steel gate

iii) Waste Generation and Disposal

The type of waste that will be generated during operation phase of the facility include sewage, oily rags, empty plastic containers, oily water, and assorted office waste. Indiscriminate disposal of the various waste streams has the potential of contaminating surface water and soil resources and causing aesthetic degradation. Sewage has also the potential of impacting negatively on public health.

Mitigation measures

- Contract a NEMA licensed waste handlers to collect oily water from the facility for appropriate disposal
- Provide staff with personal protective equipment including coveralls, safety boots and gloves
- Oily rags to be accumulated safely for collection and incineration by NEMA licensed incinerator operators

- Provide suitable and well labelled solid waste containers
- Proper segregation of solid waste
- Contract a licensed solid waste transporter
- Sewage & waste water from the kitchen to be discharged into the septic tank
- Regular inspection of the sewer line for blockages
- Contract a NEMA licensed sewage exhauster to exhaust sewage from the septic tank prior to overflowing onto the ground surface
- Implement an oil skimming programme for oil/water interceptors to ensure normal functioning
- Carry out water quality test for waste water discharged from the decanting chambers through the oil/water interceptor at least once in a period of six months to ensure the effluent complies with the standards for discharge into the environment

iv) Spillage and/or leakage of materials

Accidental spillage or leakage of oil during offloading, storage in tanks and loading on trucks has the potential of causing direct contamination of soil resources and indirect contamination of surface water resources through storm water runoff.

Proposed mitigation measures

- Train staff on spill response and management
- Document and display at the site emergency response procedures and plan for spillage incidents
- Provide suitable spill response kits at strategic positions within the facility for containing spillage
- Appropriate siphoning equipment is to be used for transferring recycled oil from storage tanks onto tankers to avoid oil spills.

- Transportation tankers and reception/storage tanks will be checked for any leakages at the start of operations and the necessary precautions taken.
- Impervious surfaces to be well maintained at all places likely to receive spills
- Provide secondary containment for the used oil storage tanks and the decanting chambers to facilitate proper management of spillage

Actions to be taken in the event of spillage include:

- taking immediate steps to avoid the spillage spreading and contaminating a wider area;
- keeping other people and vehicles away from the site;
- wearing protective clothing appropriate to the use of the hazardous material involved;
- soaking up the hazardous material with absorbent material such as dry sand, soil or wood shavings in the case of a liquid, and removing the contaminated matter with a brush and shovel and storing securely in suitable container for appropriate disposal
- If there is a risk of the spillage becoming airborne, some damp sand should be scattered before attempting to decontaminate;
- decontaminating any remaining traces of spillage including that on vehicles or equipment by washing down and draining the contaminated water through an oil interceptor
- bathing or thoroughly washing immediately afterwards

v) Direct contact with hazardous materials

Staff handling waste oil and/or processed oil during offloading from and loading on trucks respectively have the potential of suffering from occupational ailments as a result of continual inhalation of fumes and/or as result of the materials coming into direct contact with their skin.

Proposed mitigation measures

The facility manager will be required to implement the following measures:

- Provide all workers handling hazardous materials with personal protective equipment including gloves, coveralls, and safety boots and enforce use of the same throughout the operation phase of the project.
- Provide adequate sanitary facilities including bathrooms
- Maintain at the site, a file on material safety data sheets for all the hazardous materials handled at the site. Such data sheets contain essential detailed information regarding the identity and classification of the product, the hazards it presents and the appropriate safety precautions and emergency procedures.
- Employees will need to undergo an initial medical examination to provide baseline information on their health status and then have periodical medical check-ups to determine presence of any health risks
- Train staff on safe handling and storage of oil. The facility manager shall ensure that workers prior to commencement of new assignments have received adequate training and information enabling them to understand the hazards of work and to protect their health from hazardous ambient factors that may be present. The training must adequately cover: a) knowledge of materials, equipment, and tools; b) known hazards in the operations and how they are controlled; c) potential risks to health; d) precautions to prevent exposure; e) hygiene requirements; f) wearing and use of protective equipment

7.2.3 Potential Negative Impacts and Mitigation Measures During Decommissioning Phase

The environmental aspects associated with decommissioning phase of the proposed project include dust, noise, waste generation, handling of hazardous materials, and general health and safety aspects. Mitigation measures for dust, noise, general health and safety risks have been covered under section 8.2.1 and 8.2.2 above. The procedure to be followed during decommissioning is provided under section 2.2.3 of the report.

CHAPTER 8

8.1 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The Environmental Management Plan (EMP) for the proposed project is detailed below:

| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |
|---------------------------|---|---|----------------------|---------------------------------|--|
| CONSTRUCTION PHASE | | | | | |
| Dust | <ul style="list-style-type: none"> • Adverse Human health • Soiling of neighbouring properties • Nuisance to neighbours • Impaired visibility | Frequent watering of all exposed earth surfaces | 50,000 | Main Contractor for Civil Works | Throughout construction phase |
| | | Enclosure of the site with iron sheet perimeter fence | 200,000 | Main Contractor for Civil Works | Prior to commencement of major civil works |
| | | Enclosure of the concrete mixer with dust nets | 50,000 | Main Contractor for Civil Works | Throughout construction phase |
| | | Cover trucks with canvas to prevent loose materials from being blown by wind | 50,000 | Main Contractor for Civil Works | Throughout construction phase |
| | | Concrete mixer to be positioned away from major work areas & perimeter fence | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Provide personal protective equipment including dust masks, eye goggles and coveralls | 150,000 | Main Contractor for Civil Works | Throughout construction phase |

| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |
|----------------------|---|---|----------------------|---------------------------------|-------------------------------|
| Dust | <ul style="list-style-type: none"> • Adverse Human health • Soiling of neighbouring properties • Nuisance to neighbours • Impaired visibility | Limit drop heights of sand and soil | Nil | Main Contractor for Civil Works | During loading and offloading |
| | | Construction materials to be stockpiled and protected from wind erosion | Nil | Main Contractor for Civil Works | Throughout construction phase |
| Noise | <ul style="list-style-type: none"> • Adverse Human health • Nuisance to the public | Use of ear protectors by workers exposed to noise hazard >85 dB(A) | 100,000 | Main Contractor for Civil Works | Throughout construction phase |
| | | Recondition engine exhaust systems | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Proper engine tune-up | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Establish inspection and maintenance program for equipment and tools | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Post appropriate notices to warn drivers against unnecessary hooting | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | reduction of idling time of equipment and vehicles | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Construction activities to be scheduled between 8.00 a.m and 5.00 p.m. | Nil | Main Contractor for Civil Works | Throughout construction phase |

| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |
|--|---|---|----------------------|---------------------------------|-------------------------------|
| Exhaust emissions from equipment & vehicles | <ul style="list-style-type: none"> • Adverse Human health • Contribution to Greenhouse effect (global warming) • Nuisance to workers and neighbours | Recondition engine exhaust systems | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Proper engine tune-up | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Establish inspection & maintenance program for equipment | Nil | Main Contractor for Civil Works | Throughout construction phase |
| Spillage of hazardous materials like lubricants and fuel | <ul style="list-style-type: none"> • Ground water contamination through leaching • Contamination of surface water through storm water run-off • Soil contamination | Document spill prevention procedure & response plan | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Off-site maintenance of fuel powered equipment and vehicles | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Maintain spill response kits at the site | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Use of drip trays when carrying out minor servicing of equipment | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Hazardous materials to be stored in closed containers and placed on water proof surface | 50,000 | Main Contractor for Civil Works | Throughout construction phase |

| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |
|--|--|---|----------------------|---------------------------------|--|
| Spillage of hazardous materials like lubricants and fuel | | Minimize the quantity of hazardous materials stored at the site | Nil | Main Contractor for Civil Works | Throughout construction phase |
| Waste disposal | Ground water contamination through leaching of the leachate. | Provide suitable and well labelled solid waste containers | 10,000 | Main Contractor for Civil Works | Prior to commencement of construction work |
| | <ul style="list-style-type: none"> • Surface water contamination through run off • Aesthetic degradation • Nuisance to workers and neighbours • Clogging of storm drains • Soil contamination | Proper segregation of waste generated | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Reduce generation of solid waste at the source | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Reuse of top soil for landscaping of the site | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Empty packaging materials like cartons and cement bags should be piled in a safe place and sold or issued out for reuse | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Sell used oil and scrap metals to licensed dealers | Nil | Main Contractor | Throughout construction phase |
| | | Other solid waste to be collected by licensed waste handlers for appropriate disposal | 4,000 per month | Main Contractor for Civil Works | Throughout construction phase |

| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |
|-----------------------------|---------------------------------------|---|-----------------------------|---------------------------------|---|
| Waste disposal | | Provision of sanitary facilities for use by workers | 80,000 | Main Contractor for Civil Works | Prior to inception of construction phase |
| Fire | -Loss of property and/or life | Provide appropriate fire fighting equipment | 40,000 | Main Contractor for Civil Works | Prior to commencement of construction works |
| | | -Train workers on fire fighting | 20,000 | Main Contractor for Civil Works | Prior to commencement of construction works |
| | | Ensure inspection of the fire equipment | 10,000 | Main contractor for civil works | During construction phase |
| | | Designate a smoking zone | Nil | Main contractor for civil works | Prior to commencement of civil works |
| | | Post No smoking signs at the storage area for the fuel and/or oil | Nil | Main contractor for civil works | Prior to commencement of civil works |
| | | | | | |
| Elevated & Overhead Works | Injury to workers | Provide appropriate number of standard first aid kits | 20,000 | Main Contractor for Civil Works | Prior to commencement of construction works |
| | | Adequate number of workers to be trained on first aid | 20,000 | Main Contractor for Civil Works | Prior to construction works |
| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |

| | | | | | |
|---------------------------|-------------------|---|--------|---------------------------------|---|
| Elevated & Overhead Works | Injury to workers | Names of trained first aiders to be conspicuously displayed at the site | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Maintain a record of incidents & accidents on site | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Document the procedure for working at heights | Nil | Main Contractor for Civil Works | Prior to commencement of construction works |
| | | Provide safety nets/traps | 30,000 | Main Contractor for Civil Works | During construction works |
| | | Use appropriate safety signage to warn workers | 2,000 | Main Contractor for Civil Works | Prior to major civil works |
| | | Restrict access to the construction site by unauthorized individuals | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | statutory inspection of all lifting equipment (Chain blocks and cranes) | 40,000 | Main Contractor for Civil Works | Throughout construction phase |
| | | Cranes should be operated by trained & experienced personnel | Nil | Main contractor for civil works | Throughout construction phase |

| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |
|-----------------------------------|--|--|-----------------------------|---------------------------------|---|
| Elevated & Overhead Works | Injury to workers | Adhere to the safe load of lifting equipment | Nil | Main contractor for civil works | Throughout construction phase |
| General Health and Safety Aspects | <ul style="list-style-type: none"> • Injury to worker • Loss of life • Damage to property | Construction of a site office for coordinating construction activities | 200,000 | Main Contractor for Civil Works | Throughout construction phase |
| | | Appoint a health and safety personnel | Nil | Main Contractor for Civil Works | Prior to commencement of construction works |
| | | Document emergency response procedures | Nil | Main Contractor for Civil Works | Prior to commencement of construction works |
| | | Conduct mandatory safety inductions for all visitors to the site | Nil | Main Contractor for Civil Works | Any time visitors access the site |
| | | Document and display at the site emergency phone contacts for external emergency service providers | Nil | Main Contractor for Civil Works | Prior to commencement of construction works |
| General Health and Safety Aspects | <ul style="list-style-type: none"> • Injury to worker • Loss of life • Damage to property | Obtain indemnity cover for all workers on site | 500,000 | Main Contractor for Civil Works | Prior to commencement of construction works |

| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |
|-----------------------------------|--|--|--|--|---|
| General Health and Safety Aspects | <ul style="list-style-type: none"> • Injury to worker • Loss of life • Damage to property | Provision of wholesome drinking water to workers | 10,000 per month | Main Contractor for Civil Works | Throughout construction phase |
| | | Use of permit to work for critical tasks | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Hold toolbox and monthly meetings to discuss general safety concerns, review incidents, and determine actions needed to implement job safety | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Maintain a register of workers on site | Nil | Main Contractor for Civil Works | Throughout construction phase |
| | | Designate an emergency assembling point | Nil | Main Contractor for Civil Works | Prior to commencement of construction works |
| | | Establish a health and safety committee where appropriate | Nil | Main Contractor for Civil Works | Prior to commencement of construction works |
| | | Increased traffic | <ul style="list-style-type: none"> -Nuisance to neighbours -Violation of traffic rules | Schedule delivery of materials to the site during periods of light traffic | Nil |

| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |
|----------------------|--|--|----------------------|---------------------------------|-------------------------------|
| Increased traffic | -Nuisance to neighbours -Violation of traffic rules | Install appropriate traffic signs | 3000 | Main Contractor for Civil Works | Throughout construction phase |
| | | Define speed limit within the yard | Nil | Main contractor for Civil Works | Throughout construction phase |
| | | Maintain a record of incidents and accidents | Nil | Main contractor | Throughout construction phase |
| | | Control traffic flow to and from the site | Nil | Main Contractor for Civil Works | During delivery of materials |

Operation Phase Impacts and Mitigation Measures

| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |
|----------------------|---|---|----------------------|-------------------|----------------------------|
| Disposal of waste | <ul style="list-style-type: none"> • Contamination of soil • Adverse human health • Aesthetic degradation • Ground water contamination • Surface water contamination | Provide suitable and well labelled solid waste containers | 15,000 | Project proponent | Throughout operation phase |
| | | Proper segregation of solid waste | Nil | | |
| | | Sell scrap metals to licensed dealers | Nil | | |
| | | Implement an oil skimming programme for oil/water interceptors to ensure normal functioning | 3,000 per month | | |
| | | Carry out water quality analysis for effluent discharged from oil/water interceptor | 2,000 | | |
| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |

| | | | | | |
|-------------------|---|---|-------------------|-------------------|--|
| Disposal of waste | <ul style="list-style-type: none"> • Contamination of soil • Adverse human health • Aesthetic degradation • Ground water contamination • Surface water contamination | Oily rags to be accumulated safely for collection and incineration by NEMA licensed incinerator operators | 200,000 per annum | Project proponent | Throughout operation phase |
| | | Sewage & waste water from the kitchen to be discharged into the septic tank | Nil | Project proponent | Throughout operation phase |
| | | Contract a NEMA licensed sewage exhauster to exhaust sewage from the septic tank prior to overflowing onto the ground surface | 15,000 per trip | Project proponent | Throughout operation phase |
| | | Contract a NEMA licensed solid waste transporter | 5,000 per month | Project proponent | Throughout operation phase |
| | | Dispose of oily water via licensed handlers | 15,000 per month | Project proponent | Throughout operation phase |
| | | Provision of fire fighting equipment | 50,000 | Project proponent | Prior to commencement of project operation |
| Fire | Loss of life and/or property | Regular inspection and servicing of fire prevention equipment | 10,000 per annum | Project proponent | At least once in a period of six months |
| | | Post fire emergency evacuation procedures at strategic points | Nil | Project proponent | Prior to commencement of operations |

| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |
|-----------------------------|---------------------------------------|---|-----------------------------|-----------------------|--|
| Fire | Loss of life and/or property | Establish a fire fighting team and have them trained | 40,000 for training | Project proponent | Upon commissioning of the project |
| | | Carry out annual statutory fire safety audit | 80,000 | Project proponent | During project operation |
| | | Use of appropriate signage to prohibit smoking & naked flames | 2,000 | Project proponent | Prior to project operation |
| | | Provide at least two sand buckets at the oil storage area | 1,000 | Project proponent | Prior to project operation |
| | | Maintain a standard first aid kit on site | 10,000 | Project proponent | Prior to project operation |
| | | Train staff on basic first aid techniques and ensure they undertake refresher course at defined intervals | 50,000 | Project proponent | Throughout project operation |
| | | Designate an emergency assembling point | Nil | Project proponent | Prior to project operation |
| | | Conduct regular fire drills | 5000 | Project proponent | At least once in a period of 12 months |

| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |
|--------------------------------------|---|---|----------------------|-------------------|------------------------------|
| General safety aspects | <ul style="list-style-type: none"> • Loss of property • Injury to staff • Damage to equipment | Employ security guards from reputable firms | 30,000 per month | Project proponent | Throughout operation phase |
| | | Carry out annual statutory health & safety audit | 60,000 | | |
| | | Train staff on equipment operation | Nil | | |
| | | Establish workplace Health and Safety Committee where appropriate | Nil | | |
| | | Register the facility as a workplace | 5000 | | |
| | | Provide first aid training | 20,000 | | |
| | | Carry out health and safety committee meetings | Nil | | |
| Spillage and/or leakage of materials | <ul style="list-style-type: none"> -Direct contamination of soil resources -Indirect contamination of surface water resources | Train staff on spill response and management | 30,000 | Project proponent | Throughout project operation |
| | | Document and display at the site emergency response procedures and plan for spillage incidents | Nil | | |
| | | Provide suitable spill response kits at strategic positions within the facility for containing spillage | 30,000 per annum | | |
| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |

| | | | | | |
|---|---|--|-------------------|-------------------|-------------------------------------|
| Spillage and/or leakage of materials | -Direct contamination of soil resources -Indirect contamination of surface water resources | Document and maintain at the site procedure for offloading and dispensing waste & decanted oil | Nil | Project proponent | Prior to commencement of operations |
| | | Use of appropriate siphoning equipment for transferring decanted oil from storage tanks onto tankers to avoid oil spills | 60,000 | Project proponent | Throughout operation phase |
| | | Regular inspection of transportation tankers and reception/storage tanks for leakages | Nil | Project proponent | Throughout operation phase |
| | | Provision of secondary containment for the used oil storage tanks & the decanting chambers | 150,000 | Project proponent | Prior to commencement of operations |
| | | Provide impervious surfaces at all places likely to receive spills | 250,000 | Project proponent | Prior to project operation |
| Direct contact with hazardous materials | Adverse human health | Provide personal protective equipment including gloves, coveralls, air respirators and safety boots | 100,000 per annum | Project proponent | Throughout operation phase |

| Environmental Aspect | Potential Environmental Impact | Mitigating Measures | Estimated Cost (Ksh) | Responsibility | Time Frame |
|---|---------------------------------------|---|-----------------------------|-----------------------|--------------------------------------|
| Direct contact with hazardous materials | Adverse human health | Maintain at the site, a file on material safety data sheets for all the hazardous materials handled at the site | Nil | Project proponent | Throughout project operation |
| | | Train staff on safe handling and storage of hazardous materials | 50,000 per annum | Project proponent | Prior to commencement of the project |
| | | Initial & periodic medical examination of staff | 2,000 per staff | Project proponent | Prior and during project operation |

CHAPTER 9

9.0 ENVIRONMENTAL MONITORING PLAN

Environmental monitoring is a regular and systematic observation or tracking of an activity to determine whether it is proceeding or functioning as expected. It is important as it provides information to measure environmental change and assess the effectiveness of procedures employed to mitigate adverse impacts of the project.

| Environmental/Social Aspect | Monitoring Indicator | Monitoring Method | Monitoring Frequency |
|--------------------------------------|--|--|---|
| Construction Phase Monitoring | | | |
| Traffic congestion | Number of queuing along the access road near the entrance while delivering materials | Visual inspection | daily |
| Dust | Airborne particles | Visual inspection | Daily |
| | Number and type of complaints recorded | Inspection of complaints register | Daily |
| Noise Generation | Measured noise levels | Measuring noise using a calibrated noise meter | At least once during commencement of civil works and after six months |
| | Number and type of complaints recorded | Inspection of complaints register | Daily |
| Conflicts | Number and type of incidents recorded | Review of incident record | Weekly |
| Waste generation | Quantities of waste generated | Tracking all categories of waste generated | Daily |
| Health & safety aspects | Identified safety targets | Site visit, interview with workers and recording of observations | At least once in a month |
| Injuries | Monthly statistical records | Reporting of accidents | Daily |

| Environmental/Social Aspect | Monitoring Indicator | Monitoring Method | Monitoring Frequency |
|-----------------------------------|--|--|---|
| Operation Phase Monitoring | | | |
| Effluent discharge | Effluent quality | Sampling and laboratory tests | At least once in a period of six months |
| Handling of hazardous materials | Health of workers | Medical examination | Prior to deployment and once in a period of 12 months |
| Waste generation | Quantities of waste generated | Tracking all categories of waste generated | Daily |
| Health & safety aspects | Identified safety targets | Site visit, interview with workers and recording of observations | At least once in a month |
| Traffic congestion | Number of queuing along the access road near the entrance while delivering materials | Visual inspection | daily |

CHAPTER 10

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

The findings of the EIA study for the proposed used oil transfer station on Plot L.R No. Kilifi/Kaliangombe/Jimba/16 in Kokotoni area, Kilifi County indicates that the proposed project has the potential for both positive and negative environmental impacts. However, the positive impacts outweigh the negative impacts.

The potential negative social and environmental impacts identified are those associated with the following aspects: dust, noise, elevated and overhead work, indiscriminate disposal of waste, general health and safety aspects, increased traffic, spillage of waste oil on the ground surface, management of hazardous waste and gaseous emissions.

10.2 Recommendations

Appropriate mitigation measures for the negative impacts associated with the aspects mentioned above have been provided by the EIA team in the EMP. It is the opinion of the EIA team that implementation of the EMP by the project proponent will ensure environmentally sustainable development throughout the project cycle. The project proponent has committed himself to implementing the EMP and further mitigation measures that may be recommended by NEMA from time to time during the operation phase of the project.

APPENDICES

Appendix 1: Copy of Certificate of Incorporation & Personal Identification Number (PIN).

Appendix 2: Copies of - Land Lease Agreement

- TOR approval

- Laboratory soil sample

Appendix 3: Copies of the Experts' registration Certificates.

Appendix 4: Minutes