ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT

FOR

PROPOSED INTEGRATED WASTE MANAGEMENT SITE ON PLOT L.R NO. 6216 KALUMANI MNYENZENI AREA, KILIFI COUNTY

Project proponent:

KILINDINI WASTE HUB LIMITED
P.O BOX 99308-80100
MOMBASA

GPS Coordinates

3º44'51.83"S, 39º 24'10.40"E (-3.7477379, 39.4028785)

Sep 2023

ESIA; PROPOSED INTEGRATED WASTE MANAGEMENT SITE FOR KILINDINI WASTE HUB LIMITED

DOCUMENT AUTHENTIFICATION

EIA/EA EXPERTS

This report has been prepared in pursuant to the Environmental Management and Coordination Act Cap.387 of the Laws of Kenya. We hereby certify that this study report was prepared on the information provided by the proponent, consulted stakeholders as well as that collected from other primary and secondary sources and on the best understanding and interpretation of the facts by the environmental experts. It is issued without any prejudice.

EIA/EA Experts team

Name	Qualifications
Mr. Evans Kibon Totona Lead Expert, NEMA Reg. No. 8049	MSc. Occupational Health and Safety
Mr. Ben Arnold Opapo Associate Expert, NEMA Reg, No. 9294	BSc. Disaster Mitigation and Sustainable Development
Mr. Alex Maina Sociologist, NEMA Reg No. 2049	Bachelor of Art Sociology and Economics
Mr. Fredricks Omondi Ojijo NEMA Reg No. 8666	BSc. Environmental Management and Conservation

LEAD EXPERT

Name: Mr. Evans Kibon Totona (8049)

Designation: Lead Expert

Signature: ..... Date: 09/09/2023

ASSOCIATE EXPERT

Name: Mr. Ben Arnold Opapo (9294)

Designation: Associate Expert

Signature: ..... Date: 09/09/2023

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ESIA; PROPOSED INTEGRATED WASTE MANAGEMENT SITE FOR KILINDINI WASTE HUB LIMITED

PROJECT PROPONENT

Signed for and on behalf of

KILINDINI WASTE HUB LIMITED
P.O BOX 99308-80100
MOMBASA

Name Meshack M. Nzala

Designation Director

Signature

Date 19/09/2023

KILINDINI WASTE HUB LTD.
P. O. Box 99744 - 80107,
MOMBASA - KENYA

EXECUTIVE SUMMARY

This Environmental and Social Impact Assessment (ESIA) report documents the findings of a study of the proposed Integrated Waste Management Site (IWMS) to be situated at Mnyenzeni, Mzinzi area, Kaloleni Sub County within Kilifi County by Kilindini Waste Hub Limited herein referred to as the proponent. The proponent, Kilindini Waste Hub Limited, proposes to set up an Integrated Waste Management Site pursuant to Section 58 of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya and Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019, the proponent has contracted a team of Environmental experts (consultants) licensed by National Environment Management Authority (NEMA), to prepare an Environmental and Social Impact Assessment (ESIA) Study Report for the proposed project. In addition to compliance with the law, the output of the ESIA process will provide a baseline of the environmental and social conditions of the project area to enable future monitoring of the environmental performance of the proposed project.

The proponent has proposed to set up integrated waste management site that will include asbestos disposal site (landfill), incineration facility and handling of non-hazardous wastes in sanitary landfills through deep burying/composting to be situated Plot number 6216 Mnyenzeni, Mzinzi area, Tsangatsini location, Kaloleni Sub County off Mombasa-Nairobi Highway within Kilifi County. The proposed project will be set up on a nine acres piece of land. The geo-reference points of the site are Latitude **3º44′51.83″S** & Longitude **39º 24′10.40″E (-3.7477379, 39.4028785)** at an elevation of 653ft above sea level.

The proponent intends to have all these project components (three waste management aspects) integrated and processed as a Comprehensive Environmental Impact Assessment considering they are on the same parcel of land and intended to be implemented by the same proponent. The proponent intends to own and operate waste management site with enhanced health and safety mechanisms and without compromising environment and public health with prospects of future expansion. Currently, the proposed project site has no ongoing construction or operations activities since it's a bare/virgin land. The proponent intends to set up waste management site with enhanced health and safety mechanisms and without compromising environment and public health with prospects of future expansion.

The methodology for preparing the ESIA study report was guided by the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019. Project site visits were undertaken in July 2023 for purposes of area reconnaissance survey, assessing the baseline and environmental risks associated with the proposed project as well as applicable environmental safeguards and standards. An environmental screening was conducted by the environmental experts in compliance with Environmental (Impact Assessment and Audit)

(Amendment) Regulations, 2019 criterion. The issues considered by the experts included; ecological and socio-economic issues, landscape changes, land use character and water use and requirements. Data collection methods included literature review of relevant documents, observations during site visits and photography. The stakeholder engagement strategy included stakeholder consultative meeting that was conducted at Mzinzi ECD within the environs of the proposed project site with Project Affected Parties (PAPs).

The proposed project will comprise integration of various types of wastes with their respective management and handling mechanisms simultaneously on the same site hence the term integrated waste management site. The project will integrate the following waste management mechanisms as explained below;

The Proposed Integrated Waste Management Site (IWMS) will include asbestos disposal site (landfill), incineration facility and handling of non-hazardous wastes in sanitary landfills through deep burying/ composting. The proposed project will also feature other associated amenities and facilities. These proposed project components are explained below;

The proposed development will comprise of asbestos disposal site (land fill) covering approximately one acre of the whole plot. The asbestos landfill will be dug in consideration of the relevant baseline studies such as hydrological survey comments regarding the water table of the area so as to avoid ground water contamination. This proposed project site will have a capacity of approximately 2500 tons of the asbestos material/asbestos containing materials (ACM). The proposed pit will be excavated up to 10M below the ground. After excavation, concrete foundation slab will be constructed on the excavated pit to ensure that the asbestos containing material does not penetrate into the underground water. After lining the pit with concreate, the asbestos material shall be placed on the constructed pit progressively up to one metre below ground level, then covered. The pit shall be marked with visible marks indicating what has been disposed, the source and the words 'danger" on it. The proponent proposes to set up asbestos landfill in line with the National Guidelines on Safe Management and Disposal of Asbestos

Waste incineration is a method of waste disposal whereby high temperatures are used to sufficiently oxidize the combustible components in waste. The project proponent intends to install an incinerator plant to be used in disposal of both hazardous and non-hazardous materials/wastes streams through combustion. The proposed incinerator plant will entail electric operated and manual operated, a box type furnace with two chambers (primary & secondary).

The incinerator will have the following components/specifications;

- Manual door for feeding the wastes for combustion

- 2 main burners (chambers, primary & secondary) each with electronic temperature control from 0 to 1,200ºC
- The control panel for adjusting of the plant operation, with: The main switch, On /Off buttons for the burners and the ventilator
- The ventilator (air pump) with connections to the furnace and the reaction chamber
- Hand adjustable time-clocks for the burners and the ventilator
- Digital displays of the electronic burner temperature controls

The process will entail complete combustion through injection of air (oxygen) from the installed air fan to aid in secondary combustion of other gases within the furnace before emitting the smoke into the atmosphere. The incinerator will have the capacity of handling approximately 20,000kgs/hr.

Handling of non-hazardous wastes will entail sanitary landfills through deep burying/ composting. The proposed sanitary landfill will be operated as one-off since the landfill will be dug depending on the capacity of wastes to be disposed at any given time.

The proposed integrated waste management project is necessitated by the ever-increasing waste generation from industrialization and other development activities within Kilifi County, other neighboring counties and whole country at large and the implementation of Environmental Management and Coordination (Waste Management) Regulations, 2006 in addition to the need to cope and comply with other regulatory framework.

The documented findings of this ESIA study report demonstrate that the proposed project is expected to have both positive and negative environmental and social impacts to the community and other Project Affected Parties (PAPs). Anticipated positive impacts include; provision of effective and sustainable waste management services in compliance with Waste Management Regulations 2006, creation of employment opportunities and generation of revenue to the Kilifi County Government and Central government through payment of operational permits/licenses. Alongside the positive impacts, several environmental and social constrains will arise at different phases of the project implementation stages.

There are potential safety and health risks associated with operations of the proposed integrated waste management site. These include accidental falls, air pollution, increased waste generation in terms of stockpiles and other social concerns associated with the proposed project. All these risks have potential to cause injuries, permanent disability or even death and hence the management should be committed to ensuring safety and health of workers and visitors at the site. The proposed mitigation measures include

developing and implementing a safety and health policy, and emergency response plan for the site, sensitizing employees to adhere to work procedures to minimize accidents, providing adequate and appropriate PPE's to workers and enforcing on their use and displaying precautionary signages at appropriate sections within the facility. Additionally, the proponent should conduct first aid training among the workers, provide well-stocked first aid kit, conduct annual occupational safety and health audits and comply with the provisions of the Occupational Safety and Health Act, 2007.

Conclusion

The proposed project is considered important and beneficial to the economy as it will ensure safe management of wastes both hazardous and non-hazardous; promote socio-economic growth of the area through employment creation and revenue generation to the relevant government agencies. This study report proposes comprehensive mitigation measures for the negative anticipated impacts during the entire project cycle and improves the environmental performance of the proposed project. It is on this basis that we recommend that the proposed project be allowed to proceed alongside conditions which will ensure compliance with the relevant environmental legislations and standard.

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ABBREVIATIONS AND ACRONYMS

ACM	Asbestos Containing Material
DCC	Deputy County Commissioner
EA	Environmental Audit
EDL	Effluent Discharge License
ESIA	Environmental and Social Impact Assessment
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
EMS	Environmental Management System
EPRA	Energy and Petroleum Regulatory Authority
ERC	Energy Regulatory Commission
ILO	International Labour Organization
IWMS	Integrated Waste Management Site
ESMP	Environmental and Social Impact Plan
GBV	Gender Based Violence
GHGs	Green House Gases
GPS	Geographical Positioning System
HIV/AIDS	Human immunodeficiency virus/ acquired immunodeficiency syndrome
KNBS	Kenya National Bureau of Statistics
NCA	National Construction Authority
NCCAP	National Climate Change Action Plan
NEMA	National Environmental Management Authority
OHS	Occupational Health & Safety
PAPs	Project Affected Parties
PPE	Personal Protective Equipment
PWDs	People Living Disabilities
SEA	Sexual Exploitation and Abuse
SOPs	Standard Operating Procedures
SHE	Safety Health and Environment
STI	Sexually Transmitted Infections

WIBA	Work Injury Benefits Act
WRUA	Water Resource Users Association
WRA	Water Resource Authority
WSP	Water Service Providers
WWDA	Water Works Development Agencies

CHAPTER 1: INTRODUCTION

1.1 Background Information

Waste management is an integral part of industrial development in Kenya and all over the world. Without this, all the development activities would be detrimental to the environment and to life in general. Waste management in the Kenya has been assumed to be managed by the National Environmental Management Authority (NEMA) and the County governments. However, the National Environmental Management Authority has had private entities/companies to help in the collection, transfer of wastes to designated areas and waste management through other means in compliance with set regulations and standards. It is in this regard that Kilindini Waste Hub Limited is proposing to engage in waste management activities as a private entity in compliance with existing waste management regulations.

Kilindini Waste Hub Limited intends to deal in general waste management and disposal activities in compliance with existing waste management regulations and other applicable laws. The proponent is seeking to expand and improve waste management activities within the County and its environs by setting up integrated waste management site with enhanced safety and health measures and without compromising environment and public health.

The inception of the proposed project is necessitated by the ever increasing and escalating waste generation from industrialization and other development activities in Kilifi County, its environs and the country in general.

1.2 Project Location

Proposed project site is located on Plot number 6216 Mnyenzeni, Mzinzi area, Tsangatsini location, Kaloleni Sub County off Mombasa-Nairobi Highway within Kilifi County. The proposed project will be set up on a nine acres piece of land. The geo-reference points of the site are Latitude **3º44′51.83″S** & Longitude **39º 24′10.40″E (-3.7477379, 39.4028785)** at an elevation of 653ft above sea level.


Legend
Feature 1
Project Site
Mwabani
Mkuluni
-3.7477379, 39.4028785 PROPOSED PROJECT SITE
Kirumbi Primary School
Miyani Primary School
KARIMBO SECONDARY SCHOOL
Jungle Park Resort
Mariakani Rifle range
Mwamba Care Childrens Centre
Google Earth
N
2 mi

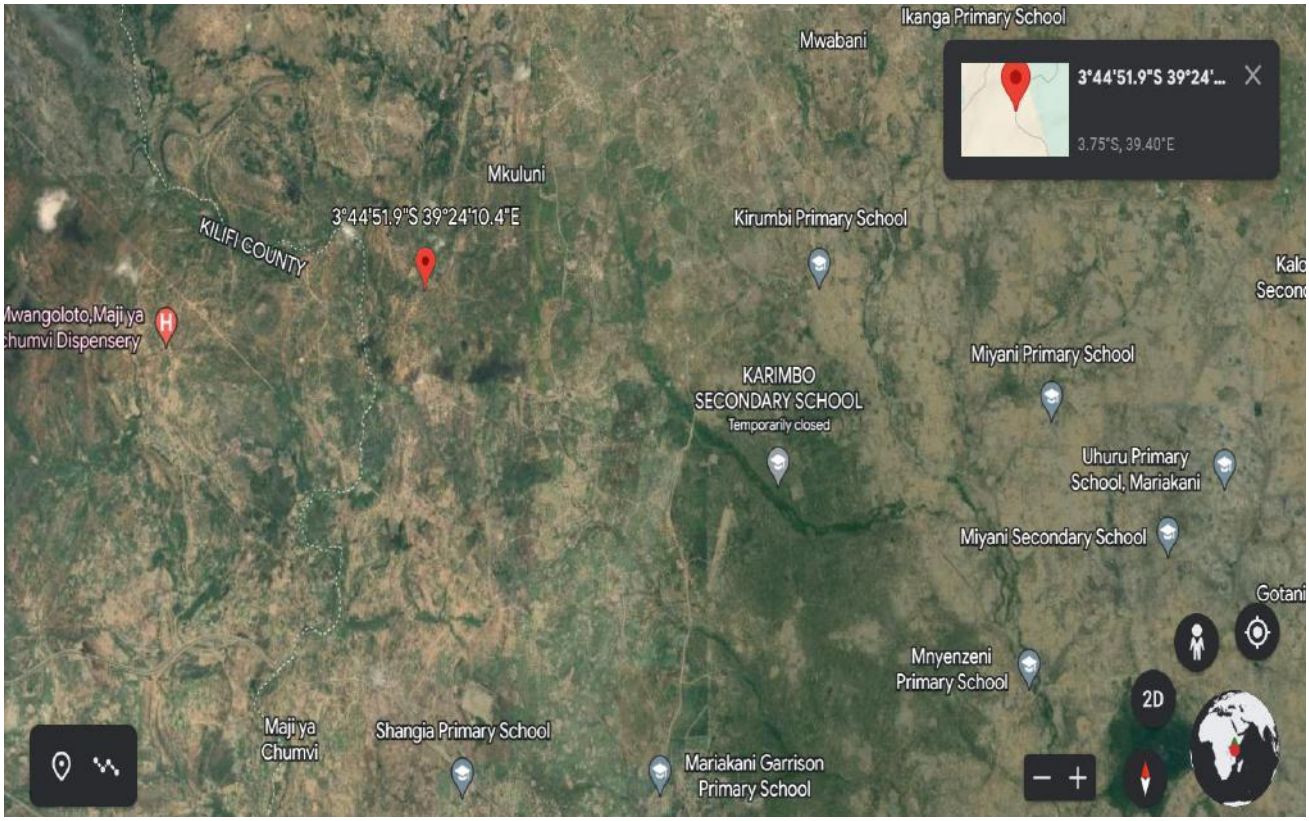

Ikanga Primary School
Mwabani
3°44'51.9"S 39°24'...
3.75°S, 39.40°E
Mkuluni
3°44'51.9"S 39°24'10.4"E
KILIFI COUNTY
Kirumbi Primary School
Mwangoloto,Maji ya Chumvi Dispensery
Miyani Primary School
KARIMBO SECONDARY SCHOOL
Temporarily closed
Uhuru Primary School, Mariakani
Miyani Secondary School
Gotani
Mnyenzeni Primary School
2D
Maji ya Chumvi
Shangia Primary School
Mariakani Garrison Primary School

Figure 1.1: Location Map (Source: Google map 2022)

Figure 1.2: Proposed project site current status (Source; Site Survey/Photography)

Figure 1.3: Access weather road to the project site (Source; Site Survey/photography)

1.3 Project Neighborhood

Some of the adjacent parcels of land neighboring the site are not developed with either commercial or residential developments, it's a bare land used as grazing land.

1.4 Project objective

The overall objective of the proposed project is to set up & operate an integrated waste management site pursuant to Section 58 of the Environmental Management and Coordination Act Cap. 387 of the Laws of Kenya

1.5 Project Justification

Managing waste properly is essential for building sustainable and livable cities, but it remains a challenge for many developing countries and cities. The proposed project will improve public health and livelihoods by reducing improper waste management mechanisms through open burning, mitigating pest and disease vector spreading leading to environmental degradation. In Kenya, management of wastes (both hazardous & non-hazardous) is regulated under the Environmental Management and Co-ordination Act (Waste Management) Regulations, 2006 and other related regulations. These regulations establish an order of preference for the management of wastes to enhance environmental protection. A number of waste generation facilities in the country lack proper waste management systems thus opting for open dumping or even illegal disposal and

dumping. However, this is not safe thus the urgency to establish quality and functional waste management facilities within Kilifi County and its environs. Operation of the proposed project will thus foster proper management and handling of various waste streams within Kilifi County and the surrounding environs.

1.6 Scope and criteria

The study has been conducted to evaluate the environmental impacts of the proposed integrated waste management site. Upon evaluation, recommendations are made on the accentuation of positive impacts and the mitigation of negative ones. The scope for the assessment dwelled on impacts the project will have on the following parameters:

- Physical environment
- Socio-cultural environment
- Land use
- Socio-economic aspects
- Flora and fauna
- Occupational safety & health issues

1.7 Assessment methodology

This ESIA study is based on proposed project site visits, literature review, and discussions with the project proponent, engineers and consultation with the stakeholders through public participation with Project Affected Parties (PAPs). The project proponent provided all details relevant to the proposed project. While preparing the ESIA study report, care has been taken to identify the potential negative impacts and their mitigation measures in terms of:

- Impacts due to project location;
- Impacts from project design and during construction; and
- Impacts during the operation of the project

For the purpose of the assessment and preparation of the Study report, the following approaches and methodologies were employed:

1) Desktop studies which involved review and analysis of literature for acquisition of secondary data;
2) Environmental screening, in which the project was identified as among those requiring ESIA under second schedule of Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019, the proposed project is classified as a High Risk Project.
3) Environmental scoping that provided the key environmental issues to be investigated in relation to implementation of the proposed project;
4) Physical inspection of the site and surrounding areas;
5) Consultation involving key stakeholders for collection of primary data through public meeting and questionnaires administration
6) Identification of potential impacts and preparing an ESMP;
7) Confirmation and sharing of findings with the project proponent;
8) Reporting assessment findings

1.8 Stakeholder Identification, Analysis and Engagement Plan

a) Stakeholder Identification

Stakeholders represent individuals or groups that hold a stake in the project, either because they will be impacted by the project or because they have a vested interest in it. A public consultation/engagement process is very important in gauging the sentiments of a variety of stakeholders. Besides the fact that this is a regulatory requirement under the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019, it is an excellent opportunity to offer the public an opportunity to ventilate their concerns and probably give recommendations concerning the proposed project in the specific area.

The stakeholders' categories identified in this proposed project included the following Project Affected Parties;

- Local communities/immediate neighbors
- Local Administration (Area chief, Tsangatsini location)
- Government agencies
- Political representatives (Member of County Assembly)
- Community Based Organizations (CBO's)

Each of the stakeholders above had different requirements, different interests, different levels of influence, and different expectations towards the project. A project proponent's challenging role is to align these expectations, engage the stakeholders, and promote acceptance of the project in totality.

b) Stakeholder Analysis

After the identification of the stakeholders, they were analysed by the environmental consultants on who they really were, their level of interest, what power they had, what their expectations were, and if they seemed favourable or against the proposed project. This was done through a power-interest matrix, where each stakeholder was plotted in the matrix based on their level of power to impact the project and their level of interest. In any project, all stakeholders are equal, but some are more equal than others.

Depending on power and interest of the stakeholder, different strategies apply to manage their engagement:

- **Keep them satisfied**

Stakeholders in this group have little interest in the project but high power to continue or stop. Examples of such stakeholders include the local communities which forms the larger group. The best engagement strategy is to meet their needs and keep them satisfied, which can mean invite them for project updates meetings occasionally or ensure that their communication requirements are being met.

- **Minimal effort**

Stakeholders who have little power and little interest in the project are the least important and require minimal effort from the project manager. However, they should not be totally overlooked.

- **Engage closely**

Stakeholders with a high level of power and a high level of interest are the most important stakeholders. This will include the lead and government agencies interested in the proposed project.

- **Keep them informed**

These are the stakeholders with low power but highly interested in the project. These are stakeholders to whom you need to show consideration, such as the project end-users and whom you should keep informed regularly on the project status.

In consideration of the above stakeholder engagement plan, public consultative meeting for the proposed project was conducted at Mzinzi ECD on 6th September 2023. (*See attached meeting minutes*)

1.9 Terms of reference

The terms of reference for the proposed project represents NEMA approved terms of reference report vide reference number NEMA/TOR/5/2/596 that was submitted to the Authority prior to the commencement of this study report. The approved terms of reference define the objectives and scope of the ESIA as follows:

- Assess the baseline environmental conditions in the project area, such as biological, physical and socio-economic environment;
- Study the potential positive and negative impacts of implementing the proposed project in the society living within the influence of the project including, but not limited to, sound disposal and management of wastes, job creation and improvement in the livelihood within the local community.
- Assess the potential environmental and social impacts of the project and suggest suitable mitigation measures for the adverse impacts;
- Study the project conditions and requirements in terms of location, implementation and operation requirements;
- Study negative impacts arising from the proposed project for example public safety and health and rehabilitation of the affected environment.
- Prepare an Environmental and Social Management Plan (ESMP) for implementation and monitoring of mitigation measures along with budgetary estimates.

CHAPTER 2: BASELINE INFORMATION ON PROJECT AREA

2.1 Introduction

This chapter presents a status report on the situation of the proposed project within the context of Kilifi County as a whole. The environmental baseline offers both the present and future status of the environment. It takes into account changes which might be occasioned by natural and anthropogenic activities. Baseline information provides a basis to ascertain the implication of the development process and determine the mitigation measures to be undertaken or suitable to ameliorate the identified impacts. The baseline survey was done through literature review, site visits and baseline environmental monitoring within the proposed project area.

2.2 Administrative location and size

Administratively, Kilifi County is divided into nine sub-counties namely; Chonyi, Ganze, Kaloleni, Kauma. Kilifi North, Kilifi South, Magarini, Malindi and Rabai Sub Counties. Kilifi County was formed in 2010 as a result of a merger of Kilifi District and Malindi District. Its capital is Kilifi and its largest town is Malindi. The county has a population of 1,453,787. It covers an area of 12,245.90 km^2. The county is located north and northeast of Mombasa. Kilifi has fewer tourists than Mombasa County, but there are some tourists' beaches in Kikambala, Watamu, Malindi and Kilifi.

2.3 Location

The proponent has proposed to set up an integrated waste management site on a piece of land of approximately nine (9) acres to be located on Plot number 6216 Mnyenzeni, Mzinzi area, Tsangatsini location, Kaloleni Sub County off Mombasa-Nairobi Highway within Kilifi County. The proposed project will be set up on a nine acres piece of land. The geo-reference points of the site are Latitude **3º44′51.83″S** & Longitude **39º 24′10.40″E (-3.7477379, 39.4028785)** at an elevation of 653ft above sea level.

2.4 Climatic conditions

Kilifi County lies within the coastal strip which is a hot tropical region. Local weather is influenced by monsoon winds. The average annual rainfall ranges from 300mm in the hinterland to 1,300mm at the coastal belt. The coastal belt receives an average annual rainfall of about 900mm to 1,100mm with marked decrease in intensity to the hinterland. Areas with highest rainfall include Mtwapa and to the north of the coastal strip around the Arabuko Sokoke Forest. Evaporation ranges from 1800mm along the coastal strip to 2200mm in the Nyika plateau in the interior. The highest evaporation rate is experienced during the months of January to March in all parts of the county. The annual temperatures in the county range between 21 degrees Celsius

and 30 degrees Celsius in the coastal belt and between 30 degrees Celsius and 34 degrees Celsius in the hinterland. The county experiences relatively low wind speeds ranging between 4.8 km/hr and 12 Km/hr.

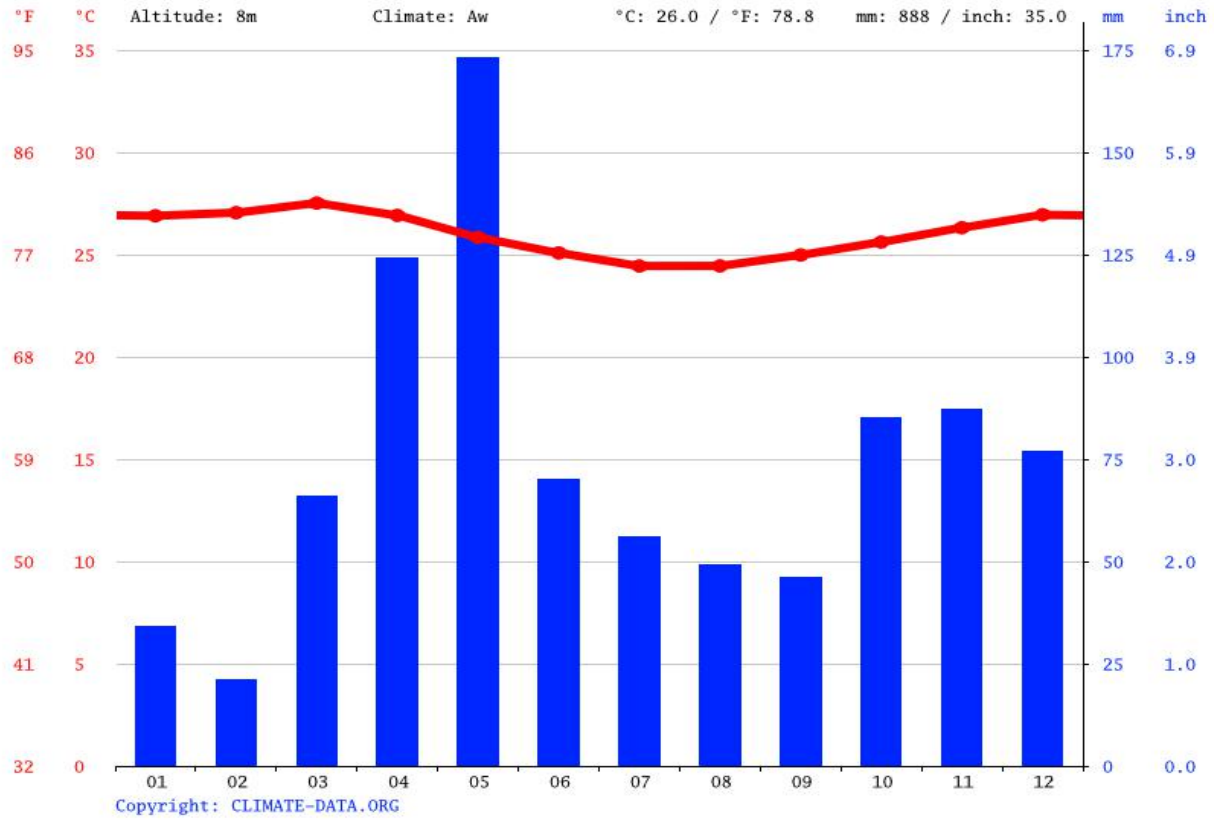


Figure 2.1: Climatic conditions graph (Source: CLIMATE-DATA.ORG)

2.5 Topography and geology

Kilifi County has four major topographical features with marked geological and rainfall characteristics which dictate the resource potential and land use patterns. These are the Coastal Plain, the Foot Plateau, the Coastal Range and the Nyika Plateau. Mnyenzeni area lies within the Coastal Plains of Kilifi County.

The geology of Kilifi consists of sediments and sedimentary rocks of several types; the Jurassic systems, the tertiary system and the quaternary system and each of these units have several formations. The sedimentary rock systems run parallel to the coastline in a north east-south west direction. The sediments found in Kilifi were deposited at various stages of geological history.

2.6 Water Supply infrastructure

The four main sources of water supply identified in the larger Kilifi County are individual shallow wells, piped water supply scheme, seasonal ponds and a permanent river source. These sources are dwindling in rural areas due to increased demand within the nearby towns such as Kilifi Town and the other larger towns. Seasonal ponds which retain rainwater dry up sometimes in the year due to the changing climatic conditions. The area relies on water from dams, ponds and water pans.

According to the Department of Water Environment, Forestry Natural Resources solid waste management score Card Report, (2016), 60% of the households in the county have access to piped water distributed by Kilifi-Mariakani Water and Sewerage Company (KIMAWASCO) and Malindi Water and Sewerage Company (MAWASCO). The County Government and other stakeholders in the water sector are exploring possibilities of drilling boreholes, pipeline extensions and enhancing other water sources to meet the growing water demands in both rural and urban areas. Other equally important sources of water for

the communities in the county are water pans, earth dams and rivers especially in the rural areas where piped water is either not available or inadequate. Therefore, deliberate efforts to expand water sources and develop a climate proof water schemes that are dedicated to serve the County citizens is paramount in ensuring adequate access to clean and safer water to all.

2.7 Land Use Systems

The proposed project site is an ASAL (arid and semi-arid land) area in terms of land use and comprises of communal land used as grazing area, the main economic activity being charcoal burning and forest harvesting. This is coupled by the unavailability of sustainable rainfall in the area to support any other activity that is dependent on rainfall. This area is sparely populated with the population density being below the Kenya's average population density.

2.8 Physiography and vegetation

The proposed site lies on a relatively flat ground covered with natural growing grass, shrubs, and trees. Vegetation gives the ground a lot of cover, which prevent rainwater from hitting the ground directly to cause soil erosion. The cover also stops the water from flowing freely to the streams, hence giving the rainwater more time to percolate and recharge the groundwater. The cover in some cases stops evaporation of the soil moisture and leaves the water on the soil for long allowing plants to utilize the same for their growth. During transpiration the water, which evaporates from the plants increases the cloud moisture and cools the clouds

causing rain. Trees also hold rain water for a short period before it falls to the ground giving it more time for percolation as to much water on the ground would flow to the rivers.

Fig 2.3: Project site vegetation covers (Source, Site visit/photography)

2.9 Energy Supply

Only 2% of residents in Kilifi County use liquefied petroleum gas (LPG), and 8% use paraffin. 67% use firewood and 21% use charcoal. Firewood is the most common cooking fuel by gender with 65% of male headed house-holds and 73% in female headed households using it.

2.10 Waste Management Practices and Sanitation

The proposed project area (Mnyenzeni, Mzinzi village) is classified as rural area and the waste production is negligible. There is no formal waste disposal service and each household disposes of its own waste. The most frequently utilized means of waste disposal is through burning of combustible materials or used as manure or buried.

Access to basic sanitation facilities remains a formidable challenge across the county. The county toilet coverage is estimated at 67% while 30% of households have hand washing facilities. A significant proportion of the population in the county has no access to basic sanitation facilities, posing serious public health implications. More importantly, proportion of households with access to sanitation facilities varies across and between major urban centers and peri-urban areas and the concentration of these facilities tends to decline towards the rural areas within the county. Concerted efforts should be put in place to invest in public toilets in major towns and trading centers and establishing of sewerage facilities in coherence with existing town planning principles.

2.11 Population Density

According to the 2019 Population and Housing Census, the population of Kilifi County stood at 1,453,787 of which 704,089 are males, 749,673 females and 25 intersex persons. There are 298,472 household with an average household size of 4.4 persons per household and a population density 116 people per square kilometer

Sub County	Male	Female	Intersex	Total
Chonyi	29,527	32,807	1	62,335
Ganze	66,921	76,981	4	143,906
Kaloleni	92,614	101,063	5	193,682
Kauma	10,965	11,673	5	22,638
Kilifi North	86,986	91,836		178,824
Kilifi South	101,852	104,897	2	206,753
Magarini	93,302	98,308	4	191,610
Malindi	163,351	169,866		333,226
Rabai	58,571	62,242	9	120,813
Total	**704,089**	**749,673**	**25**	**1,453,787**

Table 2.1: Distribution of Population by Sex and Sub-County

2.12 Settlement Patterns

Within the project area, inhabits are Giriama tribe of the larger Mijikenda Community. The population of the village is sparsely distributed, the average density of Kaloleni Sub County being 42 persons per square kilometer while the total population of 193,682 for the whole Sub County. The population distribution patterns in the area are skewed towards the availability of social amenities and infrastructural distribution such as access roads and availability of water pans which are the major source of water provision within the area.

2.13 Socio-Economic Profile

The area where the project will be located relies mostly on charcoal making. Formal employment is very low apart from charcoal making. There are no cultural or historically important sites within the project influence area and therefore the proposed project is bound to have no adverse impacts on the cultural aspects of the neighboring community.

CHAPTER 3: POLICY, INSTITUTIONAL & LEGAL FRAMEWORK

3.1 Introduction

The relevant legislation which the project must comply with is intended to ensure project's sensitivity to environmental concerns, public safety, public health and physical planning regulations. Kenya has a policy, legal and administrative framework for guiding it in environmental management. Under the framework, NEMA is responsible for ensuring that EIAs/ESIAs are carried out for new projects and EAs on existing facilities as per the provisions of Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019. ESIAs are carried out in order to identify positive and negative impacts associated with ongoing projects with a view to taking advantage of the positive impacts and developing mitigation measures for the negative ones.

The legal and institutional frameworks provide important safeguards for protection and conservation of fragile environments and vulnerable communities and enhance the implementation of the Environmental and Social Management Plans. Under this section, the ESIA study report will therefore review the applicable sets of laws, management principles and institutions that require level of environmental compliance for the proposed integrated waste management site.

This chapter will discuss the following aspects in relation to the proposed project;

- Policy Framework
- Environmental Management Principles and Guidelines
- Institutional Framework
- Legal Framework
- International Conventions and Treaties

3.2 Policy Framework

3.2.1 *National Environment Policy, 2013*

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

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

National Environment Policy also elaborates on environmental quality and health and the need to ensure a clean and health environment for all.

3.2.2 *The National Land Policy, 2009*

The National Land Policy guides the country towards efficient, sustainable and equitable use of land for prosperity and posterity. The Mission of the Policy aims at promoting positive land reforms for the improvement of the livelihoods of Kenyans through the establishment of accountable and transparent laws, institutions and systems dealing with land. The overall objective of the Policy is to secure rights over land and provide for sustainable growth, investment and the reduction of poverty in line with the Government's overall development objectives. Specifically, the policy offers a framework of policies and laws designed to ensure the maintenance of a system of land administration and management that will provide:

- All citizens with the opportunity to access and beneficially occupy and use land
- Economically viable, socially equitable and environmentally sustainable allocation and use of land
- Efficient, effective and economical operation of land markets
- Efficient and effective utilization of land and land-based resources
- Efficient and transparent land dispute resolution mechanisms.

Sustainable land use practices are key to the provision of food security and attainment of food self-sufficiency.

3.2.3 *The National Health Policy, 2014-2030*

- The goal of the Policy is to attain the highest possible standard of health in a responsive manner. The health sector aims to achieve this goal by supporting equitable, affordable, and high-quality health and related services at the highest attainable standards for all Kenyans. This Policy has six objectives which include;
- Eliminating communicable conditions
- To halt and reverse the rising burden of non-communicable conditions and mental disorders
- To reduce the burden of violence and injuries

- To provide essential healthcare
- To minimize exposure to health risk factors
- To strengthen collaboration with private and other sectors that have an impact on health.

This policy takes into account the functional responsibilities between the two levels of government (county and national) with their respective accountability, reporting and management lines. It proposes a comprehensive and innovative approach to harness and synergize health services delivery at all levels.

3.2.4 *The National Energy and Petroleum Policy, 2018*

Energy is a critical component in the economy, standard of living and national security of a country. The level and the intensity of energy use in a country is a key indicator of economic growth and development. The Kenya Vision 2030 identified energy as one of the infrastructure enablers of its socio-economic pillar. Sustainable, competitive, affordable and reliable energy for all citizens is a key factor in realization of the Vision.

This Policy aims to ensure sustainable, adequate, affordable, competitive, secure and reliable supply of energy at the least cost geared to meet national and county needs while protecting and conserving the environment. It has twenty objectives that include but not limited to providing an environment conducive for the development and provision of energy services and ensuring that prudent environmental, social, health and safety considerations, as well as issues of climate change are factored in energy and petroleum sector developments.

3.3 Environmental Management Principles & Guidelines

The project proponent and the contractor/project engineer are expected under law and best practice to consider and exercise all the principles and tenets of environmental management. These principles are as discussed below:

3.3.1 *The Principle of Sustainability*

The principle of sustainability requires that natural resources should be utilized in a way and at a rate that does not lead to the long-term decline of natural resources, thereby maintaining its potential to meet the needs and aspirations of present and future generations. It strives for equity in the allocation of the benefits of development and decries short-term resource exploitation which does not consider the long-term costs of such exploitation. In the course of implementing the proposed project, the project proponent/manager is strongly advised to use resources sustainably and source materials from suppliers that have been identified as employing/ practicing sustainable resources use.

3.3.2 *The Principle of Intergenerational Equity*

The principle of sustainability should be examined together with that of intergenerational equity, which focuses on future generations as a rightful beneficiary of environmental protection. Essentially, the principle of intergenerational equity advocates for fairness, so that present generations do not leave future generations worse off by the choices they make today regarding development. Operations and activities undertaken at all the stages of the proposed project ought to be designed to embrace the rationale of intergeneration equity in resources use both natural and man-made resources. Besides, intra-generation equity should be observed whereby various resources users in the current generation should not have their resources use ability compromised by the proposed project.

3.3.3 *The Principle of Prevention*

The principle of prevention states that protection of the environment is best achieved by preventing environmental harm in the first place rather than relying on remedies or compensation for such harm after it has occurred. The reasoning behind this principle is that prevention is less costly than allowing environmental damage to occur and then taking mitigation measures. The project proponent is duty bound under EMCA Cap 387 to undertake all the preventive and viable measures to protect the environment in the course of implementing the project, upon commissioning the project through to decommissioning of the project.

3.3.4 *The Precautionary Principle*

The precautionary principle recognizes the limitations of science, as it is not always able to accurately predict the likely environmental impacts of resource utilization. It calls for precaution in the making of environmental decisions where there is scientific uncertainty. Accordingly, it is closely related to the principle of prevention and can be viewed as the application of the principle of prevention where the scientific understanding of a specific environmental threat is not complete. The precautionary principle thus requires that all reasonable measures must be taken to prevent the possible deleterious environmental consequences of development activities. Further, it demands that scientific uncertainty should not be used as a reason for not taking cost effective measures to prevent environmental harm. The project proponent should undertake all the necessary precautionary measures in the course of implementing the proposed project.

3.3.5 *The Polluter Pays Principle*

The polluter pays principle requires that polluters of natural resources should bear the full environmental and social costs of their activities. It seeks to internalize environmental externalities by ensuring that the full environmental and social costs of resource utilization are reflected in the ultimate market price for the

products of such utilization. Since environmentally harmful products will tend to cost more, this principle promotes efficient and sustainable resource allocation as consumers are likely to prefer the cheaper fewer polluting substitutes of such products. This principle dictates that when undertaking a project or running institution, if damage is caused to private properties or even public utilities such as roads or public goods such as water bodies, measures to compensate the affected should be instituted immediately.

3.3.6 *The Principle of Public Participation*

The principle of public participation seeks to ensure environmental democracy and requires that the public, especially local communities should participate in the environment and development decisions that affect their lives. It requires that the public should have appropriate access to information concerning the environment that is held by public authorities and should be given an opportunity to participate in decision-making processes. This principle calls for public participation in the development of policies, plans and processes for the management of the environment. Public participation ensures that:

- The process is open and transparent;
- Provides valuable sources of information on key impacts, potential mitigation measures and possible alternatives;
- Ensures that a project meets the community's needs;
- Ensures that a project is legitimate and it is a way of ensuring that conflicts can be addressed before NEMA makes a decision;
- Assists in informed decision making
- Promotes better implementation of projects once NEMA has made a decision;
- Enlightens the community on the opportunities and benefits that could arise from a project;

In compliance to this principle, public meeting was conducted at Mzinzi ECD with the Project Affected Parties (PAPs) to give their views regarding the proposed project.

3.3.7 *The Cultural and Social Principle*

The Cultural and Social Principle is traditionally applied by many communities in Kenya for the management of the environment or natural resources in so far as the same are relevant and are not repugnant to justice and morality or inconsistent with any written law. Since time immemorial many communities have lived sustainably in various ecosystems in Kenya. It against this setup that existed where resources utilization though devoid of sophisticated/ complicated technologies guaranteed health environment that the current development should borrow leave from. It is therefore important for the proponent to factor in local/ traditional environment management systems in the course of implementing the project.

3.3.8 *The Principle of International Co-operation*

The Principle of International Co-operation applies in the management of environmental resources shared by two or more states. Environmental impacts do not respect national or international boundaries and as such are trans-boundary. This principle ensures that international relations and understanding are upheld and therefore management of environmental concerns arising from a project/ action across two jurisdictions can be managed. However, the proposed project does not have far reaching impacts across national boundaries. (trans-boundary impacts)

3.4 Legal Framework

The key national laws that govern the management of environment resources in the country in relation to the proposed project have been discussed in the following paragraphs. The relevant legislation which the proposed project must comply with is intended to ensure project's sensitivity to environmental concerns, public safety, public health and physical planning regulations.

3.4.1 The Constitution of Kenya, 2010

The Constitution of Kenya 2010 is the supreme law of the land. Any other law that is inconsistent with the Constitution is null and void to the extent of its inconsistency. Under Chapter IV, article 42 provides for the right to a clean and healthy environment for all. Further, Chapter V of the Constitution deals with Land and Environment. Specifically, Part 2 elaborates on the following components regarding the protection of the environment.

- Enforcement of environmental rights
- Obligations in respect of the environment
- Agreements relating to natural resources
- Legislation relating to the environment

Relevance to the proposed project

- *Under the Constitution the proponent is entitled to carry out the project within legal limits and a fair administrative decision-making process from NEMA and other State organs. On the other hand, he is required to ensure:*
    - *That the development is carried out in an ecologically, economically and socially sustainable manner;*
    - *That the right to a clean and healthy environment for all is upheld in all phases of the development*

- *That all the applicable provisions of the Constitution are observed at all times.*
- *The proponent should ensure that construction and operations of the facility do not infringe on the right to a clean and healthy environment for all*

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

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

Relevance to the proposed project

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

The relevant Regulations under EMCA that are relevant to the proposed project are discussed below;

a) The Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019

These Environmental (Impact Assessment and Audit) Regulations, 2003 were amended in by deleting regulation 7. The EIA/EA Regulations are meant to ensure the implementation of Sec. 58 of EMCA. It makes it illegal for anyone to undertake developments without an EIA license and stipulates the ways in which environmental experts should conduct the Environment Impact Assessment and Audits reports in conformity to the requirement stated. It is concise in its report content requirements, processes of public participation, licensing procedures, inspections and any possible offences and penalties under the Act.

Relevance to the proposed project

- *The proponent is preparing this ESIA report for submission to the Authority for licensing/approval prior to commencement of the project.*

b) Environmental Management and Coordination (Waste Management) Regulations, 2006

These regulations define the responsibilities of waste generators and define the duties and requirements for transportation and disposal of waste. The regulations provide for mitigation of pollution and handling of

hazardous and toxic wastes. The regulations require a waste generator to dispose waste only to a designated waste receptacle. The proponent shall adhere to the regulations during the project implementation.

Relevance to the proposed project

- *Seek license to operate/own waste disposal site and ensure that vehicles delivering wastes are licensed in compliance with these regulations*
- *Ensure hazardous wastes are disposed off in the manner prescribed*
- *Ensure that tracking documents for the waste are used and kept for future inspection if needed*

c) Environmental Management and Coordination (Air Quality) Regulations, 2014

The objective of these Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The general prohibitions state that no person shall cause the emission of air pollutants listed under First Schedule (Priority air pollutants) to exceed the ambient air quality levels as required/ stipulated under the provisions of the Seventh Schedule (Emission limits for controlled and non-controlled facilities) and Second Schedule (Ambient air quality tolerance limits). The regulations provide for the establishment of emission standards for various sources, including as mobile sources (e.g., motor vehicles) and stationary sources (e.g., industries) as outlined in the Environmental Management and Coordination Act, 1999. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. The Regulations prohibits the Proponent from:

- Acting in a way that directly or indirectly cause or may cause air pollution to exceed levels set out in the second Schedule to the Regulations
- Allowing particulates emissions into the atmosphere from any source not listed in the Six Schedule of the Regulations
- Causing ambient air quality in controlled areas (listed in Schedule Thirteen) to exceed those stipulated under second Schedule.
- Allowing (during construction and demolition) emission of particulate matter above the limits stipulated in Second Schedule
- Causing or allowing stockpiling or storage of material in a manner likely to cause air pollution.
- Causing or allowing emissions of oxides of nitrogen in excess of those stipulated in the eleventh Schedule of the Regulation

d) Environmental Management and Coordination (Water Quality) Regulations, 2006

These Regulations address the challenges of pollution of water resources and conservation. It consists of VI parts and eleven schedules dealing with protection of sources of water for domestic use to miscellaneous provisions.

Relevance to the proposed project

- *The proponent should implement measures to prevent water pollution from construction activities, effluent discharge and oil spills at operational phase.*
- *The proponent should apply for and obtain an Effluent Discharge License from NEMA during the operation phase of the proposed project*

e) ***Environmental Management and Coordination (Noise and Excessive Vibrations Pollution) (Control) Regulations, 2009***

These regulations prohibit any person to cause unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Part 11 section 6 (1) provides that no person shall cause noise from any source which exceeds any sound level as set out in the First Schedule of the regulations. The proposed project will comply with this regulation to reduce the possibility of adverse noise impacts to human health in the project area.

Relevance to the proposed project

- *Ensure compliance with the set noise level limits for the site especially during construction and occupational phases. The proponent should ensure that employees are not exposed to noise levels above 85 dB (A) and in such cases provide suitable personnel protection equipment (ear protective devices).*

3.4.3 The Climate Change Act, 2016

This is an Act of Parliament to provide for a regulatory framework for enhanced response to climate change; to provide for mechanism and measures to achieve low carbon climate development, and for connected purposes. The Act provides a regulatory framework for the development, management, implementation and regulation of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya. It provides for mainstreaming of climate change responses into development planning, decision making and implementation as well as resilience and adaptation in all governance sectors.

The Act also stipulates the climate change response measures and actions; this includes the formation of National Climate Change Action Plan. The National Climate Change Action Plan shall be presented for approval by the Council.

The National Climate Change Action Plan shall prescribe measures and mechanisms that will include guiding the county toward the achievement of low carbon climate resilient sustainable development among other measures and mechanisms aimed at reducing carbon levels in the country.

Relevance to the proposed project

- *The proponent should develop a Climate Change Action Plan and implement measures to ensure low carbon footprint at the facility through incorporating low carbon technologies in order to reduce emission intensity*
- *The proponent should install renewable energy sources such as lighting, energy efficient machines and ensure low carbon emissions to the environment*

3.4.4 The Occupational Safety and Health Act, 2007

The purpose of the Occupational Safety and Health Act (OSHA) is to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces and to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes.

Of particular importance to the proposed project is the requirement that all work places must be registered with the Department of Occupational Safety and Health Services. Further, there is a requirement that a Safety and Health Committee must be put in place and those employees and members of this committee must be inducted and trained on the provisions of the Act accordingly.

The OSHA, 2007 stipulates that an employer shall not require or permit his employee to engage in the manual handling or transportation of a load which by reason of its nature is likely to cause the employee to suffer bodily injury.

Relevance to the proposed project

- *Under OSHA, the proponent should register the site as a workplace with the DOSHS and ensure timely renewal of the same*
- *It also involves the prevention of accidents at the workplace and provision of personal protective equipment (PPE) to all workers and enforces their use.*
- *Strict provisions will be made for the requirement of supervision and training of inexperienced workers during commissioning period and carry out occupational safety and health audit annually*

3.4.5 Public Health Act, 2012

This is an act of parliament to make provision for securing and maintaining health. Section 13 states that it shall be the duty of every health authority to take all lawful, necessary and under its circumstances reasonably practicable measures for preventing the occurrence or dealing with any outbreak, or prevalence of any infections, communicable or preventable diseases or conditions to safeguard and promote the public health and to exercise the powers and perform the duties in respect of the public health conferred or imposed on it by this act or by any other law. The Public Health Act Cap 247, Section 3 gives provisions for use of poisonous substances. It refers to regulations for protection of persons against risk of poisoning, imposing restrictions or conditions on the importation, sale, disposal, storage, transportation or use of poisonous substances. This Act also requires persons concerned with importation, sale, disposal storage, transportation or use of poisonous substances to be registered and licensed and provides measures for detecting and investigating cases in which poisoning has occurred.

Relevance to the proposed project

- *The proponent should ensure compliance with the Act by providing clean, healthy and safe environment during construction and subsequent operation of the proposed waste management site*

3.4.6 The Water Act, 2016

The purpose of the Water Act 2016 is to align the water sector with the Constitution's primary objective of devolution. The act recognizes that water related functions are a shared responsibility between the national government and the county government. The Constitution acknowledges access to clean and safe water as a basic human right and assigns the responsibility for water supply and sanitation service provision to the 47 established counties.

This is also an act of Parliament to provide for the regulation, management and development of water resources, water and sewerage services; and for other connected purposes. This Act may be cited as the Water Act, 2016 and shall come into operation on such a date as the Cabinet Secretary responsible for matters relating to water may by notice in the Gazette, appoint, and different dates may be appointed for the coming into operation of different provisions. Water in Kenya is owned by the Government, subject to any right of the user, legally acquired. However; this Act regulates conservation and management of all water resources within the republic, and related purposes. In section 3 of part II, it states that every water resource is vested in the State, subject to any rights of user granted by or under this Act or any other written law. The Act also provides for establishment of a Water Resource Authority, whose aim is to manage and coordinate conservation and utilization of water resources at national scale and other several organs to ensure

development and sustainable use of water resources. These include Water Sector Trust Fund (WSTF), Water Resources Users Associations (WRUAs), Water Services Providers (WSPs) and Water Works Development Agencies among others.

Relevance to the proposed project

- *The proponent should ensure that water usage in all phases of the project cycle is in line with the provisions of this Act*
- *Obtain a permit from WRMA if a borehole will be considered as a source of water to supply the facility.*
- *The proponent should also ensure that the activities of the site does not cause any leachate that may cause ground water pollution.*

3.4.7 The Energy Act, 2019

An Act of Parliament to consolidate the laws relating to energy, to provide for National and County Government functions in relation to energy, to provide for the establishment, powers and functions of the energy sector entities; promotion of renewable energy; exploration, recovery and commercial utilization of geothermal energy; regulation of midstream and downstream petroleum and coal activities; regulation, production, supply and use of electricity and other energy forms; and for connected purposes. The Act sets up the establishment of Energy and Petroleum Regulatory Authority (EPRA) hereinafter referred to as the Authority. The Energy and Petroleum Regulatory Authority (EPRA) is established as the successor to the Energy Regulatory Commission (ERC) under the Energy Act, 2019 with an expanded mandate of inter alia regulation of upstream petroleum and coal.

Relevance to the proposed project

- *The proponent is required to ensure that the energy supplied is consumed in accordance to the provisions of the Act and energy audits carried out on the facility*

3.4.8 The Petroleum Act, 2019

An Act of Parliament enacted by the Parliament of Kenya to provide a framework for the contracting, exploration, development and production of petroleum; cessation of upstream petroleum operations; to give effect to relevant articles of the Constitution in so far as they apply to upstream petroleum operations,

regulation of midstream and downstream petroleum operations; and for connected purposes. The facility should strive to be compliant to provisions of this Act.

Relevance to the proposed project

- *The proposed project should strive to be compliant to provisions of this Act.*

3.4.9 Physical and Land Use Planning Act, 2019

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

3.4.10 County Government Act, 2012

An Act of Parliament to give effect to Chapter Eleven of the Constitution; to provide for county governments' powers, functions and responsibilities to deliver services and for connected purposes. Section 109 of the County Government Act, 2012 helps counties to ensure effective coordination of spatial developments. Sub - section (2) part C states in part; a spatial county plan shall;

- Indicate desired patterns of land use within the county
- Address the spatial construction or re-construction of the county
- Provide strategic guidance in respect of the location and nature of development within the county
- Set out basic guidelines for a land use management system in the county taking into account any guidelines, regulations or laws as provided for under Article 67(2) (h) of the Constitution
- Set out a capital investment framework for the county 's development programs and;
- Contain a strategic assessment of the environmental impact of the spatial development framework

Relevance to the proposed project

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

3.4.11 Occupiers Liability Act Cap 34

This is an Act of parliament to amend the law as to liability of occupiers and others for injury or damage resulting to persons or goods lawfully on land or property from dangers due to the state of the property or to things done or omitted to be done there.

Relevance to the proposed project

- *Ensure safety of workers during construction, implementation and possible decommissioning phases of the proposed project*
- *The act requires that the occupier warn the visitors of the likelihood of dangers within his premises to enable the visitor to be reasonably safe*

3.4.12 National Construction Authority Act, 2011

This is an Act of Parliament to provide for the establishment, powers and functions of the National Construction Authority and for connected purposes. The National Construction Authority Act seeks to regulate the construction industry and coordinate its development.

Relevance to the proposed project

- *The project proponent, shall liaise with NCA to ensure licensed contractors are the ones to be awarded contract to construct the proposed project at times whenever needed*

3.5 Institutional Framework

At present there are many institutions and departments which deal with environmental issues in Kenya. To implement the above legal framework, these government institutions have varying mandates of implementation. These include;

a) The National Environment Management Authority (NEMA)

The object and purpose for which NEMA is established is to exercise general supervision and coordinate over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment.

b) The Directorate of Occupational Safety and Health Services

The mandate of the Directorate is to ensure compliance with the provisions of the Occupational safety and health Act 2007 and promote safety and health of workers. The directorate is aimed to promote a safe and health workplace by implementing effective systems for the prevention of Occupational diseases, ill health accidents and damage to property in order to reduce the cost of production and improve productivity in all sectors of our economic activities. The core function of the directorate is among other functions Inspecting workplaces to ensure compliance with safety and health law.

c) The County Government of Kilifi

The County Government of Kilifi has powers to control or prohibit all businesses, factories and other activities including the proposed project which by reason of smoke, fumes, gases, dust, noise, wastes or other cause, maybe or become a source of danger, discomfort or annoyance to the neighborhood and to prescribe conditions subject to which such activities shall be carried.

The County Government of Kilifi shall supervise project roll out by use of the technical team to ensure no activity being implemented may become a source of danger, discomfort or annoyance to the neighborhood. The relevant county departments will be responsible in the issuance of the approvals and necessary permits for the proposed project activities.

d) The National Construction Authority (NCA)

The NCA is responsible for issuing permits to construction sites and advising the government of Kenya on construction. The proponent shall liaise with NCA to ensure licensed contractors are the ones to be awarded contract to carry out the project activities.

CHAPTER 4: PROJECT DESIGN & DESCRIPTION

4.1 Project description

The Proposed Integrated Waste Management Site (IWMS) will include asbestos disposal site (landfill), incineration facility and handling of non-hazardous wastes in sanitary landfills through deep burying/ composting. The proposed project will also feature other associated amenities and facilities. The intended wastes will be transported using trucks licensed by the Authority in compliance with Waste Management Regulations 2006, both owned by the proponent or the other parties and deposited for sorting at the site before final disposal as appropriate depending on the nature of waste being handled.

4.2 Project Design

The proposed project will be implemented on a piece of land covering approximately nine acres being the total size of the land owned by the proponent. These proposed project components are explained below;

4.2.1 Asbestos disposal site (Landfill)

The proposed development will comprise of asbestos disposal site (land fill) covering approximately one acre of the whole plot. The asbestos landfill will be dug in consideration of the relevant baseline studies such as hydrological survey comments regarding the water table of the area so as to avoid ground water contamination. This proposed project site will have a capacity of approximately 2500 tons of the asbestos material/asbestos containing materials (ACM). The proposed pit will be excavated up to 10M below the ground. After excavation, concrete foundation slab will be constructed on the excavated pit to ensure that the asbestos containing material does not penetrate into the underground water. After lining the pit with concreate, the asbestos material shall be placed on the constructed pit progressively up to one metre below ground level, then covered. The pit shall be marked with visible marks indicating what has been disposed, the source and the words 'danger" on it. The proponent proposes to set up asbestos landfill in line with the National Guidelines on Safe Management and Disposal of Asbestos

4.2.2 Incineration plant

Waste incineration is a method of waste disposal whereby high temperatures are used to sufficiently oxidize the combustible components in waste. The project proponent intends to install an incinerator plant to be used in disposal of both hazardous and non-hazardous materials/wastes streams through combustion. The proposed incinerator plant will entail electric operated and manual operated, a box type furnace with two chambers (primary & secondary).

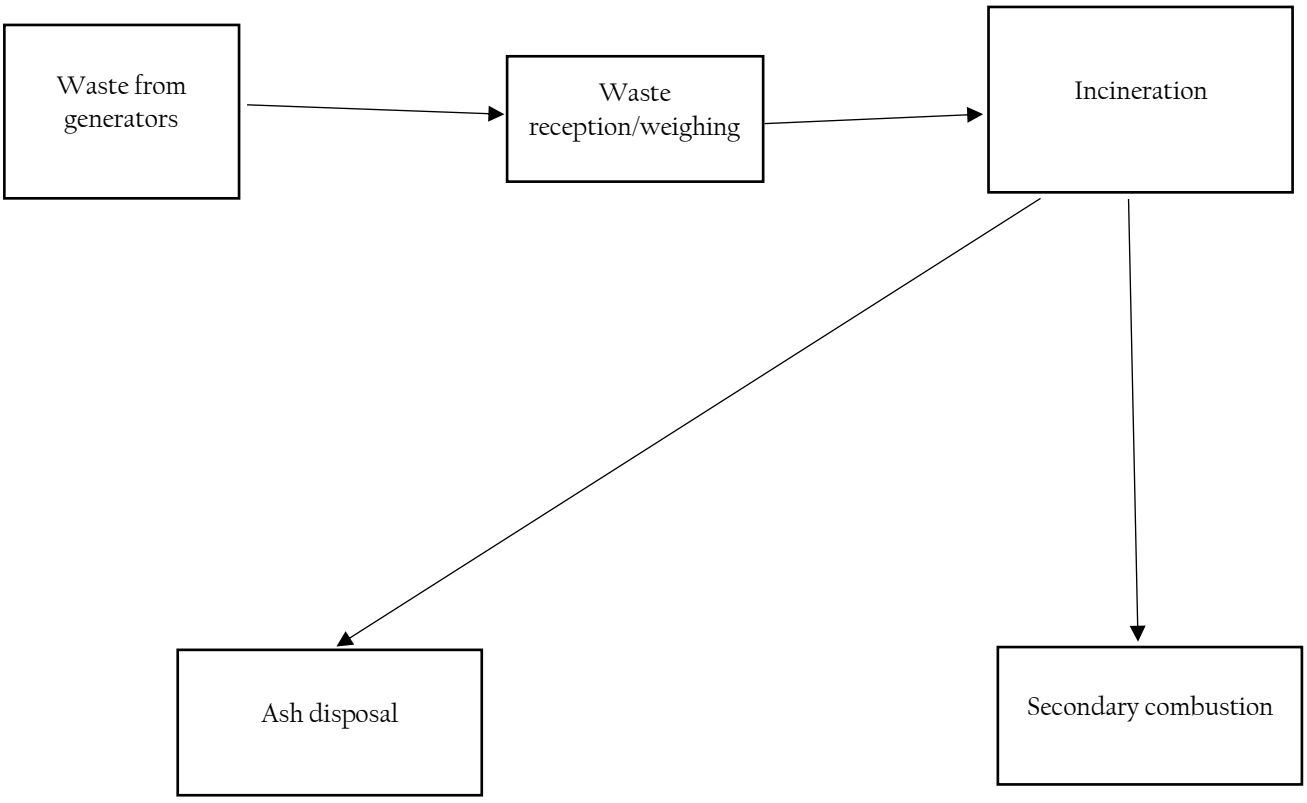
The incinerator will have the following components/specifications;

- Manual door for feeding the wastes for combustion

- 2 main burners (chambers, primary & secondary) each with electronic temperature control from 0 to 1,200ºC
- The control panel for adjusting of the plant operation, with: The main switch, On /Off buttons for the burners and the ventilator
- The ventilator (air pump) with connections to the furnace and the reaction chamber
- Hand adjustable time-clocks for the burners and the ventilator
- Digital displays of the electronic burner temperature controls

The process will entail complete combustion through injection of air (oxygen) from the installed air fan to aid in secondary combustion of other gases within the furnace before emitting the smoke into the atmosphere. The incinerator will have the capacity of handling approximately 20,000kgs/hr.

Figure 4.1: Incineration process



4.2.3.1 Air Pollution Control Measures at the Incinerator

The proposed incinerator will comprise a primary with temperature controls of 700-900 ºC and a secondary chamber with temperatures of 800-1200 ºC with a batch waste feeding process. In addition, the facility will install cyclones as air control technology.

4.2.4 Sanitary landfill

The integrated waste management site will also entail disposal of non-hazardous and biodegradable wastes in sanitary landfill through deep burying and composting. The proposed sanitary landfill will be operated as one-off since the landfill will be dug depending on the capacity of wastes to be disposed at any given time.

4.2.4.1 Waste Management Plan for Sanitary Landfill

The factors that may lead to environmental degradation from the operations of the sanitary landfill include the following;

- Improper and incomplete waste separation
- Uncovered improvised trucks for waste collection and transportation
- Improper storage of received and separated waste
- Uncontrolled dumping of composting rejects
- Improper fencing and waste handling leading to litter in the surrounding area of the facility
- Manual handling of waste without appropriate safety precautions leading to occupational hazards

a) Contamination of ground/surface water from Leachate

Sanitary landfills operations can result in contamination of both ground and surface water through the production of leachate. Leachate can result from the waste received prior to its processing, waste stored for temporal holding and maturating compost piles. Leachate production and subsequently water contamination is aggravated with the occurrence of rainstorm, in case the facility is not fully covered and does not possess adequate drainage control structures to divert rain water from the plant.

Other baseline studies such as hydrogeological survey of the site will be carried out to locate the landfill in a hydrologic setting that will prevent hazardous constituents from migrating into ground water. Through this the consultants will aim at minimizes negative impacts of landfill on the groundwater, particularly water abstraction sources and well field.

The problems associated with leachate may be minimized by limiting the amount of water getting in to the solid waste matrix. This can be achieved into a number of simple design and operational measures;

Mitigation Measures

- An effective drainage must be established for leachate and storm water collection and management
- Storm water and runoff should be diverted to avoid any contact with the waste (surface water diversion)
- Ensuring surface water does not enter the landfilled areas, or areas prepared for future landfilling by construction intercepting ditches between the working areas and surrounding unused parts of the site.
- Ensuring water does not accumulate in the working area where waste is being landfilled
- Applying soil cover to the wastes at the end of each working day
- No burying of waste next to drainage line
- Flows which contain leachate should be contained and disposed of as hazardous waste

b) Air quality impacts

Once solid waste dumped into the landfill it will be subjected to series of reactions. Initially the waste is aerobically and the main reaction products are carbon dioxide gas and water. This stage takes several days to a week. With the progress of degradation, the oxygen is depleted and the degradation converted into anaerobic. As waste decompose in the landfill, landfill gases will be generated due to the anaerobic degradation of the organic fraction of the waste. Gas will start to be given off within few weeks of the waste deposition and will continue to be emitted even after the site closure. The main components of the landfill gas are methane and carbon dioxide. Both of methane and carbon dioxide are greenhouse gases (GHG's), which contribute to global warming phenomena. In addition, the methane gas is a potentially flammable and explosive gas for a concentration of 15% of the air volume. Furthermore, some of the gases that can be produced as a result of anaerobic degradation are hydrogen sulfide and ammonia. These gases are mainly causing a bad odor in the vicinity of the landfills/sanitary landfill.

Mitigation measures

- The sanitary design should include gas collection and recovery system, which will prevent the odor and release of GHG's to the atmosphere.
- Proper ventilation of the sanitary landfill
- Creation of carbon sinks within the site. A carbon sink is anything that absorbs more carbon from the atmosphere than it releases. For instance, the proponent has initiated tree planting program especially indigenous species within the site to increase the level of carbon sinks in the area.

c) Impacts on Solid Waste Generation

Mitigation measures

- Waste minimization policy should be formulated by Sergent Logistics Limited

- Regular maintenance and housekeeping of the access roads and waste disposal
- The waste must be immediately sorted, segregated and disposed as soon as possible to reduce waste accumulation on site
- Sensitize workers on the process of solid waste collection, segregation and proper disposal
- No hazardous waste allowed to be disposed on sanitary landfill

The proponent intends to set up environmentally friendly waste management site with enhanced health and safety standards without compromising environment and public health. The proposed integrated waste management site will be designed to facilitate proper handling and management of wastes and will accommodate the following basic components;

a) Waste reception

It is expected that waste will be delivered to the site by trucks from all parts of the country as desired. Delivery will also be mainly by road but in compliance with waste transport regulations. The waste reception will comprise of;

- Security check of the wastes at the site entrance with issued gate pass
- Offloading area for the containerized waste since the wastes will be delivered using trucks
- The proponent has an existing waste transport license from the Authority

b) Waste sorting

The wastes that will be received at the proposed site may be mixed depending on sources and the transportation means. Sorting of the wastes before final disposal will be important since some wastes may require varying handling options/method depending on the nature of the waste. Sorting will be a manual process by the human labour at the site during operations, sorting bay will therefore, be provided with/fitted with appropriate quantification/weighing facilities, documentation and temporal holding zones. Necessary safety and environmental protection provisions will be provided.

c) Waste disposal/handling operations

The proposed project will entail management and disposal of wastes in compliance with waste management regulations depending on the nature of the wastes being handled. The proposed project will handle wastes through incineration, deep burying in sanitary landfills and disposal of asbestos wastes. The wastes which will not be final disposed at the site will be transferred to the other sites such as licensed recycling sites for final disposal.

d) Waste transport

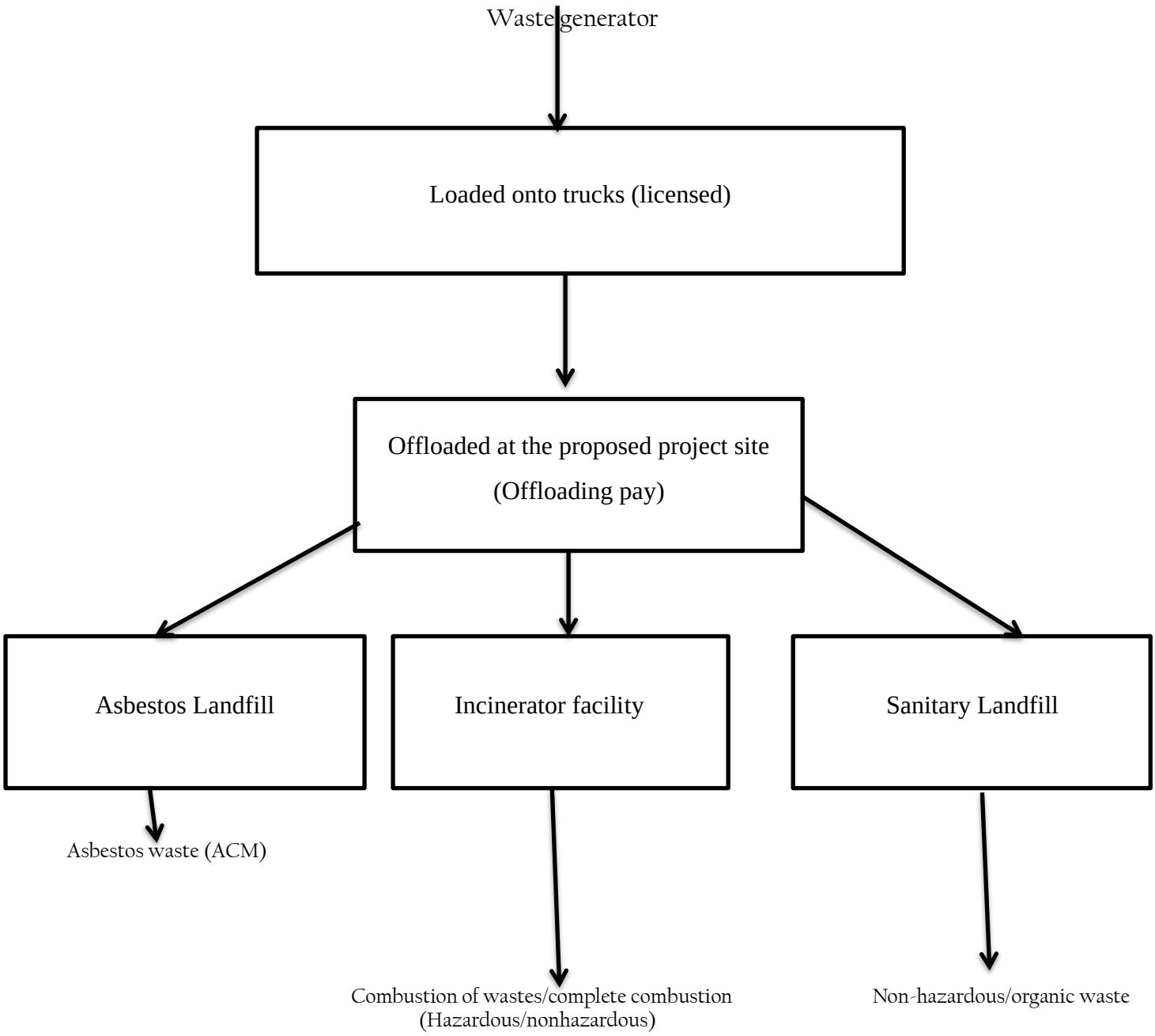
The waste transportation from the source to the project site for disposal will be in compliance to Waste Management Regulations, 2006. The transport trucks will be required to have waste transport licenses from the Authority accompanied with tracking documents for easy waste tracking.

e) Support amenities/services

The proposed project site will incorporate other support amenities/services. The site for the proposed project will comprise of the following support amenities;

- Site offices
- Sanitation facilities (toilets, bathrooms)
- Water supply (supplied on need basis)
- Trucks parking area
- Access weather road
- Health and safety provisions (fire extinguishers, proper signage, first Aid points etc)
- Security arrangements (all round chain-link boundary with one entrance gate

Figure 4.2: Schematic waste management flow at the proposed project site



4.3 Project Activities

a) Construction activities

The construction activities shall involve civil and engineering works as here on:

- Site preparation/clearing the site
- Laying of concrete foundations slab and bud walls for the facility
- Landscaping
- Installation of electrical works and other support services
- Government inspection/occupation certificate and completion of works issued
- Commissioning the project

b) Operational activities

The proponent intends to set up an integrated waste management site. The site shall be used as a disposal facility and management site for various streams of wastes within Kilifi County and its environs from potential clients. The proponent intends to operate waste management site with enhanced health and safety mechanisms and without compromising environment and public health with prospects of future expansion. The site shall only be commissioned once operational license has been granted by the Authority.

c) Project's Decommissioning Activities

Decommissioning is an important phase in the project cycle and comes last to wind up the operational activities of a particular project. It refers to the final disposal of the project and associated materials at the expiry of the project lifespan. If such a stage is reached, the proponent needs to remove all materials resulting from the demolition/ decommissioning from the site. The following should be undertaken to restore the environment;

- The general public to be informed of demolition exercise well in advance by placing notices in public places concerning the intended demolition at least two weeks in advance;
- The site must be sealed off from public access;
- The firm commissioned to demolish must have enough relevant machines and equipment such as fleet of dumpers that will enable the work be undertaken smoothly and be completed within stipulated time;
- The firm must have experienced labor force to undertake the exercise;
- Adequate measures to be put in place to minimize environmental degradation;
- Site supervision from relevant County Government Departments throughout the exercise;

- Waste materials resulting from demolished development must be handled and disposed according to environmental requirements and procedures;
- Care must be taken to avoid destruction of trees and other vegetation on site during the exercise.

d) Site rehabilitation

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

- Test and analysis of soil from site should be undertaken before rehabilitation begins;
- Planting of appropriate species of trees (indigenous), shrubs and grasses;
- Ensuring they are regularly watered, weeded in their early stages to ensure survival;
- The area should be fenced off while rehabilitation is in progress.

4.4 The Project Concept

Environmental Hygiene is the science of anticipation, recognition, evaluation and control of health hazards in the work environment with the objective of protecting the health of workers and citizens of the community. Its role is first, to ensure a healthy work environment through continuous surveillance; second, to protect workers from diseases that can be caused by unhealthy environments; third, to break the vicious cycle of 'unhealthy environment' thus occupational diseases. It is for this reason, that proponent sought the assistance of environmental consultants to carry out an environmental impact assessment of the proposed integrated waste management site.

4.5 Project Cost

The project implementation cost is estimated at Kshs. Ten Million (10,000,000). See the attached project Bill of Quantities.

CHAPTER 5: PUBLIC & STAKEHOLDER CONSULTATION

5.1 Introduction

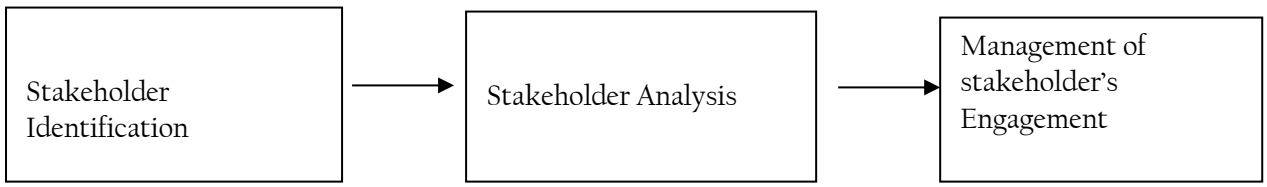
A public consultation process was engaged in gauging the sentiments of a variety of stakeholders. Besides the fact that this is a regulatory requirement under the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019, it was an excellent opportunity to offer the public (PAPs) an opportunity to ventilate their concerns and probably give recommendations concerning the proposed project in the specific area.

Stakeholders represent individuals or groups that hold a stake in the project, either because they will be impacted by the project or because they have a vested interest in it. A public consultation/engagement process is very important in gauging the sentiments of a variety of stakeholders. The stakeholders' categories identified in this proposed project included the following Project Affected Parties;

- Local communities/immediate neighbors
- Local Administration (Area Chief, Tsangatsini Location)
- Government agencies
- Political representatives (MCA's office- Kayafungo Ward)
- Community Based Organizations (CBO's)

Each of the stakeholders above had different requirements, different interests, different levels of influence, and different expectations towards the project.

Stakeholder Management Plan



5.2 Stakeholder Analysis

After the identification of the stakeholders, it is time to analyse who they really are, their level of interest, what power they have, what their expectations are, and if they seem favourable or against the proposed project. This will be done through a power-interest matrix, where each stakeholder is plotted in the matrix

based on their level of power to impact the project and their level of interest. All stakeholders are equal, but some are more equal than others.

Depending on power and interest of the stakeholder, different strategies apply to manage their engagement:

- **Keep them satisfied**

Stakeholders in this group have little interest in the project but high power to continue or stop. Examples of such stakeholders include the local communities which forms the larger group. The best engagement strategy is to meet their needs and keep them satisfied, which can mean invite them for project updates meetings occasionally or ensure that their communication requirements are being met.

- **Minimal effort**

Stakeholders who have little power and little interest in the project are the least important and require minimal effort from the project manager. However, they should not be totally overlooked.

- **Engage closely**

Stakeholders with a high level of power and a high level of interest are the most important stakeholders. This will include the lead and government agencies interested in the proposed project.

- **Keep them informed**

These are the stakeholders with low power but highly interested in the project. These are stakeholders to whom you need to show consideration, such as the project end-users and whom you should keep informed regularly on the project status.

5.3 Stakeholder engagement table

Stakeholder identification	Method of engagement	Presentation of the comments/concerns
Local Communities/immediate neighbours - Local residents	Public gathering/open public meeting was conducted at Mzinzi ECD on 6th Sept 2023	Minutes of the meeting
Local Administration Mzee wa Mtaa/Village elders (Mzinzi I & Mzinzi II) Area Chief, Tsangatsini Location	Public gathering/open public meeting was conducted at Mzinzi ECD on 6th Sept 2023	Minutes of the meeting

Government agencies - County government of Kilifi, Department of Water, Environment & Natural Resources - County government of Kilifi, Department of Lands, Energy, Housing, Physical Planning & Urban Development - National Environment Management Authority (NEMA), County Director of Environment, Kilifi	Questionnaire/public meeting Questionnaire/public meeting Public meeting	Minutes of the meeting
Political representatives - Area member of county assembly's office- Kayafungo Ward	Public gathering/open public meeting was conducted at Mzinzi ECD on 6th Sept 2023	Minutes of the meeting
Community Based Organizations (CBO's) - Community development organizations within the area	Focus group discussions (FGDs) Public meeting	Minutes of the meeting

Figure 5.1: Public Consultation site, Mzinzi ECD (3º47'25.95"S &39º 22'15.00"E) (Source: Site survey/photography)

Figure 5.2: Stakeholder consultative meeting at Mzinzi ECD (Source: Site survey/photography)

5.4 Public consultation methodology

Public consultative meeting was conducted at Mzinzi ECD on 6th September 2023 which is within the vicinity of the project area with the project affected parties; the local community and local leadership regarding the proposed project. Meeting minutes have been appended to this report.

5.5 Stakeholder comments/concerns

All the Project Affected Parties (PAPs) and the local community had a chance to understand and present their views and opinions about the proposed project. They were all in support of the proposed project as the benefits of the project seemed to supersede the threats to the environment and human health. However, community pointed out the following;

- The proponent should strive to create good and sustainable working relationships to foster good neighborhood. This will in turn promote project acceptance among the locals hence sustainability of the project in the area.
- The proponent should engage in Cooperate Social Responsibility (CSR) initiates such as drilling water for the community when needed
- They pointed out that the whole construction process should be conducted in accordance with environmental regulations and all applicable laws of the land and all relevant government agencies so as to reduce impacts to human health.
- The local community also cited that in the event that the proposed project is seen to negatively impact on the health and environment due to failure of the proponent to abide by the set regulations, they will not hesitate to stop the project operations through their local leadership by launching official complain to NEMA and other state organs.

5.6 Conclusion on findings

Members of the public and key stakeholders could see enormous benefits accruing to them by the coming into being of the proposed project. The local community and local leadership endorsed and supported the proposed project on condition that the relevant regulations and guidelines will be followed during operations and the local community will stand a chance to benefit from the project.

CHAPTER 6: ANALYSIS OF PROJECT ALTERNATIVES

6.1 Introduction

Investigating the available alternatives to the development proposal is an important aspect of the assessment process that could invariably help in mitigating the impacts of the proposed project. In this analysis, the consultants' team considered alternatives on the following basis.

- The project site
- Design and technology alternatives
- Scale and extent
- Waste management alternatives

In most cases, the ESIA process often occurs too late in decision-making to consider a full range of alternatives. This can undermine ESIA goals to encourage more environmentally sound and publicly acceptable solutions. Allowing new alternatives and objectives to evolve in relation to environmental conditions, public preferences and project sustainability may be a solution to most of the environmental and socio-economic problems associated with the implementation of new projects

6.2 Proposed Project Alternatives

6.2.1 The "No Project" Alternative

The No Project option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures noninterference with the existing environmental conditions. This alternative is however not viable owing to the fact that the status quo denies the proponent a viable investment opportunity and thereby income generation translating into profits, denies the local community employment opportunities and also denies both the County and National Government revenue. The 'No project' alternative is therefore not considered viable in the light of the benefits and deprivations of the project. From the analysis above, it becomes apparent that the No Project alternative is no alternative to the proponent.

6.2.2 The "Yes Project" alternative

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

- There will be employment creation
- Commitment to environmental performance through effective management procedures
- Source of income to the proponent through investment

- County and National Government revenue generation

6.2.3 Alternative project site

Relocating the proposed project to an alternative site is not a viable option. An alternative site could be considered for the proposed project if the proposed project would present serious environmental challenges that cannot be effectively managed. However, the proposed mitigation measures are considered adequate to minimize the impacts to levels that do not warrant significant environmental damage. In addition, the proponent intends to expand the capacity of commercial waste management site within Kilifi County and its environs, there is also availability of adequate piece of land for the development, the site is also accessible and away from the densely populated areas thus making it suitable for waste disposal activities, this piece of land is also dully owned by the project proponent. This alternative is therefore not viable.

6.2.4 Project Design Alternatives

a) Technological Alternatives and Input Materials

The proposed project will be constructed using environmentally accepted technological innovations and materials compliant to engineering standards but locally available to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors, the project will entail use of locally available materials like sand, cement and ballast or similar approved materials that would not have adverse impacts on the environment. The technology to be used is environmentally friendly. Proposed project design will employ simple technology that lowers the cost of setting up the project based on the prevailing geographical formation.

b) Sustainability and Affordability

Sustainability of the proposed integrated waste management site would have a bearing on the environment in the area. This is because the operations of the project might affect the local environment positively or negatively; the proponent is expected to operate waste management site in line with the set guidelines by NEMA and internationally acceptable standards. This will be assured by developing standard operating procedures (SOPs) that will ensure that the project is sustainable. Sustainability would mean the ability of the project to continuously serve the proponent without adverse impacts within the project area. This would call for designs that would ensure that the cost of operating the waste management facility is cost effective and does not impact negatively on the environment. Subsequently, this translates to affordability of the

proposed project. Sustainability would also translate to the longevity of the project versus intended use. Affordability is greatly determined at the design stage.

c) Potential environmental impacts

The project might not generate a lot of wastes other than excess industrial wastes from the waste generator and the excavated top soil that the proponent would use for landscaping purposes. An integrated solid waste management system is recommendable. First, the proponent will give priority to reduction at source of the materials. This option will demand a solid waste management awareness programme in the management and the staff involved in implementing the project. Recycling and reuse options of the waste will be the second alternative in priority. This will call for a source separation programme to be put in place.

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CHAPTER 7: POTENTIAL ENVIRONMENTAL IMPACTS IDENTIFICATION & MITIGATION MEASURES

This Chapter identifies both positive and negative environmental and social impacts likely to be occasioned by the activities of the proposed integrated waste management site. These impacts are hereby identified in three distinct phases of the project i.e., planning and designing phase, implementation/construction phase and operation phase. It discusses the nature of impacts, their magnitude, spatial and time extent and significance. The table below shows how these impacts are assessed.

Table 7.1: Scale for evaluation of project impacts

SCORE	(-1) +1	(-2) +2	(-3) +3	(-4) +4	(-5) +5
PARAMETER					
Magnitude	Impacts occur or are felt on site		Impacts affect more than 3 kilometers radius		Impacts affect the region
Significance	**Low** Small changes which are hardly detectable	**Moderate** Impact measurable but does not alter processes	**High** Many people, animals, plants affected. Disruption to ecosystems and social systems.	**Very high** Loss of biodiversity, property, livelihood systems	**Unknown effects** Insufficient information available. Apply precautionary principle
Probability of occurrence	**Possible** Impacts can occur but are controllable		**Probable** The impact is likely to occur but can be controlled by effective measures.		Definitely will occur
Duration of occurrence	**Short term** During pre-disposal phase only	**Medium term** Impacts will be during operational phase only		**Long term** Impacts will be there for entire operation phase	**Very Long term** For the entire operational phase and afterwards

7.1 Planning and Design Phase

7.1.1 Positive Impacts

- *Creation of Employment opportunities*

During the planning and design phase of the proposed project, there will be employment opportunities especially for professionals. Those involved in planning and design include engineers, surveyors, environmentalists and sociologists among others. Those employed will improve their living standards from the fees they will be paid for their services.

- *Awareness creation among the local community*

During the planning and design phase of the proposed project, a lot of awareness shall be done through consultations on different aspects of the project. Awareness improves civility in project planning, implementation and operations. This is a sure formula for ensuring there is sustainability of the project and acceptability among the local community. Impacts during this phase of the project are not significant. However, the professional consultants shall take necessary measures to document any concerns and address them on as they occur.

7.1.2 Negative Impacts

- *Heightened Expectations and Speculations*

The planning and design phase is bound to create heightened expectations and unwarranted speculations. It is expected that before all persons living within the project area are well informed on the objectives of the proposed project, a lot of speculation, lies and half-truths are peddled. This in return creates a lot of heightened expectations.

Proposed Mitigation Measures

- There has been adequate awareness through a public meeting held at Mzinzi ECD by the ESIA experts
- Other professionals (engineers, architects, and surveyors) should be keen to listen and document any issue that requires to be addressed all through the project implementation cycle.

7.2 Implementation/Construction Phase

7.2.1 *Positive Impacts*

- ***Employment opportunities***

The construction works will require several human resources from machine operators to other skilled and unskilled labourers. Machine operators will be engaged for excavation works, site clearance and compaction work. Several workers including casual labourers, plumbers and engineers are expected to work on the site for a period of time. Semi-skilled, unskilled and formal employees are expected to obtain gainful employment during the period of construction. With labour intensive construction technologies, the project will provide employment for the locals.

- ***Market for construction inputs***

The project will require construction materials, most of which will be sourced locally. These include sand, cement, ballast and steel bars/ rods among others. This will provide a ready market for suppliers in and outside the project area.

7.2.2 Negative Impacts

- ***Loss of Flora and Fuana***

The proposed site lies on a relatively flat land covered with thorny bushes. The project site is a virgin land hence there will be clearing of the bushes to set up the site in preparation of the project implementation. The significance of the vegetation loss and other living organism during the site clearance will be high.

Proposed Mitigation Measures

- The contractor will ensure proper demarcation of the project area to be affected by the construction works; Strict control of construction vehicles to ensure that they operate only within the area to be disturbed by access routes and other works;
- The proponent has started planting and maintanting some of the already depleted indigenous plant species with the project site

- ***Excavation and loss of top soil***

Project construction will involve earthworks and excavation that will comprise of pits and other landscaping activities. These activities will generate a lot of top soil that will need to be disposed from the project site.

This top soil will also be used during backfilling and landscaping activities. The excavated soil may affect the surrounding environment if not adequately disposed.

Proposed Mitigation Measures

- Maximizing the re-use of excavated materials to ensure that no permanent spoil dumps are created
- Extra loads of excavated soil should be used to make good the access road to the project site
- Properly disposing off the spoil in an area identified by the experts and approved by NEMA

- ***Physical disturbance of the project setting***

The proponent is expected to undertake physical works on the project site especially during the clearing of the project area and making of the access roads within. These activities will have minimal negative impacts and could result in; changes in the local topography during excavation and blockage of natural drainage for rain water.

The negative impacts will be temporal because the proponent is expected to mitigate all the negative impacts prior to commissioning of the project. The potential negative impacts on the physical environment will be addressed through the environmental management plan.

Proposed Mitigation Measures

- The proponent should ensure that there is minimal disturbance to the topography of the area
- The excavation and lanscaping design shall not interfere with local drainage or change the topography or introduce physical changes that are not in harmony with the physical setting of the project area
- The project components and associated structures should be aesthetically acceptable to blend in with the surroundings
- The proponent shall as much as possible complete the works in such a way that natural aesthetics shall be retained at the locations
- Restoration shall be undertaken to ensure that the original setting is as much as possible retained
- The proponent should observe measures stipulated in the ESMP

- ***Noise and Excess Vibrations***

Constructions of the proposed project will most likely result in noise disturbance as a result of the machines that will be used e.g., excavation equipment and construction vehicles delivering materials to site. Noise will also be generated by construction workers. Significance of noise impacts depends on whether the project

would increase noise levels above the existing ambient levels by introducing new sources of noise. Noise impacts would be considered significant if the project would result in the following:

- Exposure of persons to noise levels in excess of acceptable and permitted levels
- Exposure of persons to excessive ground-borne vibration or ground-borne noise levels
- A substantial permanent increase in ambient noise levels (more than 3dBA) in the project vicinity above levels existing before the project

Proposed Mitigation Measures

- Provision of appropriate Personnel Protective Equipment (PPE)
- Construct mainly during the day
- Consider labour based construction methodologies; and
- The provisions of EMCA on noise and excessive vibrations should be observed

- ***Dust Emissions***

Dust will be emitted during excavation and related earthworks. Air-borne particulate matter pollution is likely to occur during the excavation works. This is likely to affect site workers, in extreme situations leading to respiratory problems.

Proposed Mitigation Measures

- Minimizing the number of motorized vehicles on use
- Rehabilitate disturbed areas
- Wet all active construction areas as and when necessary to reduce dust.

- ***Increased Waste Generation***

Solid wastes generated during construction include papers used for packing, plastics, cuttings and trimmings of materials among others. Dumping around the site will interfere with the aesthetic status and has a direct effect on the surrounding community. Disposal of the same solid wastes off-site could also be a social inconvenience if done in the wrong places. The off-site effects could be aesthetic, pest breeding, pollution of

physical environment including water resource, invasion of scavengers and informal recycling by communities.

Proposed Mitigation Measures

- Setting up waste collection and segregation area strategically within the site for collection and sorting of solid wastes before disposal.
- Construction waste should be recycled or reused as much as possible to ensure that materials that would otherwise be disposed as waste are diverted for productive uses
- The proponent shall put in place measures to ensure that construction materials requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is kept minimal
- Employ the 3R's concept (Reduce, Reuse & Recycle) in dealing with wastes onsite

- ***Increased Water Demand***

During the construction phase of the proposed project, both the construction workers and the construction works will create demand for water in addition to the existing demand. Water will mostly be used during construction for wetting surfaces or cleaning/curing completed structures. It will also be used by the construction workers to wash and drink.

Proposed Mitigation Measures

- The proponent through the contractor shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water use
- Any water handling equipment, facility and systems shall be appropriate for the intended usage.
- Water used on the construction shall reflect the level of conservation achieved by the contractors.
- Documentation of amounts of water used will be helpful in minimizing wastage

- ***Occupational hazards at workplace***

Construction workers are likely to have injuries and hazards as the construction works unavoidably expose workers to occupational safety and health risks. The workers are also likely to be exposed to risk of accidents and injuries resulting from accidental falls and injuries from hand tools and construction equipment. There

will also be an increased risk of traffic accidents where delays and diversions are imposed or altered without adequate warning.

Proposed Mitigation Measures

- To reduce on the workers accidents and hazards, the proponent will develop and commit the contractors to Site Occupational Safety and health rules and regulations as stipulated in the Occupational Safety and Health Act, 2007
- All construction workers should be advised of the dangers associated with construction work
- Workers should be provided with suitable and appropriate PPE's
- Provision of adequate sanitary facilities to workers, the site has an existing sanitary facilities
- Train all workers on Safety Health and Environment (SHE) with an aim of improving awareness
- Install safety signage along the work areas
- Task-based risk assessment should be done on daily basis to assess the risks and hazards thereby prescribing the appropriate prevention measures

7.2.3 Social Impacts during Construction Phase

- ***Loss of Heritage, Cultural and Historical values***

The proposed project has the potential to cause loss of heritage cultural and historical significant to the community during its implementation. The site for the proposed project does not possess any cultural and heritage sites. From the field studies, there are no known impacts on archaeologically protected monuments and cultural properties in the proposed project area, if any archaeological or culturally important artefact be discovered during the construction process, the contractor should develop and implement a chance find procedure that should be approved by the relevant government body.

- ***High Prevalence of Infectious and Communicable diseases***

During the construction phase there is a risk of spread of communicable diseases. Aspects of the physical environment that promote transmission of diseases include: disposal of wastes and ventilation which are likely to occur during the construction phase of the project. With the influx of people during construction, there will be a likelihood of increase in diseases such as typhoid, tuberculosis, diarrheal diseases, respiratory diseases, dysentery and cholera.

The infection rate of HIV/AIDS and other STI's is expected to rise during the construction phase of the proposed project. This is due to the fact that the contractors, traders and workers will have money to attract

women/men from the project area in a bid to solicit for sex, thereby creating avenues for spread of HIV/AIDS and other STIs. The most vulnerable members of the community are women as they don't have access to resources necessary for production and wealth creation.

Proposed Mitigation Measures

- Education and sensitization of workers and the local communities on STIs including provision of condoms to the project team and the public
- The contractor has to institute HIV/AIDS awareness and prevention campaign amongst workers for the duration of the contract e.g. erect and maintain HIV/AIDS information posters at strategic locations within the site.
- The contractor has to ensure that staff are made aware of the risks of contracting or spreading sexually transmitted diseases
- The contractor should ensure that the project workers are sensitized on the local culture

- ***Influx of people in the area***

The proposed project has the potential to contribute to the massive influx/movement of people from different areas both during the construction and operation/occupation phases. This will have an extended impact of the social setting of the Mnyenzeni, Mzinzi area in general. This therefore leads to concentration of people in one area drawn from diverse social and cultural backgrounds often resulting to a number of issues such as;

- Strain on various resources especially water resources, electricity and roads
- Grievances from local community members over job opportunities
- Sexual exploitation and abuse (SEA) and unwanted pregnancies

- ***Social security and conflict***

Construction sites usually attract different kinds of people. These will include workers (both permanent and casual contract workers), food suppliers (to construction workers) and some idlers. A site of this nature can provide temptations to crooked workers and others to engage in theft. The presence of these people can therefore, negatively impact on the area's security. There could be conflict between the contractor or the facility and the surrounding communities due to: labor recruitment, shared resources (road, etc.) and behavior of workers.

Proposed Mitigation Measures

- The contractor should ensure the security personnel are well inducted to address security related issues as they arise
- Prepare labor management plan to guide recruitment of the workers in conjunction with local leaders
- Limit worker's interaction where possible with community members
- Contractor security personnel should discourage the use of force among the workers and community members unless for defensive purposes

- ***Gender based violence and gender inequalities***

Gender-Based violence refers to harmful acts directed at an individual based on their gender. It is rooted in gender inequality, the abuse of power and harmful norms. Gender-based violence (GBV) is a serious violation of human rights and a life-threatening health and protection issue. Development projects are not isolated from traditions, culture, norms, customary laws and governmental policies that exist in the country and the community. If not addressed properly, commercial development projects can implicitly legitimize and reinforce harmful gender norms.

Gender inequalities may occur during project construction phase when the Contractor fails to comply with the following provisions; gender inclusivity requirements in hiring of workers and entire project management

as required by the Gender Policy of 2011 and gender rule, failure to protect Human Risk Areas Associated with Disadvantaged Groups, interfering with Participation Rights, and interfering with Labor Rights.
Women face greater economic vulnerability as their labor participation is often highly informal, without social protection. Low-income women and women migrant workers are especially vulnerable.

Proposed Mitigation measures

- The contractor will mainstream Gender Inclusivity in hiring of workers and entire Project Management as required by the Gender Policy of 2011 and Gender Rule
- The existing community structures headed by local area administration such as chiefs should be involved in local labor hire, emphasize the requirement of hiring women, youth and people with disability
- Protecting Human Risk Areas Associated with, Disadvantaged Groups, interfering with Participation Rights and interfering with Labor Rights to include promotion of rights, including gender equality and equity
- Ensure safe employment for women, including training for all staff on sex-disaggregated latrines, regular consultation with female employees and other measures to ensure physical safety and dignity of female employees
- GBV constitutes acts of gross misconduct and are therefore grounds for sanctions, penalties and/or termination of employment. All forms of GBV including grooming are unacceptable in the work site, the work site surroundings, or at worker's camps (if any). Prosecution of those who commit to be pursued
- Treat women and children (persons under the age of 18) with respect regardless of race, color, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status. Do not use language or behavior towards women or children that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate
- Sexual activity with children under 18-including through digital media is prohibited. Mistaken belief regarding the age of a child and consent from the child is not a defense
- Exchange of money, employment, goods, or services for sex, including sexual favors or other forms of humiliating, degrading or exploitative behavior is prohibited
- Sexual interactions between contractor's and consultant's employees at any level and member of the communities surrounding the workplace that are not agreed to with full consent by all parties involved in the sexual act are prohibited. This includes relationships involving the withholding, promise of actual

provision of benefit (monetary or non-monetary) to community members in exchange for sex, such sexual activity is considered "non-consensual" and should not be allowed

- Where an employee develops concerns or suspicions regarding acts of GBV by a fellow worker, whether in the same contracting firm or not, he or she must report such concerns in accordance with Standard Reporting Procedures
- All employees are required to attend an induction-training course prior to commencing work on site to ensure they are familiar with the GBV Code of Conduct
- All employees must attend a mandatory training course once a month for the duration of the contract starting from the first induction training prior to commencement of work to reinforce the understanding of the institutional GBV Code of Conduct.

- ***Child employment (child abuse) and other Labor Related Impacts***

The proposed project will have massive employment opportunities for the locals within the area especially for non-skilled labor. The project area hosts populations living below poverty line, coupled by high illiteracy levels, these vulnerability conditions can lead to employment of the minors who may disguise as adults.

This social impact is prevalent due to the fact that project construction phase attracts various categories of workers from local, national and international markets. This therefore leads to concentration of people in one area drawn from diverse social and cultural backgrounds often resulting to a number of issues such as; strain on various resources especially water resources, electricity and roads. grievances from local community members over job opportunities, sexual exploitation and abuse (SEA) and unwanted pregnancies.

Proposed Mitigation Measures

- The Contractor will ensure effective community engagement and strong grievance mechanisms on matters related to labor with a discrete mechanism for safely and confidentially reporting issues sexual exploitation and abuse and GBV at the community level triggered by the project
- Effective contractual obligations for the contractor to adhere to the mitigation of risks against labor influx, the contractor should engage a local community liaison person in employment issues
- The contractor will ensure proper records of labor force on site while avoiding child and forced labor
- The Contractor will ensure compliance with provisions of the Work Place Injuries and Benefits Act (WIBA) 2007
- The Contractor will develop and implement a Child Protection Strategy; this strategy will ensure that no person under the legal age of 18 years is employed in the project

- The contractors will develop training and sensitization of workers on Sexual Exploitation and Abuse and ensure specific signage on zero tolerance in all work sites
- The contractor will ensure signage on SEA-related rights and safe and confidential reporting mechanisms at the community level
- The contractor shall comply with the International Labor Organization Standards ratified in Kenya which include but not limited to: Prohibition of forced labor (ILO No 29) and Abolition of forced labor (ILO No 159)
- The contractor shall comply with the Kenya's persons with disabilities PWDs Act. The contractor will make reasonable accommodations for qualified individuals with known disabilities. This policy governs all aspects of employment, including selection, job assignment, compensation, discipline, termination and access to benefits and training
- It is the contractor's responsibility to provide all employees with a workplace free of harassment, intimidation, coercion and retaliation as provided by Kenya's Employment Act Cap 226 of 2007
- Any employee(s) who witness or believe they have been subject to discrimination, harassment, retaliation is encouraged to notify their supervisor

- ***Drug & substance abuse***

The proposed project involves the influx of people from various areas. With huge population in one place, drug and substance abuse is a factor. This may also occur during operation of the waste management site since workers may indulge in drug and substance abuse.

Proposed Mitigation Measures

- The project contractor and the proponent should create awareness among the site workers on the impacts of drug abuse
- The project contractor should discourage the use and abuse of drugs among the workers and the community members
- The contractor should formulate a policy that discourages entrance with drugs on site

- ***Impacts on Traffic and Site accessibility***

The operations of the proposed project are likely impact on the traffic in the area through the access road to the site. The proposed project will come along with increased (vehicle) traffic along the connecting routes especially during construction phase.

Proposed Mitigation Measures

- The trucks carrying construction materials will be advised to access the site at intervals to reduce traffic congestion along the access road
- Develop and implement a traffic management plan
- Control entry and exit of vehicles to and from construction site
- Comply with the provisions of Traffic Act, 2016

7.3 Operation Phase

- *Environmental Contamination*

During the operation of the proposed asbestos landfill and associated activities, there are bound to be breakages that will generate dust therefore inhalation will occur. Due to the fibrous nature of the asbestos, airborne dust is likely to be present in the environment close to the premises where asbestos is handled. All people within that vicinity are likely to be exposed to the dust in the air. Fibres embedded in lung tissue over time may cause serious lung diseases including asbestosis, lung cancer or mesothelioma. The major health effects associated with asbestos exposure includes:

Asbestosis -- Asbestosis is a serious, progressive, long-term non-cancer disease of the lungs. Symptoms of asbestosis include shortness of breath and a dry, crackling sound in the lungs while inhaling. There is no effective treatment for asbestosis.

Lung Cancer -- People who work in the mining, milling, manufacturing of asbestos, and those who use asbestos and its products are more likely to develop lung cancer than the general population. The most common symptoms of lung cancer are coughing and a change in breathing. Other symptoms include shortness of breath, persistent chest pains, hoarseness, and anemia.

Mesothelioma --this is a rare form of cancer that is found in the lung, chest, abdomen, and heart and almost all cases are linked to exposure to asbestos. This disease may not show up until many years after asbestos exposure.

- *Impacts on Occupational Health and Safety at Workplace*

There are potential safety and health risks associated with operations of the facility. These include; accidental falls, injuries and general health hazards as a result of handling of hazardous industrial wastes. All these risks

have potential to cause injuries, permanent disability or even death and hence the management should be committed to ensuring safety and health of workers and visitors at the facility.

Proposed Mitigation Measures

- All employees to be provided with the appropriate Personal Protective Equipment and Clothing (PPE & C) and enforce their use
- Warning & Safety signage to be displayed at strategic areas within the site
- Restrict access to the site by the unauthorized people/persons
- The employer must not allow anybody to work in or to enter an environment in which they may be exposed to asbestos that will exceed the exposure limit for asbestos.
- Develop and implement a safety and health policy, and emergency response plan for the site
- Sensitize employees to adhere to work procedures to minimize accidents
- Conduct first aid training among the workers and provide well-stocked first aid kit
- Provide and keep an accident/incident register occurring on the facility including near misses and actions taken to prevent future occurrences
- Conduct annual occupational safety and health audits and other statutory safety audits
- Comply with the provisions of the Occupational Safety and Health Act, 2007

Personal Protective Equipment (PPE) for use at the Waste Management Site

Refers to clothing and respiratory apparatus designed to shield or protect individuals from chemical, physical or biological hazards. PPE assists in providing preventive measures when used correctly. All PPE must be suitable for the person using it and provide effective protection for its intended purpose

The following are some of the protective equipment that can be used during asbestos handling activities;

Respirators - half-face, dual-cartridge respirators, each equipped with a pair of High Efficiency Particulate Air (HEPA) filters.

Overalls – should be with built-in booties and disposed off properly in sealed asbestos disposal bags after use.

Rubber boots - These are highly recommended so that coverall booties do not wear through. Rubber boots can be washed off later or disposed of as contaminate debris.

Eye protection - Each person removing asbestos materials should wear non-fogging goggles or safety glasses

- ***Fire risks***

The proposed waste management site will comprise of waste that is combustible. Without provisions for fire safety, there is a risk of fire outbreak at the project site during site operations. Fires can start from chemical spills, ignitable materials within the site, accidents/elevated emissions associated human error and defective electrical connections.

Proposed Mitigation Measures

- Provide firefighting equipment within the facility
- Firefighting equipment should be serviced quarterly by fire service providers
- Train employees on the use of fire-fighting equipment
- Develop and implement a fire and emergency response plan
- Provide informative fire safety and warning signage and replace warn out ones within the facility
- Enforce a 'no smoking' rule within the facility
- Conduct fire drills and fire safety audits annually

- ***Impact on air quality (air & noise pollution)***

Integrated waste management and treatment facility will have the potential to affect the general air quality of the environment due to various waste streams to be handled. For instance, sources of potential air pollution will include bad odor gases associated with municipal wastes such as biodegradable wastes. On the other hand, noise pollution will emanate from vehicular movement in and out of the facility. However, the background noise within the area is in keeping with that will be generated by the vehicles accessing the facility.

Proposed Mitigation Measures

- Provision of appropriate and adequate PPE to all workers within the site and enforce on their use
- Sensitize the drivers to avoid unnecessary hooting and running of vehicle engines
- Conduct air quality monitoring in collaboration with a NEMA designated laboratory especially for the incinerator during operations in compliance with air quality regulations
- Comply with the provisions of the Environmental Management and Coordination (Air Quality) Regulations, 2014 and (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

- ***Impact on water quality (effluent management)***

Water will be required during the project operation for dilution of the water-based wastes (effluent/domestic wastes), water will also be used for sanitation and drinking purposes and will be supplied on need basis. Waste water from the facility will be generated as effluent from sanitation facilities and will be managed through septic tank.

Proposed Mitigation Measures

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

- ***Impact on solid waste generation and management***

The facility will generate different types of solid wastes i.e., from the office comprising of mainly paper from administrative activities, glass and plastics for office supplies. The facility will also produce both hazardous and no hazardous wastes. Poor disposal of solid waste degrades environmental quality. Adequate measures should be put in place to ensure that hazardous wastes are not mixed with regular wastes.

Proposed Mitigation Measures

- Provide adequate solid waste collection bins with a capacity for segregation within the facility
- Sensitize workers on the process of solid waste collection, segregation and proper disposal
- Procure a sizeable central solid waste collection bin with chambers to accommodate separated waste
- Contract a NEMA licensed waste handler to dispose off wastes that cannot be handled at the site
- Comply with the provisions of Waste Management Regulations, 2006

- ***Impacts on Traffic and Site accessibility***

The operations of the proposed waste management site are likely to impact on the traffic in the area through the access road to the site. This will be as a result of trucks visiting the site in delivering the wastes. The proposed site area does not exhibit traffic jams since the site is within the village setting from the main highway.

Proposed Mitigation Measures

- The trucks carrying wastes will be advised to access the site at intervals to reduce traffic congestion along the access road
- The operations of the site will be on contractual basis hence reducing the potential impacts of heavy traffic
- Develop and implement a traffic management plan
- Control entry and exit of vehicles to and from the facility
- Comply with the provisions of Traffic Act, 2016

- ***Impacts on Heritage, Cultural and Historical Values***

The site for the proposed project does not possess any cultural and heritage sites. Therefore, the proposed protect will not have any impact on the cultural and heritage values of the community.

7.4 Decommissioning Phase

Decommissioning is an important phase in the project cycle and comes last to wind up the operational activities of a particular project. It refers to the final disposal of the project and associated materials at the expiry of the project lifespan. If such a stage is reached, the proponent needs to remove all materials resulting from the demolition/ decommissioning from the site and the proponent is also required to prepare a decommissioning management plan that will guide the decommissioning process and seek approvals/ permits from all the relevant government agencies.

- **Occupational health and safety impacts**

Proposed Mitigation Measures

- Ensure that the process of demolition is supervised by competent personnel
- Seek the services of a licensed construction company to carry out demolitions
- Ensure the protection of infrastructural facilities within the site during the decommissioning phase such as water facilities
- Provision adequate and appropriate PPE's and Clothing and enforce on their use for people involved
- Seek demolition permit from the relevant authorities
- Ensure compliance with the Occupational Safety and Health Act, 2007

- **Waste generation and management**

Proposed Mitigation Measures

- Ensure compliance with the Waste Management Regulations, 2006 in disposing of the demolition wastes
- Contract a NEMA licensed waste handler to dispose waste generated from the demolition activities
- Waste recovery should be encouraged, reusable and recyclable components from the site should be conserved for secondary use

- **Socio-economic impacts**

Proposed Mitigation Measures

- Inform and train employees on alternative livelihoods prior to decommissioning of the project
- Prepare and issue recommendation letters to the workers to seek alternative employment opportunities elsewhere
- Ensure compliance with labor laws and other statutory regulations in decommissioning phase
- Economic decline within the project area, look for an alternative site to set up the facility and realize the associated economic benefits

CHAPTER 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

8.1 Introduction

The objectives of the Environmental and Social Management Plan are:

- To guide the project implementers in project planning,
- To guide the Project implementers on the likely impacts of the project and when they are likely to occur
- To give an assessment of the capacity requirements for the implementation of the ESMP
- To guide the project implementers to allocate adequate resources for the implementation of the mitigating measures

8.2 ESMP Outline

The table below outlines the environmental and social management plans for the proposed project cycle. The plan considers the following;

- Predicted/anticipated environmental impact
- Proposed mitigation measures
- Responsible party / parties
- Timeframe
- Estimated costs

The ESMP for the proposed project will cover all the project cylce or phases. The project phases comprises of construction phase, operation phase and decommissiong phase.

8.3 ESMP for Proposed Integrated Waste Management Site

8.3.1 Construction Phase

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
Occupational Health and Safety Hazards at Workplace	– Provide all employees with appropriate and adequate Personal Protective Equipment and Clothing (PPE's & C). These include working safety boots, overalls, helmets, goggles, earmuffs, respirators/masks and gloves. – Warning & Safety signage will be placed at the strategic areas within the facility – Provide employees with correct equipment tools and for the jobs assigned and train on their use – Provide first aid services and emergency services kit at the project site. This should be fully equipped at all times and should be managed by qualified person. – Register the site as a workplace with the Directorate of Occupational Safety and Health Services – Ensure moving parts of machines and sharp surfaces are securely protected while on site – The proponent should have workmen's compensation cover (WIBA). It should comply with workmen's compensation	Project Manager/Contractor	50,000.00
Loss of flora and fauna (Biodiversity loss)	– The contractor will ensure proper demarcation of the project area to be affected by the construction works; Strict control of construction vehicles to ensure that they operate only within the area to be disturbed by access routes and other works	Proponent/ site manager	10,000.00

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
	– The proposed site will be rehabilitated through the rehabilitation plan to be developed by the proponent to try and retain the natural flora and fauna during the operation phase. – This will entail progressive planting of native trees within the boundary of the facility. – Introduction of vegetation (trees, shrubs and grass) on open spaces within and around the site. Indigenous species would be preferred.		
Excavation and loss of top soil (Land degradation)	– Maximizing the re-use of excavated materials to ensure that no permanent spoil dumps are created – Extra loads of excavated soil should be used to make good the access road to the project site – Properly disposing off the spoil in an area identified by the experts and approved by NEMA – Ensure compliance with Waste Management Regulations, 2006 in disposing the excavated soil	Site Manager/proponent	20,000.00

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
Physical disturbance of the project area	– The proponent should ensure that there is minimal disturbance to the topography of the area – The excavation and lanscaping design shall not interfere with local drainage or change the topography or introduce physical changes that are not in harmony with the physical setting of the project area – The project components and associated structures should be aesthetically acceptable to blend in with the surroundings – The proponent shall as much as possible complete the works in such a way that natural aesthetics shall be retained at the locations – Restoration shall be undertaken to ensure that the original setting is as much as possible retained	Proponent/contractor	Nil
Noise and excessive vibrations	– Provision of appropriate Personnel Protective Equipment (PPE) to protect the empoyees from noise and vibrations effects – Construct mainly during the day (8am-5pm) – Consider labour based construction methodologies – Sensitize truck drivers to avoid unnecessary hooting and running of vehicle engines – Ensure compliance with provisions of Environmental Management and Coordination (Noise and Excessive Vibrations Pollution) (Control) Regulations, 2009	Proponent/contractor	50,000

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
Dust Emissions (Air pollution)	– Minimizing the number of motorized vehicles on use – Rehabilitate disturbed areas – Wet all active construction areas as and when necessary to reduce dust. – Dry materials should be kept dump or covered at all time – Install gadgets to intercept the particulate matter as well as controlling gaseous emissions.	Proponent/contractor	20,000.00
Increased waste generation	– Setting up waste collection and segregation area strategically within the site for collection and sorting of solid wastes before disposal. – Construction waste should be recycled or reused as much as possible to ensure that materials that would otherwise be disposed as waste are diverted for productive uses – The Proponent shall put in place measures to ensure that construction materials requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is kept minimal	Proponent and site supervisor	30,000.00
Increased Water demand	– The proponent through the contractor shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water use – Any water handling equipment, facility and systems shall be appropriate for the intended usage. Water used on the construction shall reflect the level of conservation achieved by the contractors. – Documentation of amounts of water used will be helpful in minimizing wastage – Comply with Water Quality Regulations, 2006	Proponent/contractor	30,000.00

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
Loss of Heritage, Cultural and Historical values	– Prevention and restoration of cultural and heritage values of the community in the proposed project site – The site for the proposed project does not possess any cultural and heritage sites	Proponent/contractor	Nil
High Prevalence of Infectious and Communicable diseases	– Education and sensitization of workers and the local communities on STIs including provision of condoms to the project team and the public – The contractor has to institute HIV/AIDS awareness and prevention campaign amongst workers for the duration of the contract e.g. erect and maintain HIV/AIDS information posters at strategic locations within the facility. – The contractor has to ensure that staff are made aware of the risks of contracting or spreading sexually transmitted diseases – The contractor should ensure that the project workers are sensitized on the local culture	Contractor/proponent	10,000.00
The community conflicts	– Make sure all stakeholders and the local population is comfortable with project implementation. – Comprehensive public consultation was conducted with the local community and leadership to create awareness among the locals	Proponent/ESIA experts	50,000

8.3.2 Operation phase

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
Occupational Health and Safety	– Develop and implement a safety and health policy, and emergency response plan for the site/facility – All employees to be provided with the appropriate Personal Protective Equipment and Clothing (PPE & C) and enforce their use – Sensitize employees to adhere to work procedures to minimize accidents – Warning & Safety signage to be displayed at strategic areas within the facility – Restrict access to the site by the unauthorized people/persons – Register the site as a workplace with the Directorate of Occupational Safety and Health Services – Sensitize employees to adhere to work procedures to minimize accidents – Conduct first aid training among the workers and provide well-stocked first aid kit – Provide and keep an accident/incident register occurring on the facility including near misses and actions taken to prevent future occurrences – Conduct annual occupational safety and health audits – Comply with the provisions of the Occupational Safety and Health Act, 2007 – The workers should be trained on asbestos handling and management and other hazardous wastes	The Proponent/Health and Safety advisor	80,000.00
Screening of asbestos wastes	– All Asbestos Containing Materials (ACM) will be recoded indicating the origin of the waste for easy tracking – All deliveries to the disposal site to be registered in NEMA tracking document – Confirmation of material properties prior to disposal – Employees at the site to be trained on asbestos handling procedures	The proponent/waste generator	Nil

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
Water Quality and underground contamination	– The asbestos wastes shall be disposed in underground concrete confinement of 130mm thick – The maximum depth of the pit will be 10M not exceeding a depth of water table of the project area. – The pit will be built with the recommendations in the safe asbestos management guidelines – The proponent shall install water quality monitoring device – Asbestos is insoluble in water and alkali and as such cannot can leach	The proponent	50,000.00
Asbestos and Asbestos Containing Material (ACM) Management	– Asbestos disposal site shall be marked clearly as handling hazardous material – The asbestos will be appropriately contained and sealed to minimize exposure – The asbestos prior to removal should be treated with a wetting agent to minimize asbestos dust – Asbestos should be handled and disposed by skilled & experienced professionals – If asbestos material is being stored temporarily, the wastes should be securely enclosed inside closed containments and marked appropriately. Security measures will be taken against unauthorized removal from the site. – The removed asbestos will not be reused	The proponent	60,000.00
Risk of Asbestos Exposure	– The proponent shall not permit any person to work in an environment in which he or she would be exposed to asbestos in excess of the prescribed occupational exposure limit. – Provision of appropriate PPE to all employees within the site at all times – All the workers at the site to be subjected to regular medical surveillance	The proponent/site supervisor	50,000.00
Fire Risks and hazards	– Provide firefighting equipment within the site/facility – Firefighting equipment should be serviced quarterly by fire service providers – Develop and implement a fire and emergency response plan	Proponent	80,000

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
	– Train employees on the use of fire-fighting equipment – Develop and implement a fire and emergency response plan – Provide informative fire safety and warning signage within the facility – Enforce a 'no smoking' rule within the facility – Conduct fire drills and fire safety audits annually		
Impacts on air quality (air& noise pollution)	– Conduct air quality monitoring in collaboration with a NEMA designated laboratory especially for the incinerator – Conduct annual stack emission assessment for the incinerator through NEMA accredited laboratories – Direct observation of particulate matter from the facility – The existing incinerator has been compliance with Air quality regulations – Choosing advanced combustion designs and emission-control technologies – Having well-trained and certified employees that ensure that the combustor is operated to maximize combustion efficiency and that the emission control devices are operated to optimize conditions for pollutant capture or neutralization – Comply with the provisions of the Environmental Management and Coordination (Air Quality) Regulations, 2014	Proponent	100,000.00

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
	– Provision of appropriate and adequate PPE to all workers within the site and enforce on their use – Sensitize the drivers to avoid unnecessary hooting and running of vehicle engines		
Water quality and effluent management	– Create awareness among the staff on water conservation mechanisms – Monitor the quality of the domestic effluent and the discharge to ascertain conformity to the standards stipulated under the Third Schedule of Environmental Management and Coordination (Water Quality) Regulations, 2006 – Apply for and obtain an Effluent Discharge License (EDL) from NEMA – Comply with the provisions of the Environmental Management and Coordination (Water Quality) Regulations, 2006	Proponent/Accredited laboratories	70,000
Impacts on solid waste generation & management	– Provide adequate solid waste collection bins with a capacity for segregation within the facility – Sensitize workers on the process of solid waste collection, segregation and proper disposal – Procure a sizeable central solid waste collection bin with chambers to accommodate separated waste – Contract a NEMA licensed waste handler to dispose solid waste – Comply with the provisions of Waste Management Regulations, 2006	Proponent	20,000

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
Traffic management & site accessibility	– The trucks carrying wastes will be advised to access the site at intervals to reduce traffic congestion along the access road – The operations of the site will be on contractual basis hence reducing the potential impacts of heavy traffic – Develop and implement a traffic management plan – Control entry and exit of vehicles to and from the facility – Comply with the provisions of Traffic Act, 2016	Proponent	Nil
Increased energy demand	– Sensitize workers to switch off lights when not in use – Ensure regular servicing and maintenance of electrical appliances – Use of renewable energy sources such as solar energy	Proponent	Contracted cost

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
Heritage, Cultural and Historical values	– Prevention and restoration of cultural and heritage values of the community in the proposed project site – The site for the proposed project does not possess any cultural and heritage sites – The project should be in harmony with the cultural and social aspect of the community	Proponent	Nil
Prevalence of Infectious and Communicable diseases	– Education and sensitization of workers and the local communities on STIs including provision of condoms to the project team and the public – The contractor has to institute HIV/AIDS awareness and prevention campaign amongst workers for the duration of the contract e.g. erect and maintain HIV/AIDS information posters at strategic locations within the site. – The proponent has to ensure that staff are made aware of the risks of contracting or spreading sexually transmitted diseases	Proponent	Nil
The community involment	– Make sure all stakeholders and the local population is comfortable with project implementation. – Provision of employment opportunities to the local community	Proponent	Nil

8.3.3 Decommissioning phase

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
Occupational Health and Safety	– The process of demolition is supervised by competent personnel – Seek the services of a licensed construction company to carry out demolitions – Ensure the protection of infrastructural facilities within the site during the decommissioning phase such as water facility – Provision adequate and appropriate PPE's and Clothing and enforce on their use for people involved – Seek demolition permit from the relevant authorities – Ensure compliance with the Occupational Safety and Health Act, 2007	Proponent/contractor	80,000.00
Waste generation	– Ensure compliance with the Waste Management Regulations, 2006 in disposing of the demolition wastes – Contract a NEMA licensed waste handler to dispose waste generated from the demolition activities – Waste recovery should be encouraged, reusable and recyclable components from the site should be conserved for secondary use	Proponent/ contractor	Within estimated project cost
Social and economic concerns	– Train employees on alternative livelihoods prior to decommissioning of the project – Prepare and issue recommendation letters to the workers to seek alternative employment opportunities elsewhere	Proponent	Nil

Anticipated Impacts/environmental aspect	Recommended Mitigation Measures	Responsible Party	Estimated Cost (Ksh)
	– Ensure compliance with labor laws and other statutory regulations in decommissioning phase – Economic decline within the project area, look for an alternative site to set up the facility and realize the associated economic benefits		
Land degradation	– Ensure environmental rehabilitation and restoration of the project site through planting of indigenous tress – Proper handling of wastes on site to reduce environmental degradation	Proponent	Contracted cost

CHAPTER 9: ENVIRONMENTAL MONITORING PROGRAM

9.1 Overview of monitoring program

Throughout the operation phase, regular monitoring intended for proper safety and protection of the environment will be undertaken. The monitoring system will assist in observation, evaluation, assessment and reporting on the performance of different/various variables with regard to the environment.

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

- Occupational safety and health monitoring plan
- Wastewater quality monitoring plan
- Solid waste monitoring plan
- Air quality monitoring plan
- Noise monitoring plan

9.2 Environmental Management System

An environmental management system (EMS) is a comprehensive approach to managing environmental issues, integrating environment-oriented thinking into every aspect of development management. An EMS ensures environmental considerations are a priority with other concerns such as costs, product quality, investments, productivity and strategic planning.

The proposed waste management facility will require that a comprehensive safety, occupational and public health and environmental system be formulated and maintained in accordance with the relevant legislative and regulatory requirements.

9.3 Environmental Institutional Framework

The project proponent will work with EIA/EA experts' team in identifying ways to improve environmental performance of the waste management facility setting objectives and targets, monitoring and evaluating implementation.

9.4 Monitoring schedule

The proponent will follow the monitoring schedule that will assist in observation, evaluation assessment and reporting on the performance of different/various variables. The following table summarizes the suggested monitoring schedule of the integrated waste management site.

Table 9.1: Summary of monitoring schedule

Description of parameter	Method of monitoring	Monitoring schedule and duration
Compliance by contractor and contractor staff to HSE requirements	Visual inspections against checklists containing requirements	Review daily to determine impact on quality
Public health and safety	Visual inspection and complaints from neighbors/workers Test quality of the environmental parameters such as air quality & water quality through NEMA accredited laboratories	Daily Quarterly assessments

9.5 Waste tracking

As per the Waste Management Regulations of 2006 and the National guidelines on Management and Disposal of asbestos, the proponent must ensure that tracking documents are in place and that necessary notifications to the authority are done.

CHAPTER 10: CONCLUSIONS & RECOMMENDATIONS

10.1 Conclusion

Waste management in the country requires collective responsibility and collaboration between different sector players. The proposed project will therefore be significant and will play a big role in enhancing the environmental protection and occupational safety and health benefits from poor and illegal waste management practices within Kilifi County and its environs. The proposed project is considered important and beneficial to the economy as it will ensure proper waste management and promote socioeconomic growth of the area through employment creation and revenue generation to the government. Mitigation measures and Environmental Management Plans have been proposed to address the scope of the predicted adverse environmental and social impacts to the highest degree. The findings of the ESIA carried out for this project indicate that possible environmental impacts generated can be addressed effectively by the proponent through the effective mitigation measures proposed.

10.2 Recommendations

This ESIA report recommends issuance of a license/approval subject to the conditions that NEMA may impose during the decision-making process. The following recommendations should however be considered:

- The project does not pose any serious/irriversable environmental concerns, other than those of a minor scale that accompany similar projects
- The positive impacts of the project outweigh the negative ones, which will be adequately contained by following the prescribed environmental and social impact management plans
- As such, the project could be allowed to commence, and activities be managed within the provided ESMP and sound environmental management practices that are locally and internationally recognized.
- Comply with all pieces of regulations as documented in this report.

REFERENCE

1. Kenya National Bureau of statistics, Kenya Population and Housing Census 2019
2. National Environment Policy, 2013
3. National Health Policy, 2014 – 2030
4. National Energy and Petroleum Policy, 2018
5. National Land Policy, 2009
6. Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019,
7. Environmental Management and Coordination (Air Quality) Regulations, 2014
8. Environmental Management and Coordination (Impact Assessment and Audit) Regulations, 2003
9. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulation, 2009
10. Environmental Management and Coordination (Waste Management) Regulations, 2006
11. Environmental Management and Coordination (Water Quality) Regulations, 2006
12. The Constitution of Kenya, 2010
13. The Occupational Safety and Health Act, 2007
14. The Climate Change Act, 2016
15. Technical Guidelines on the Management of Used Oil and Oil Sludge in Kenya
16. The County Government Act, 2012
17. The Water Act, 2016
18. The Energy Act, 2019
19. National Construction Authority Act, 2014
20. The Physical and Land Use Planning Act, 2019
21. The Public Health Act, 2012
22. Occupiers Liability Act Cap 34

APPENDICES

Appendix 1: Company Certificate of Incorporation

Appendix 2: Copy of KRA PIN certificate

Appendix 3: Copy of land lease agreement

Appendix 4: Public participation minutes

Appendix 5: Approval of TOR

Appendix 6: Bill of Quantities

Appendix 7: Copy of EIA /EA experts' practising licenses