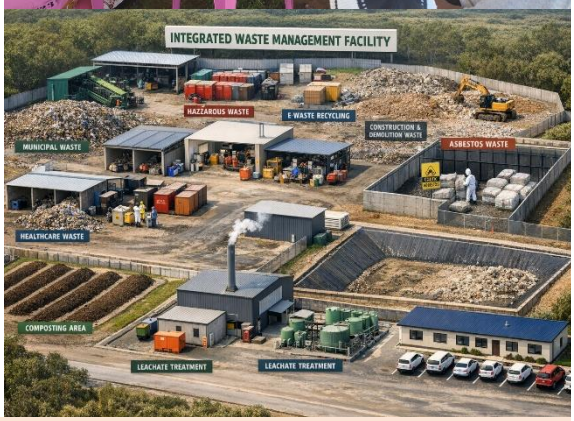
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

FOR

THE PROPOSED INTEGRATED WASTE HANDLING FACILITY LOCATED IN CHIRIMA CHA UHA ON L.R NO: 1681-MAZOLA ADJUDICATION, PUMA LOCATION, KINANGO SUB-COUNTY, KWALE COUNTY KENYA



Prepared For

Streetcare Enterprises Limited,
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Prepared By

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Submitted To:

National Environment Management Authority (NEMA) in accordance with EMCA Cap 387 and Environmental (Impact Assessment and Audit) Regulations, 2003

Location GPS Coordinates: -4.0596033S, & 39.3439001E

© April 2026

Document Certification

This Environmental and Social Impact Assessment (ESIA) Full Study Report is hereby submitted to the National Environment Management Authority (NEMA) in strict compliance with the Environmental Management and Coordination Act (EMCA), Cap 387, and the Environmental (Impact Assessment and Audit) Regulations, 2003. The report presents a comprehensive and independent evaluation of the potential environmental and social impacts associated with the proposed Integrated Waste Handling Facility Located in Chirima Cha Uha, Puma Location, Kwale County, Kenya.

The information presented herein represents a true, complete, and accurate account of the findings and analyses conducted regarding the proposed development. The assessment was undertaken using scientifically accepted methodologies and is based on documentation, data, and information provided by the project proponent, as well as findings from site inspections, stakeholder consultations, and expert evaluations carried out during the study period. We, the undersigned, hereby confirm that this Environmental and Social Impact Assessment (ESIA) Full Study Report (FSR) faithfully presents the findings, assessments, and recommendations arising from the EIA study undertaken for the project.

Firm Of Experts

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LEAD EXPERT
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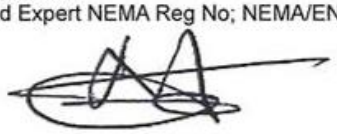

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LIST OF EXPERT PARTICIPANTS

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Kenya generates approximately 22,000–24,000 tonnes of solid waste per day, amounting to over 8 million tonnes annually, with per capita waste generation ranging between 0.3 and 0.8 kg per person per day depending on levels of urbanization and income. However, only about 55–60% of this waste is collected, while the remainder is either openly dumped, burned, or illegally disposed of in the environment. Of the waste collected, nearly 70% is disposed of in uncontrolled dumpsites, with minimal use of engineered sanitary landfills. The waste stream is largely composed of 50–65% organic material, presenting significant opportunities for composting and resource recovery, yet national recycling rates remain low at approximately 5–10%, largely driven by the informal sector. These statistics highlight substantial gaps in waste management infrastructure and underscore the urgent need for integrated and sustainable waste management solutions across the country.

Waste management remains a critical environmental challenge in Kenya, driven by rapid urbanization, population growth, changing consumption patterns, and limited infrastructure for waste collection, treatment, and disposal. Major urban centres such as Nairobi and Mombasa generate significant volumes of waste daily, placing increasing pressure on existing systems. Many urban and peri-urban areas continue to rely on open dumping and poorly managed disposal sites, contributing to environmental degradation, pollution of air, soil, and water resources, and increased public health risks. In response, the Government of Kenya has prioritized the adoption of integrated and sustainable waste management systems that emphasize waste minimization, segregation at source, recycling, recovery, and environmentally sound disposal, as reinforced under the Sustainable Waste Management Act 2022. Under Second Schedule of Environmental Management and Co-ordination Act (EMCA) Cap 387 lists projects that must undergo an Environmental Impact Assessment (EIA) prior to implementation. This includes waste-related activities such as: "*Waste disposal sites, waste treatment plants and waste incineration facilities*.

In this context, Streetcare Enterprises Limited is proposing to develop and operate an Integrated Waste Management (IWM) facility on L.R No. 1681, Mazola Adjudication Section, located in Puma Location, Kinango Sub-County, Kwale County, approximately 10 km northeast of Kinango Town. The proposed project site lies within the expansive hinterland of Kwale County and is strategically positioned to serve the growing demand for sustainable waste management solutions in the wider coast region. Pursuant to Section 58 of the Environmental Management and Co-ordination Act (EMCA), Cap. 387 of the Laws of Kenya, Waste disposal facilities are listed under the Second Schedule as **High-Risk** projects and are therefore subject to the Environmental Impact Assessment (EIA) study prior to implementation. Therefore, pursuant to compliance with established environmental and social safeguards, **Streetcare Enterprises Limited** appointed **Ecosafe Holdings Limited**, an independent environmental firm of experts, to undertake the Scoping Study and Environmental and Social Impact Assessment (ESIA) Full study report (FSR).

Project Proponent

Streetcare Enterprises Limited is a waste handling facility duly registered in Kenya under the Companies Act. The company operates in accordance with all statutory and regulatory requirements applicable to waste management services in the country. As a registered entity, Streetcare Enterprises Limited is authorized to handle, transport, treat, and dispose of various categories of waste, including Condemn industrial waste, Biomedical waste, Asbestos, and other non-hazardous waste streams.

Project Objectives

The primary objective of the proposed Integrated Waste Management (IWM) facility is to provide a comprehensive, safe, and sustainable solution for the collection, handling, treatment, and disposal of various waste streams generated within the country. Specifically, the facility aims to:

a) Manage industrial waste by safely collecting, treating, and disposing of non-hazardous and regulated industrial by-products, minimizing environmental contamination.
b) Treat and dispose of biomedical waste in accordance with national health and environmental regulations, thereby preventing the spread of infectious diseases and protecting public health.
c) Handle and safely dispose of asbestos-containing materials and other hazardous construction residues to prevent exposure risks to workers, the community, and the environment.

d) Process and manage non-hazardous municipal and commercial waste streams, including organic waste, recyclables, and residual solid waste, in a manner that promotes resource recovery, recycling, and environmentally sound disposal practices.

Location

The proposed integrated waste handling facility is situated in a remote area of Chirima cha Uha, Mazola Sub-location, Puma Location, Kinango Sub-County, Kwale County. The proposed site is geographically represented by GPS Coordinates **Latitude: -4.059603S,** and **Longitude: 39.346475E**. The surrounding environmental features are largely rural, with limited infrastructure and sparse settlement. The nearest key landmark is Chirima Cha Uha Primary School, located approximately 1.8-kilometers from the proposed facility.

Project Design and Components

The proposed Integrated Waste Management Facility (IWMF) is designed to provide comprehensive waste management services, encompassing waste minimization, recovery, recycling, treatment, and disposal. The facility will facilitate the integrated management of general and hazardous wastes in accordance with the waste management hierarchy, national regulations, and market requirements. The waste disposal facility will be developed in a systematic and phased manner. Waste disposal cells will be constructed sequentially, with each phase capped and rehabilitated progressively upon completion. This approach ensures environmental protection, prevents contamination of soil and groundwater, and allows for efficient long-term facility management.

The proposed project will include waste disposal facility, developed in phases to ensure systematic construction, progressive capping, and rehabilitation. The proposed IWMF will comprise the following key infrastructure components:

a) Waste Minimization, Recovery, Recycling, and Treatment Facilities

- Incinerator,
- Composting Facility.

b) Waste Disposal Facilities

- Landfilling Facility,
- Asbestos Handling Landfill
- Waste Oil Recycling

In addition to the main waste disposal cells, the facility will incorporate the following ancillary infrastructure to ensure environmental protection and operational efficiency.

- Landfill Leachate Collection and Containment: Dedicated, lined leachate containment ponds will be constructed to safely collect and store leachate generated from the waste cells, preventing soil and groundwater contamination.
- Stormwater and Runoff Management Infrastructure: The facility will include structures for the collection and containment of contaminated stormwater in purpose-built retention dams, ensuring that polluted water does not enter surrounding ecosystems.
- Berms: Berms will be constructed around the project perimeter to divert clean stormwater away from the landfill, reducing contamination risks and enhancing operational efficiency.
- Access road;
- Electricity and water infrastructure and connections.

c) Ancillary Infrastructure

In addition to the main waste management and disposal facilities, the proposed project will include a range of ancillary infrastructure to support operational efficiency, staff welfare, and environmental monitoring. These include:

- Administrative and Office Buildings;

- Staff welfare facilities including ablution blocks, and rest areas to ensure proper welfare for all on-site personnel.
- Potable Water Supply and Sewage Management,
- Environmental Monitoring Infrastructure, and
- Workshops and Storage Facilities.

Summary of Project Impacts

Positive Impacts

a) **Employment Opportunities:** There are limited opportunities for employment in the areas where the proposed project is to be located (Puma/Mazola area). Unemployment is a common issue reported by the stakeholders consulted during public participation. The Project's activities are expected to generate indirect and direct economic activity in the surrounding communities such as through outsourcing contracts for various services to local vendors, and employment opportunities by the Project.

b) **Stimulation of Local Economy**. The Project will, through direct employment and induced indirect mechanisms (such as more economic activity resulting from improved infrastructure), will stimulate economic activity in the region, thereby contributing to poverty alleviation and improvements to community well-being.

c) **Environmental Protection.** Proper incineration reduces the volume of solid waste significantly and destroys hazardous substances, Controlled burning systems can limit emissions compared to open dumping or uncontrolled burning while safe handling of waste oil prevents contamination of soil and water bodies, which can otherwise lead to serious ecological damage.

d) **Public Health Safety.** An integrated waste handling facility reduces exposure to harmful pathogens, especially from medical or industrial waste, prevents illegal dumping of waste oil, which can release toxic substances and pose fire risks and Minimizes breeding grounds for pests (e.g., rodents, mosquitoes) that spread diseases

Environmental Component	Potential Impact	Pre-Mitigation Significance	Proposed Mitigation Measures	Post-Mitigation Significance
Air Quality	Increase in air emissions causing health risks	Medium	• Removal of vegetation must be avoided until such time as soil stripping for construction is required. • Implement dust control measures to ensure > 50% control efficiency across all construction areas. • Exposed surfaces must be re- vegetated or stabilized as soon as is practically possible. • Excavation, handling, and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present. • Where erosion of stockpiles becomes a problem, erosion control measures must be implemented. • Vehicle speeds must not exceed 30 km/h along unpaved roads or 20 km/h when traversing unconsolidated and non-vegetated areas. • No burning of any waste may be undertaken on site • Use of water suppression method	Low
Noise	Nuisance	Medium NA	• Ensure that all equipment is fitted and operated with silencers. • Do not allow the use of sound amplifiers on site, except in the case of emergency. • Enclose stationary equipment with SPL in excess of 85 dBA, where practicable. • Restrict construction activities generating noise outputs of 85 dBA or more to the hours of 08h00 to 17h00, Mondays to Fridays.	Very Low
Hydrology	Reduction in surface water quality	High	• Phasing/scheduling of earthworks must be implemented to minimise the footprint that is at risk of erosion at any given time, or schedule works according to the season • Storage of potential contaminants in appropriate containers, with secondary containment and/or within bunded areas. Storage areas to be located at least 50 m from any natural drainage lines and drainage pathways which discharge to the environment, • In case of a discharge incident that could result in the pollution of surface water resources, an emergency response procedure must be implemented, • Maintenance of vehicles/plant to be done in a bunded concrete hardstand area or off-site, • Emergency repairs of vehicles and plant must be carried out over drip trays, appropriate spill kits must be kept on-site and be easily accessible, • A spill response plan must be in place and responsible employees must be trained in the execution of responses and use of spill kits, • Spill response must be implemented to stop, contain, and clean up spills, • Construct temporary sediment basins in the low-lying areas of the site prior to stripping of any topsoil	Low

Environmental Component	Potential Impact	Pre-Mitigation Significance	Proposed Mitigation Measures	Post-Mitigation Significance
Flora	Loss of vegetation and ecological processes	Medium-Low	• Only allow construction personnel, vehicles and equipment access within the demarcated development footprint, • All temporary construction infrastructure and facilities are to be established within the demarcated boundaries, • Undertake rehabilitation of disturbed land progressively, as soon as the disturbing activities have been complete, • Utilize locally adapted, primarily indigenous, plant species to rehabilitate disturbed areas, • Prevent, and if necessary, control the establishment of Alien Invasive Species.	Low
Fauna	Habitat loss and disturbances affecting wider ecosystem	Medium	• All disturbed areas outside of the development footprint are to be rehabilitated, • Do not harm or kill any animal encountered during site works, • All construction and operation staff are to undergo environmental awareness training on biodiversity conservation, •	Low
Labor Influx		Medium	• Prioritize recruitment of local workers to reduce large external labor influx, • Implement a code of conduct for all workers, covering acceptable behavior on and off-site, • Provide orientation and training on community norms, workplace ethics, and social responsibilities, • Establish on-site accommodation or regulated transport for external workers to reduce interaction with local communities	
Gender-Based Violence (GBV) and Sexual Harassment		High	• Develop and enforce a Zero Tolerance Policy on GBV and sexual harassment, • Provide GBV awareness and sensitization training for all employees and subcontractors, • Set up confidential reporting mechanisms for GBV cases, including hotlines or designated officer, • Coordinate with local authorities and NGOs for support services, including counseling and protection for victims, • Ensure adequate lighting and security in work and accommodation areas to protect vulnerable groups.	
Spread of Communicable Diseases (STIs, Waterborne Diseases)		Medium	• Conduct health screening and regular medical check-ups for all workers, • Provide adequate sanitation facilities, safe drinking water, and handwashing stations on-site, • Promote health education campaigns on disease prevention, including STI awareness, vaccination, and hygiene, • Implement controlled access and health protocols for external labor to minimize community exposure, • Provide first aid facilities and access to local health services for workers and nearby communities.	

Environmental Component	Potential Impact	Pre-Mitigation Significance	Proposed Mitigation Measures	Post-Mitigation Significance
Social Conflicts and Community Tensions		Medium	• Engage community representatives regularly to communicate project plans and labor policies, • Implement grievance mechanisms for workers and community members to address complaints promptly, • Ensure equitable recruitment and local benefits to avoid community resentment.	
Operation Phase				
Air Quality	Impacts on heath due to ambient air pollution		• Install and maintain advanced Air Pollution Control Devices on incinerators including quencher, venturi scrubber, wet alkali scrubber, activated carbon injection, and baghouse filters to control particulate matter (PM), dioxins/furans, HCl, NOx, SO_2, and heavy metals, • Operate dual-chamber incinerators at high temperatures (primary ≥800–850°C, secondary ≥1050–1100°C ±50°C) with minimum 2-second gas residence time and ≥99% combustion efficiency, • Use wet methods (water spraying/misting) during handling, sorting, and bagging avoid breaking, sawing, or dry handling to prevent asbestos fiber release, • Implement fugitive dust and odor control including covered storage areas, rapid waste processing, and regular vehicle/road wetting, • Develop and strictly follow an Incinerator Operations Manual and integrated Waste Management Plan, • Ensure regulatory compliance (e.g., national biomedical/hazardous waste rules, asbestos regulations, WHO guidelines), • Conduct preventive maintenance on all equipment and stock consumables (scrubbing media, etc.).and • Ensure continuous emission monitoring, regular stack testing, and high stack height (e.g., 30m) for better dispersion. • No burning of any waste on site shall be allowed. •	
Climate Change	Contribution to GHG	Medium	• Regularly inspect and maintain landfill cover layers to ensure their integrity. Promptly repair any cracks, erosion, or breaches in the cover to minimize uncontrolled release of landfill gas into the atmosphere, • Implement phased capping of completed landfill cells to limit gas emissions and enhance stabilization. Rehabilitated areas should be vegetated to improve carbon sequestration and reduce surface emissions, • Promote biodiversity conservation and revegetation programs within and around the facility using indigenous plant species. This will enhance carbon sequestration capacity while also supporting ecological restoration, •	Low

Environmental Component	Potential Impact	Pre-Mitigation Significance	Proposed Mitigation Measures	Post-Mitigation Significance

Hydrology	Surface Water Quality	High	• Runoff from outside of the operational footprint must be diverted and released to the environment,
			• Dirty water catchments must be separated from clean water catchments,
			• Direct runoff from clean water catchments to the environment.
			• Contain all potentially contaminated runoff arising from dirty water catchments
			• Only undertake waste management activities within areas protected by a dirty water catchment,
			• All hazardous chemicals (new and used) and waste streams must be handled in such a manner that they do not pollute surface water. This will be implemented by means of the following:
			  ○ Pollution prevention through basic infrastructure design such as waste storage containment, hard standing, and containment bunds.
			  ○ Pollution prevention through education and training of workers;
			  ○ Monitoring of sub-surface seepage to confirm the leachate is fully contained.
			• Formulate an Emergency Preparedness and Response Plan for operations and ensure adherence to it during any incident, discharge, or spillage of chemicals.
			• Good housekeeping practices should be implemented and maintained by timely clean-up of accidental spillages. In addition, spill cleaning kits and material safety data sheets for chemical and hazardous substances should be accessible.
				Low

	Underground Water Pollution	Medium	• Designed cells and burial sites with high mobility high toxicity constituents with additional 1m thick compacted clay under the basal liner, • Construct the containment barrier systems of the cells and leachate holding structures as per approved engineering design, • All hazardous waste must be assessed prior to acceptance to the facility. The concentrations of high mobility - high toxicity parameters must be kept on record for waste identified as containing these, • Wastes requiring treatment prior to disposal, must be treated and the efficacy of the treatment must be confirmed prior to their disposal in the waste disposal facility, • Monitor and maintain the integrity of the containment barriers in all operational cells to ensure that each achieves the design permeabilities, • Record water quality of surface water network on a quarterly basis for the first 3 years. Thereafter, the monitoring program should be optimized in terms of monitoring frequency and parameters.	Low
Alteration of drainage paths and surface water flows	Flooding	High	• Appropriate design and implementation of appropriately sized stormwater management infrastructure shall be undertaken,	Low

Environmental Component	Potential Impact	Pre-Mitigation Significance	Proposed Mitigation Measures	Post-Mitigation Significance
			• Where stormwater is diverted or concentrated, attenuation structures such as retention ponds, detention basins, or infiltration systems shall be incorporated into the detailed design, • Stormwater management infrastructure shall be designed to separate clean and contaminated water. Clean runoff should be diverted away from the Integrated Waste Management Facility (IWMF) through channels, berms, or drains to prevent flooding and reduce the volume of water requiring treatment, • Perimeter berms and lined drainage channels shall be constructed around the facility to prevent external stormwater from entering operational areas and to safely convey runoff away from critical infrastructure.	
Proliferation of the Invasive House Mouse	Introduction of the House Mouse and Black Rat may result in disease vectors.	Medium	• Construct and maintain perimeter bunds and physical barriers around the Waste Management Facility (WMF) to restrict rodent movement within the site and prevent their migration into surrounding areas. All entry and exit points should be well controlled and sealed where necessary to minimize escape routes., • Implement a comprehensive Integrated Pest Management (IPM) plan within the WMF that includes regular monitoring, trapping, baiting, and environmentally safe rodent control methods, • Ensure that waste, particularly organic waste, is promptly compacted, covered, and stored in designated areas to reduce food sources that attract rodents. Avoid accumulation of waste outside controlled zones, • Maintain high standards of site cleanliness by ensuring timely waste removal, minimizing litter, and eliminating potential rodent nesting sites such as debris piles and overgrown vegetation.	Low
Proliferation of opportunistic Avifaunal Species	Introduction of scavenging avifaunal species	Medium	• All waste materials should be promptly covered using soil, tarpaulins, or other suitable cover materials to minimize exposure. Waste storage areas should be well secured to prevent access by birds and other scavengers, • Waste deposited in landfill cells should be compacted and covered on a daily basis to reduce odours and limit attraction to scavenging bird species, • Use bird control measures such as visual deterrents (e.g., reflective tapes, scare devices), • Ensure that waste is not left exposed for prolonged periods and that litter is promptly collected within the facility to reduce attraction to avifaunal species, • Fast-track the processing or covering of organic waste, which is highly attractive to birds, through composting or immediate disposal, • Install and maintain perimeter fencing to restrict access to the facility and limit entry points for scavengers,	Low

Environmental Component	Potential Impact	Pre-Mitigation Significance	Proposed Mitigation Measures	Post-Mitigation Significance
			• Conduct routine monitoring of bird activity within and around the site to identify trends and implement additional control measures where necessary.	
Insecurity	Safety and security risks associated with informal waste pickers	Medium	• Fence off the entire site boundary using durable and secure materials, and implement strict access control measures. Entry points should be limited and monitored through security personnel, access logs, and surveillance systems such as CCTV cameras, • Engage trained security guards to monitor the facility on a 24-hour basis, ensuring that unauthorized persons, including informal waste pickers, do not access operational areas, • Install clear warning and informational signage around the site indicating restricted areas, potential hazards, and authorized access points only, • Conduct sensitization programs within surrounding communities to inform residents and informal waste pickers about the risks associated with accessing the site, including exposure to hazardous wastes • Ensure that any authorized personnel involved in waste handling are provided with appropriate PPE and trained on safe waste handling practices to minimize risks of injury and disease.	Low
Community Health and Safety	Nuisance impacts on local communities	Medium	• Establish adequate buffer zones between the facility and nearby receptors such as residential areas, schools, and public facilities to minimize impacts related to noise, odour, and air quality , • Implement odour control strategies including prompt waste covering, use of odour neutralizing agents, and proper operation of composting and landfill systems to minimize unpleasant smells, • Apply dust suppression measures such as regular watering of access roads and exposed surfaces, and ensure waste transportation vehicles are covered to prevent littering and dust emissions, • Develop and implement a traffic management plan to regulate movement of waste trucks, designate specific routes, and minimize congestion and disturbance to local communities, • Establish a community liaison office and a clear grievance redress mechanism to allow local residents to raise concerns and receive timely feedback and resolution, and • Conduct periodic monitoring of nuisance parameters (noise, odour, dust/smoke) and take corrective action where thresholds are exceeded.	Low
	Community exposure to hazardous waste	Medium	• Ensure that the Emergency Preparedness and Response Plan (EPRP) adequately addresses potential incidents such as traffic accidents, spillages, and hazardous material releases during waste transportation and handling, • The facility shall be secured through perimeter fencing, controlled access points, and surveillance systems. Only authorized personnel shall be permitted entry into the site. Security measures should include trained	Low

Environmental Component	Potential Impact	Pre-Mitigation Significance	Proposed Mitigation Measures	Post-Mitigation Significance
			personnel, access logs, and monitoring systems to prevent unauthorized access and ensure safe operations, • Waste picking within the facility shall be strictly prohibited due to associated health, safety, and security risks. Clear policies, signage, and enforcement mechanisms shall be implemented to prevent informal waste picking activities, • personnel involved in waste transport and site operations shall receive training on safe handling procedures, emergency response, and compliance with EMCA (Waste Management) Regulation 2024, • Waste transport vehicles shall be well-maintained, covered, and operated by trained drivers to prevent spillages, accidents, and nuisance impacts along transport routes.	
	Community exposure to microbial pathogens	Medium	• Ensure that all waste, particularly biomedical and organic waste, is properly segregated, handled, and treated (e.g., through incineration or controlled disposal) to eliminate or reduce pathogens before final disposal, • Restrict unauthorized access to the site through perimeter fencing, security personnel, and access control systems to prevent community exposure to contaminated materials, • Install and maintain adequate sanitation facilities, including handwashing stations with soap and clean water for workers, to prevent the spread of infectious agents, • Ensure proper collection, containment, and treatment of leachate and wastewater to prevent contamination of surface and groundwater sources that may be used by surrounding communities, • Implement measures to control disease vectors such as flies, rodents, and other scavengers through proper waste covering, pest control programs, and good housekeeping practices, • Require all workers handling waste to use appropriate PPE (e.g., gloves, masks, boots), and ensure proper training on hygiene and infection prevention, and • Conduct regular health screening for workers and implement community awareness programs on hygiene, disease prevention, and safe waste practices.	Low
Health and Safety Risks	Exposure to pathogens	Medium	• Ensure appropriate PPEs e.g. respirators (N-100/P-100 or supplied-air for high-risk tasks), full-body suits, gloves, and boot cover especially for asbestos, sharps, and infectious materials. Include decontamination zones and procedures, • Conduct comprehensive worker training on segregation, handling protocols, emergency response, and hazard recognition; regular medical surveillance (e.g., lung function tests for asbestos workers),	Low

Environmental Component	Potential Impact	Pre-Mitigation Significance	Proposed Mitigation Measures	Post-Mitigation Significance
			• Only licensed/certified personnel shall be allowed to handle asbestos. Procedures like wetting and containment; air monitoring for fiber levels; no eating/smoking in work areas shall be strictly enforced, • Develop and implement a Site Safety Plan with clear SOPs, site control, monitoring, and emergency procedures., • Limit access to hazardous areas and use signage to warn on • asbestos, chemical hazards, and high-noise zones, • Ensure full compliance with the provisions of Occupational Safety and Health Act (OSHA), 2007.	

Assumptions, Uncertainties, and Gaps

The key assumptions and limitations of this ESIA include the inherent uncertainties associated with modelling exercises, such as the Air Quality Impact Assessment (AQIA) and Hydrogeological studies, particularly regarding actual site conditions and the prediction of future events. Such uncertainties are common in environmental assessments. To address this, conservative parameters and reference values are typically adopted by modellers resulting in a tendency to overestimate rather than underestimate potential changes and impacts.

Despite these inherent uncertainties and limitations, they are not considered to compromise the credibility or reliability of the ESIA findings. The results and recommended management actions remain valid and appropriate for guiding decision-making, environmental protection, and sustainable management of the proposed Integrated Waste Management Facility (IWM). Where gaps exist in data or understanding, these have been clearly noted, and monitoring and adaptive management measures are recommended to ensure that unforeseen impacts are detected and mitigated during both construction and operational phases.

Conclusion

The proposed Integrated Waste Handling Facility (IWHF) in Kwale County represents a timely and strategic intervention to address the growing challenge of sustainable waste management in the Country as well as the coastal regions due to rapid urbanization, tourism growth, and increasing generation of domestic, commercial, industrial, medical, and hazardous wastes (including asbestos and used oils).

The ESIA study was conducted in accordance with the Environmental Management and Coordination Act (EMCA) Cap 387 and the Environmental (Impact Assessment and Audit) Regulations 2003, the Sustainable Waste Management Act 2022, the Environmental Management and Coordination (Waste Management) Regulations 2024 (Legal Notice 178/2024), the Kwale County Water and Sanitation Services Act 2020 (No. 2 of 2020) (particularly Sections 62–65 on wastewater and effluent management) and other relevant national and county laws. The ESIA study has comprehensively identified both positive and negative environmental and social impacts across the project lifecycle (construction/establishment, operation, and decommissioning).

Key Positive Impacts include:

- Significant improvement in public health and environmental quality by reducing open dumping, illegal disposal, and associated pollution of water bodies, soils, and coastal ecosystems,
- Creation of direct and indirect employment opportunities during operation, skills development, and revenue generation for the County Government and national agencies through licenses, permits, and fees, and
- Promotion of circular economy principles through waste segregation, recycling, recovery, and resource valorization, aligning with the national Sustainable Waste Management Act 2022.

Negative Impacts, when unmitigated, could include air emissions and odours from treatment processes, leachate and effluent risks to water resources, occupational health and safety hazards (especially from hazardous wastes), noise, traffic, and minor social tensions. However, these impacts are predictable, mostly site-specific or localized, and of low to moderate significance. They can be effectively avoided, minimized, or mitigated to acceptable levels through the comprehensive Environmental and Social Management Plan (ESMP) presented in this report.

In general, the proposed IWHF is environmentally, socially, and economically viable. With the full implementation of the recommended mitigation measures, monitoring plan, and stakeholder engagement commitments, the project will deliver net positive benefits to the Country while safeguarding the right to a clean and healthy environment as enshrined in the Constitution of Kenya 2010 (Article 42).

Recommendation

Based on the findings of the ESIA study, the following recommendations are made:

- **Approval and Licensing:** NEMA is hereby recommended to grant an Environmental Impact Assessment License for the proposed Integrated Waste Handling Facility, subject to the strict implementation of the ESMP contained in this report. The Proponent must also secure all ancillary permits, including Waste handling, transport, treatment, and disposal licenses under the 2024 Waste Management Regulations.

- **Monitoring and Reporting**:
    - Conduct quarterly environmental monitoring (air, noise, water quality, leachate) by NEMA-accredited laboratories, with results submitted to NEMA and the County Government.
    - Maintain a robust waste tracking system and incident logging, with immediate notification to authorities for any significant spills, fires, or exposures.
    -
- **Stakeholder Engagement and Grievance Management**

    - Continue proactive engagement with local communities and county departments throughout project implementation,
    - Operationalize the project-specific GRM with clear timelines, anonymous channels, and zero tolerance for retaliation or SEA/SH.
    -
- **Capacity Building and Compliance**
    - Provide mandatory induction and refresher training for all staff and contractors on waste handling (especially hazardous and asbestos), PPE use, emergency response, and environmental procedures.

The Proponent is committed to responsible project implementation and will collaborate closely with NEMA, Kwale County Government, and other regulatory bodies to realize the full potential of the proposed facility while minimizing any residual adverse effects. It is therefore our considered opinion that the proposed Integrated Waste Handling Facility be approved and allowed to proceed.

Acronym and Abbreviations

ACC	Assistant County Commissioner
AOI	Area of Influence
BOQ	Bill of Quantity
CAP	Climate Action Plan
CIDP	County Integrated Development Plan
CPP	Consultation and Public Participation
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
ESMP	Environment and Social Management Plan
GHG	Green House Gas
GIS	Geographic Information System
GoK	Government of Kenya
NCA	National Construction Authority
NCCAP	National Climate Change Action Plan
NCCRS	National Climate Change Response Strategy
NEMA	National Environment Management Authority
NGO	Nongovernmental Organization
OSHA	Occupational Safety and Health Act
PPE	Personal Protective Equipment
TDS	Total Dissolved Solids
ToR	Terms of Reference
WMP	Waste Management Plan

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CHAPTER 1: INTRODUCTION

1.1. Industry Overview

The National Sustainable Waste Management Policy outlines the benefits of managing waste as a resource in Kenya, including economic, social, and environmental advantages. The policy recognizes that sustainable waste management is critical to delivering on Kenya's constitutional right to a clean and healthy environment, achieving sustainable development goals, and realizing the nation's leadership in the blue economy. The policy aims to establish an enabling regulatory environment that prioritizes waste minimization and contributes to a circular economy. It also supports county governments' mandate to provide sustainable waste management services and provides the framework for coordinated action at the national level. The policy proposes a waste hierarchy that includes reducing waste generation, reusing materials, effective and affordable waste collection, and proper treatment and disposal of residual waste in well-engineered and regulated landfills. The policy also advocates for the creation of green jobs and the formalization of the waste picker sector to improve livelihoods.

It's against this context that Streetcare Enterprises Limited is proposing to establish and operate an Integrated Waste Management (IWM) facility on L.R No. 1681, Mazola Adjudication Section, located in Puma Location, Kinango Sub-County, Kwale County, approximately 10 km northeast of Kinango Town. The proposed project site lies within the expansive hinterland of Kwale County and is strategically positioned to serve the growing demand for sustainable waste management solutions in the wider coast region. Pursuant to Section 58 of the Environmental Management and Co-ordination Act (EMCA), Cap. 387 of the Laws of Kenya, Waste disposal facilities are listed under the Second Schedule as **High-Risk** projects and are therefore subject to the Environmental Impact Assessment (EIA) study prior to implementation. Therefore, pursuant to compliance with established environmental and social safeguards, **Streetcare Enterprises Limited** appointed **Ecosafe Holdings Limited**, an independent environmental firm of experts, to undertake the Scoping Study and Environmental and Social Impact Assessment (ESIA) Full study report (FSR).

1.2. Project Proponent

Streetcare Enterprises Limited is a waste handling facility duly registered in Kenya under the Companies Act. The company operates in accordance with all statutory and regulatory requirements applicable to waste management services in the country. As a registered entity, Streetcare Enterprises Limited is authorized to handle, transport, treat, and dispose of various categories of waste, including Condemn industrial waste, Biomedical waste, Asbestos, and other non-hazardous waste streams. The company is headquartered in Nairobi City County

1.3. Project Objective

The primary objective of the proposed Integrated Waste Management (IWM) handling facility is to provide a safe and suitable site for the handling, treatment, and disposal of various waste streams generated within the country and the larger coastal region. Specifically, the facility aims to:

a) Manage industrial waste by safely collecting, treating, and disposing of non-hazardous and regulated industrial by-products in order to minimize environmental contamination,
b) Treat and dispose of biomedical waste in accordance with national health and environmental regulations, thereby preventing the spread of infectious diseases and protecting public health.
c) Handle and safely dispose of asbestos-containing materials and other hazardous construction residues to prevent exposure risks to workers, the community, and the environment, and
d) Process and manage non-hazardous municipal and commercial waste streams, including organic waste, recyclables, and residual solid waste, in a manner that promotes resource recovery, recycling, and environmentally sound disposal practices.

1.4. Scope and Objectives of EIA

Under Section 2 (Interpretation) of the Environmental Management and Coordination Act, Cap. 387, an Environmental Impact Assessment (EIA) is defined as "*a systematic examination conducted to determine whether or not a programme, activity, or project will have any adverse impacts on the environment*." In

broader terms, an EIA is a vital planning and decision-making tool used to identify, predict, and evaluate the potential positive and negative environmental and social impacts associated with a development project, both in the short and long term. It considers the physical, chemical, biological, economic, cultural, and social dimensions of the environment, ensuring that all likely changes are systematically assessed and mitigated where necessary.

The requirement to conduct an EIA is provided under Section 58(1) of EMCA Cap. 387, which mandates that no proponent shall undertake a project likely to have a significant impact on the environment without the prior approval of the National Environment Management Authority (NEMA). The procedures, standards, and requirements for preparing and submitting EIA reports are detailed in the Environmental (Impact Assessment and Environmental Audit) Regulations, 2003. The scope of this Environmental Impact Assessment (EIA) was defined in accordance with the Terms of Reference (TOR) approved by NEMA and covers all phases of the project, from planning and design through construction, operation, and eventual decommissioning. Specifically, the assessment addressed:

- Baseline studies-Documentation of the current status of the natural and socio-economic environment within the project area, including baseline environmental quality parameters.
- Positive impacts-Identification and evaluation of potential environmental and social benefits associated with the proposed development.
- Negative impacts – Identification, screening, and prediction of possible adverse impacts likely to occur during the construction, operation, and decommissioning phases.
- Mitigation measures – Formulation of strategies to prevent, minimize, or offset identified adverse effects.
- Stakeholder mapping and engagement;
- Environmental and Social Management Plan (ESMP)-Development of a comprehensive ESMP outlining mitigation, monitoring, and reporting measures to ensure effective environmental and social safeguards throughout the project lifecycle.
- Final development of Comprehensive Project (EIA) report for NEMA submission and eventual EIA license issuance.

1.5. Methodology

The Environmental Impact Assessment (EIA) process applied a range of methodologies in full compliance with Section 58 of the Environmental Management and Co-ordination Act (EMCA), Cap. 387, as well as the Third Schedule of the Environmental Management and Co-ordination (Impact Assessment and Audit) Regulations, 2003, which guided the approach to data collection, analysis, and reporting. The approach was further informed by the approved Scope and Terms of Reference (ToR) for the study. The methodologies employed included, but were not limited to, the following:

1.5.1. Desktop Literature Review:

A comprehensive review of existing information was undertaken using published literature, project-specific documents, government reports, and relevant policy and legislative frameworks. This process established the environmental and socio-economic context of the project area, identified potential environmental and social issues, and informed the design of field studies and stakeholder engagement activities.

1.5.2. Assessment of Environmental Baseline Conditions

Baseline studies were undertaken to establish the existing environmental conditions within the project area prior to implementation. The data generated provides benchmark values against which potential project impacts will be assessed and monitored throughout the project lifecycle. The baseline assessment was conducted in accordance with national regulatory requirements and relevant international best practices where applicable.

Table 1: Baseline assessment Methodology

Aspect	Methodology
Ambient Air Quality Monitoring	Ambient air quality monitoring was conducted to determine concentrations of key pollutants, including particulate matter ($PM_{2.5}$ and PM_{10}), sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOCs). • *Methodology:* Use of calibrated portable air quality monitoring equipment at selected representative sampling locations. • *Standards:* Compared against the Environmental Management and Co-ordination (Air Quality) Regulations, 2014 and WHO Air Quality Guidelines.
Noise Level Measurements	Noise measurements were undertaken to establish baseline ambient noise levels within and around the project site. • *Methodology:* Use of a calibrated sound level meter to measure day-time and night-time noise levels (Leq values). • *Standards:* Compared against the Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) Regulations, 2009.
Water Quality Monitoring	Water quality analysis was conducted for both surface and groundwater sources in the vicinity of the project area. • *Parameters:* pH, turbidity, electrical conductivity, dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), heavy metals, and microbial contaminants (e.g., total coliforms). • *Methodology:* Collection of water samples and laboratory analysis following standard procedures (e.g., APHA methods). • *Standards:* Compared against the Environmental Management and Co-ordination (Water Quality) Regulations, 2006, KS EAS 12:2018 specification for natural potable water and WHO drinking water guidelines.
Soil Quality Analysis	Soil sampling and analysis were conducted to determine baseline soil characteristics and contamination levels. • *Parameters:* pH, BTEX, Polycyclic Aromatic Hydrocarbons (PAH) & Total Petroleum Hydrocarbon (TPH), nutrient levels, and presence of heavy metals. • *Methodology:* Collection of composite soil samples from selected locations and laboratory testing. • *Standards:* Benchmarked against FAO guidelines and relevant national environmental standards.
Biodiversity Assessment	A biodiversity survey was undertaken to document existing flora and fauna within the project area and its surroundings. • *Methodology:* Field observations, species identification, habitat assessment, and consultations with local communities. • *Focus Areas:* Vegetation types, wildlife presence, ecological sensitivity, and any endangered or protected species. • *Standards:* Guided by national conservation regulations and international conventions where applicable (e.g., IUCN Red List).

1.5.3.Site survey/Field Observation

On-site reconnaissance was conducted **on 20th March 10th April 2026** to assess the physical, biological, and socio-economic conditions within and adjacent to the project area. These surveys served to verify baseline environmental parameters, ground-truth secondary data, and identify site-specific features or constraints that could influence project design, implementation, and impact mitigation.

1.5.4. Stakeholder Engagement and Public Consultation

Structured consultations were conducted with project-affected persons (PAPs), government agencies, and other relevant stakeholders to identify concerns, capture local knowledge, and incorporate stakeholder perspectives into project planning. This process ensured compliance with the public participation requirements of the Environmental Management and Coordination Act (EMCA) Cap 387 and *Environmental Impact Assessment and Environmental Audit Regulation 2003* and promoted transparency, inclusivity, and social acceptability of the proposed development.

Stakeholders were identified and mapped based on their level of influence and interest using a structured stakeholder analysis matrix. This approach facilitated the categorization of stakeholders according to their potential impact on, or interest in, the project, thereby guiding the engagement strategy and ensuring meaningful participation throughout the project lifecycle.

Following stakeholder identification and analysis, three (3) public consultation meetings were scheduled. Invitation letters were distributed at least one week prior to each meeting to provide adequate notice and encourage broad participation from the affected communities and other relevant stakeholders. The engagement process was primarily facilitated through the active involvement of the area Chief, who played a pivotal role in mobilizing residents, providing local context, and coordinating communication between the project team and the community/project affected persons during the public participation phase.

Other Tools

a) **Geospatial Mapping and GIS Analysis:** Satellite imagery, topographic maps, and Geographic Information System (GIS) tools were utilized to accurately delineate the project location, identify sensitive environmental features, analyze existing land use patterns, and define potential impact zones. This spatial analysis provided a precise geographic framework to support environmental baseline assessments, impact prediction, and the integration of mitigation measures into project planning.

1.6. Impact Identification

The impacts associated with the proposed project were classified according to their **Effect Level.** Each identified adverse impact will be systematically categorized and analyzed to ensure a transparent and consistent assessment framework. Impacts will first be assigned an **Effect Level Classification** categorized as *Low/Negligible, Minor, Moderate, or Major/High* considering feasible mitigation measures. This means that impacts are evaluated not only in their raw form but also in terms of their **residual effect** once mitigation is applied. In order to determine the significance of each impact, two overall factors were considered:

- The importance and/or sensitivity of the environmental and social receiving parameter, as determined during the assessment of baseline conditions; and
- Magnitude and Nature of the impacts.

1.6.1. Sensitivity of the Receiving Parameter

The sensitivity of receiving parameters was determined using information gathered from the baseline description, including the importance, significance, or value of the social or environmental component under assessment. Data was obtained through field visits, site observations, baseline analysis and feedback from community engagements. Understanding the sensitivity of each receiving parameter is critical, as it reflects the adaptability and resilience of the environmental or social component to an identified impact. For the purposes of this assessment, the following categories of sensitivity were applied to evaluate potential effects systematically:

Significance	Narrative
High	The environmental parameter/receptor is fragile, and an impact is likely to leave it in an altered state from which recovery would be difficult or impossible.

Significance	Narrative
Medium	The parameter/receptor has a degree of adaptability and resilience and is likely to cope with the changes caused by an impact, although there may be some residual modification as a result
Low	The parameter/receptor is adaptable and is resilient to change

1.6.2. Magnitude and Nature of the Impact

The magnitude of the impact is the scale of change which the impact may cause compared to the baseline and how this change relates to accepted thresholds and standards. The following categories were applied to the assessment of the anticipated project impacts:

Table 2: Impact Criterion

Criteria	Category	Description
Magnitude of Impact	*High*	A large change compared to variations in the baseline. Potentially a clear breach of accepted limits.
	Medium	Change which may be noticeable and may breach accepted limits.
	Low	When compared with the baseline, change may only just be noticeable. Existing thresholds would not be exceeded.
Type of Impact	*Positive*	Impacts that have a beneficial environmental result, such as enhancement of existing environmental and social conditions.
	Negative	Impacts that have a harmful aspect, such as loss or degradation of environmental resources.
Type of Effect	*Direct*	Impacts clearly and directly attributed to a particular environmental or social parameter (e.g., generation of dust directly impacts air quality).
	Indirect	Impacts associated with or subsequent to a particular impact on a certain parameter (e.g., high dust levels leading to nuisance and health effects to workers).
Duration	*Short Term*	Effects disappear within 1 year or once construction activities are completed.
	Medium Term	Effects disappear within a 5-year period.
	Long Term	Effects last for more than 5 years.
Reversibility	*Reversible*	Impact significance will reduce and disappear over time (naturally or artificially) once the impacting activity ceases.
	Irreversible	Impact significance will not reduce or disappear over time, even after the activity ceases.

A qualitative assessment was conducted using professional experience, judgment, and available knowledge, and including the consideration of stakeholder views. Where there are limitations to the data, and/or uncertainties, these were recorded in the relevant chapters in the EIA report, along with any assumptions that were taken during the assessment.

1.6.3. Impacts Scoping

Potential impacts as per the Leopold matrix were identified in relation to their effects on potential receptors. These steps facilitated the elimination and scoping out irrelevant impacts taking into consideration the following:

- Type of project
- Location
- Characteristics of the surrounding environment.
- Receptor sensitivity or importance depends on its nature, value, scarcity etc.

There are three types of receptors:

- On site receptors encompassing soil and workplace.
- Receptors surrounding the site such as ambient air, humans, plants and animals.
- Final sinks/receptors such as surface and groundwater/wetlands

1.6.4.Assessing the Significance of the Impacts

The concept of 'significance' is central to the EIA process and aids the identification and categorization of environmental and social effects. As noted, in order to determine impact significance, the sensitivity of each environmental and social parameter/receptor is considered in combination with the magnitude of the impact. The table below demonstrates how these parameters were considered in the assessment of significance.

Table 3: Assessment of the Significance of the Impact

Significance of the Impact		**Magnitude and Nature of the Impact**		
		Low	Medium	High
Sensitivity of Receptors	Low	Not significant	Minor	Minor
	Medium	Minor	Minor	Moderate
	High	Minor	Moderate	Major

1.7. Rationale and Justification

The proposed Integrated Waste Handling Facility by Streetcare Limited is a timely and essential intervention to address the critical gaps in Kenya's solid waste management system. It aligns directly with the constitutional right to a clean and healthy environment under Article 42 of the Constitution of Kenya (2010) and supports national policy and legal frameworks for sustainable waste management. Kenya generates approximately 22,000–24,000 tonnes of solid waste per day, amounting to over 8 million tonnes annually, with per capita waste generation ranging between 0.3 and 0.8 kg per person per day depending on levels of urbanization and income. However, only about 55–60% of this waste is collected, while the remainder is either openly dumped, burned, or illegally disposed of in the environment.

The National Sustainable Waste Management Policy (2021) and the Sustainable Waste Management Act, 2022 (No. 31 of 2022) emphasize the waste management hierarchy prioritizing prevention, reduction, reuse, recycling, recovery, and safe disposal as the foundation for a circular economy. The National Solid Waste Management Strategy (2015, with ongoing implementation) calls for integrated solid waste management (ISWM) systems that maximize resource recovery, minimize landfill use, and engage private sector investment. Kenya's Vision 2030 and the Nationally Determined Contributions (NDCs) under the Paris Agreement further identify sustainable waste management as a key mitigation measure for climate change and a driver of job creation and green growth. The proposed facility directly supports these objectives by providing modern, centralized infrastructure for waste handling, sorting, composting organic fractions, and controlled management of residuals.

Demonstrate private-sector leadership in compliance with the Environmental Management and Coordination Act (EMCA), Cap. 387, the Waste Management Regulations (2006 as amended), and the Sustainable Waste Management Act, 2022, which explicitly encourage public-private partnerships and investment in waste infrastructure. The project is consistent with the polluter-pays principle and extended producer responsibility provisions in the Sustainable Waste Management Act, 2022, while contributing to Sustainable Development Goals. Therefore, the proposed Integrated Waste Handling Facility by Streetcare Limited is not only justified by the documented scale of the waste management crisis in Kenya but is an imperative response to national policy requirements. It will deliver measurable environmental protection, social benefits, and economic value recovery, advancing Kenya's transition to a sustainable, circular waste economy.

1.8. Estimated Project Cost

The estimated cost for the establishment of the proposed project is approximately **Kenya Shillings: 23,916,435**. This projected budget encompasses procurement of equipment, installation, upgrading works, and all other associated activities necessary for the successful commissioning and operation of the integrated waste handling facility.

CHAPTER 2: PROJECT DESCRIPTION

2.1. Overview

Accordingly, this chapter provides a comprehensive description of the proposed project, detailing the project design, layout, capacity, and the key technologies to be adopted during construction and operation phases. It also presents the geographical context of the project by describing its location, site characteristics, land ownership, and proximity to key infrastructure and sensitive environmental or social receptors.

2.2. Proposed Location

The proposed Integrated Waste Handling Facility will be situated at Chirima Cha Uha village in Mazola sub-location, Kinango Sub-County, Kwale County. The site is geographically georeferenced by the GPS coordinates: **Latitude: -4.059603** and **Longitude: 39.346475**. A prominent nearby landmark is Chirima Cha Uha Primary School, situated approximately 1.8 kilometres from the project site.

Plate 1: View of Site Location as Observed During Site Survey

2.3. Nature of The Project (Components)

The proposed Integrated Waste Handling Facility will feature a well-planned layout that strategically integrates administrative, operational, treatment, composting, burial, and residual management components. The design will optimize material and vehicle workflow to enhance occupational health and safety. The component shall include:

2.3.1.Asbestos Disposal Landfill

Asbestos waste is classified as hazardous due to its carcinogenic fibers. When asbestos-containing materials deteriorate or are disturbed during renovation, demolition, or improper disposal, microscopic fibers can become airborne and inhaled, leading to long-term health consequences. The proposed asbestos disposal unit will involve the safe handling and disposal of asbestos-containing materials. Asbestos waste will be double-bagged, clearly labeled, and disposed of in a designated, lined asbestos disposal cell within the landfill. The cell will be isolated, covered immediately after disposal, and capped to prevent fiber release and leaching. The depth for the cells to be dug will depend on the hydrogeological survey to be undertaken

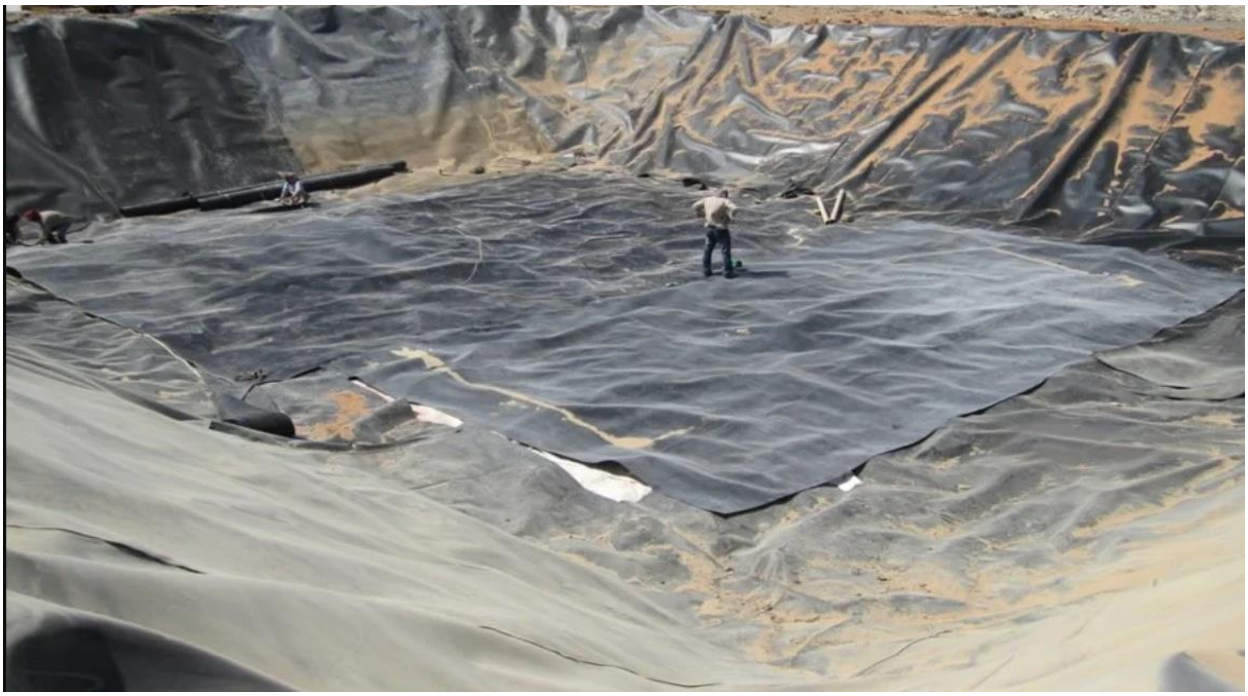


Plate 2: Typical Asbestos Disposal Site Design

2.3.2. Incineration Facility

The incineration unit will be designed for the treatment of hazardous, medical and industrial wastes. Incineration works by subjecting waste to high temperatures in a controlled combustion chamber, significantly reducing waste volume and destroying pathogens and toxic organic compounds. The facility will include air pollution control systems such as scrubbers and filters to minimize emissions, and ash generated will be safely disposed of in the engineered landfill or deep burial cells.

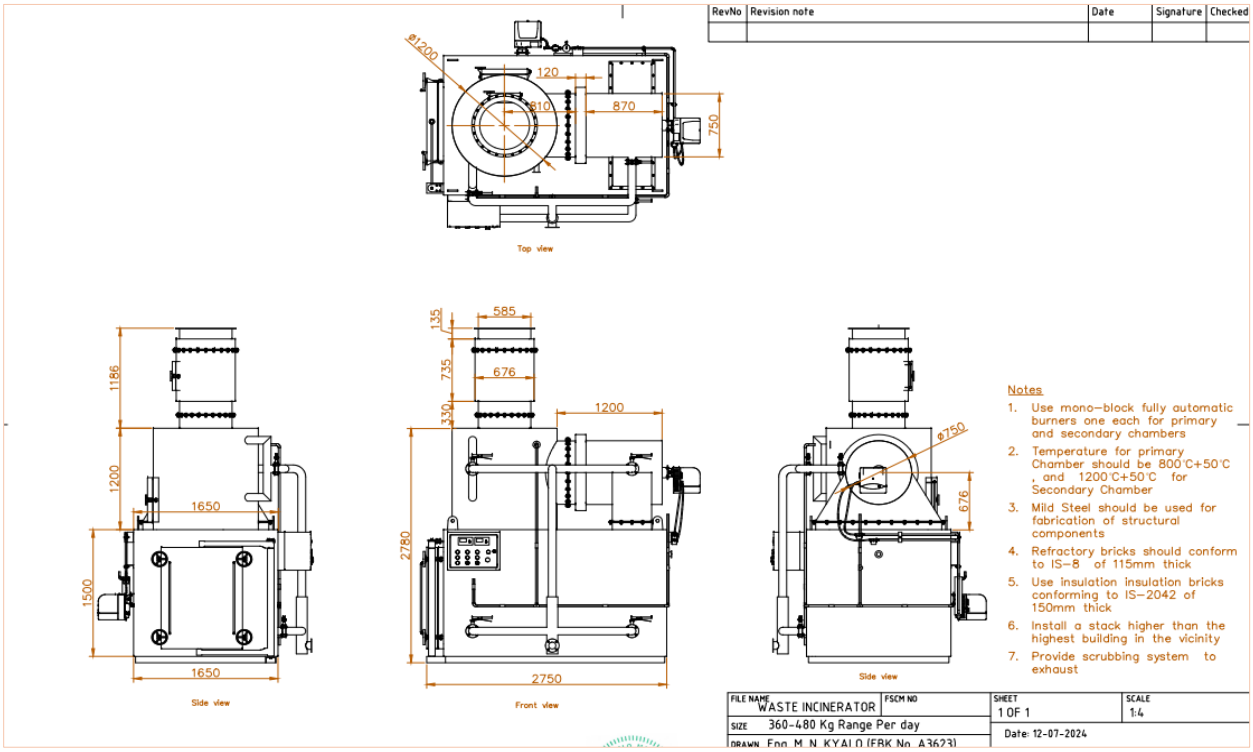


Figure 1: Incinerator Design Drawings

The proposed oil-fired incinerator has a capacity of burning 45 - 60Kgs of waste per hour. The Incinerator will be constructed using high temperature refractory, insulated and then encased in a steel frame. The primary chamber is rectangular in shape insulated and fully encased in a steel casing. The selection of waste would determine the average output of the incinerator as all wastes have different burning rates. The incinerator has two main chambers and a chimney. The primary chamber will be used for burning of the wastes and removal of ash and the secondary chamber shall be used for incineration of fine suspended particles and unburnt waste gases prior to passing to the exhaust chimney chamber.

Table 4: Key Components of Incinerator

Component	Description / Specification
Steel Incinerator Frame Casing	• The outer shell will be fabricated from mild steel plate with an internal lining comprising high-temperature refractory incinerator bricks, high-temperature cement, and modular cast sections to allow practical assembly and ease of replacement.
Loading / Ash Door	• A side-hinged loading door will be provided for manual waste charging and ash removal. The door will be fitted with a non-asbestos seal to minimize gas escape, an inner refractory plate, and a secure locking mechanism when not in use.
Chimney (Stack)	• A steel chimney will be connected to the exhaust spigot, with refractory cast using high-temperature cement. The chimney will have a minimum height of 10 meters above ground level and will extend at least 3 meters above the highest point in the area. An emission sampling port and access ladder will be provided.
Refractories	• Refractory cement will be 90% alumina high-temperature castable cement capable of withstanding temperatures up to 1,750°C. Fire bricks will be 70% alumina and will be joined using fondu cement.
Insulation	• Insulation will be of calcium silicate to minimize heat loss and improve thermal efficiency.
Primary Burner	• One (1) diesel-fired pressure jet burner with an extended flame tube will be supplied and installed for waste ignition. The burner will incorporate a forced draft fan impeller, positive displacement geared oil pump, ignition transformer, and flame failure cut-out. The system will ensure a minimum chamber temperature of 850°C for complete combustion.
Secondary Burner	• A diesel-fired secondary burner will be installed to ensure final incineration of combustible gases and toxic residues in the exhaust stream. The burner will incorporate a forced draft fan impeller, positive displacement geared oil pump, ignition transformer, and flame failure cut-out.
Blower Fan	• A blower fan comprising a 5 HP motor with a centrifugal-type fan will be incorporated to supply combustion air, assist afterburner operation, and maintain exhaust draft.
Temperature Sensors	• Type K temperature sensors will be installed in both the primary and secondary chambers. Each sensor will be connected to a temperature controller located on the main control panel for continuous monitoring.
Main Control Panel	• An electrical panel will be mounted on the incinerator side. It will contain MCBs, contactors, individual switches for burners and fan, temperature controllers, and indicator lights for power, operation, and lock-out status.
Air Pollution Control System (Wet Scrubber)	• A stainless-steel wet scrubber system with water recirculation tank, level sight glass, and spray nozzles will be installed for emission control in compliance with NEMA standards.

The dual-chamber design (primary and secondary combustion) will ensure efficient destruction of organic matter while maintaining the required temperatures and residence times for low-emission performance. The system will incorporate continuous temperature monitoring, automatic flame failure protection, and a wet scrubber for effective control of particulate matter, acidic gases, and other pollutants.

2.3.3.Composting Facility

The proposed Integrated Waste Handling Facility will include a dedicated composting unit designed to process the biodegradable organic fraction of solid waste, which constitutes approximately 50–65% of the waste stream in Kenya. The unit will primarily handle biodegradable organic waste. Composting is a biological process in which naturally occurring microorganisms break down organic material under controlled aerobic conditions, resulting in the production of stable, nutrient-rich compost. The composting unit will be engineered to maintain optimal conditions for aeration, moisture, temperature, and carbon-to-nitrogen ratio to ensure efficient decomposition and pathogen reduction.

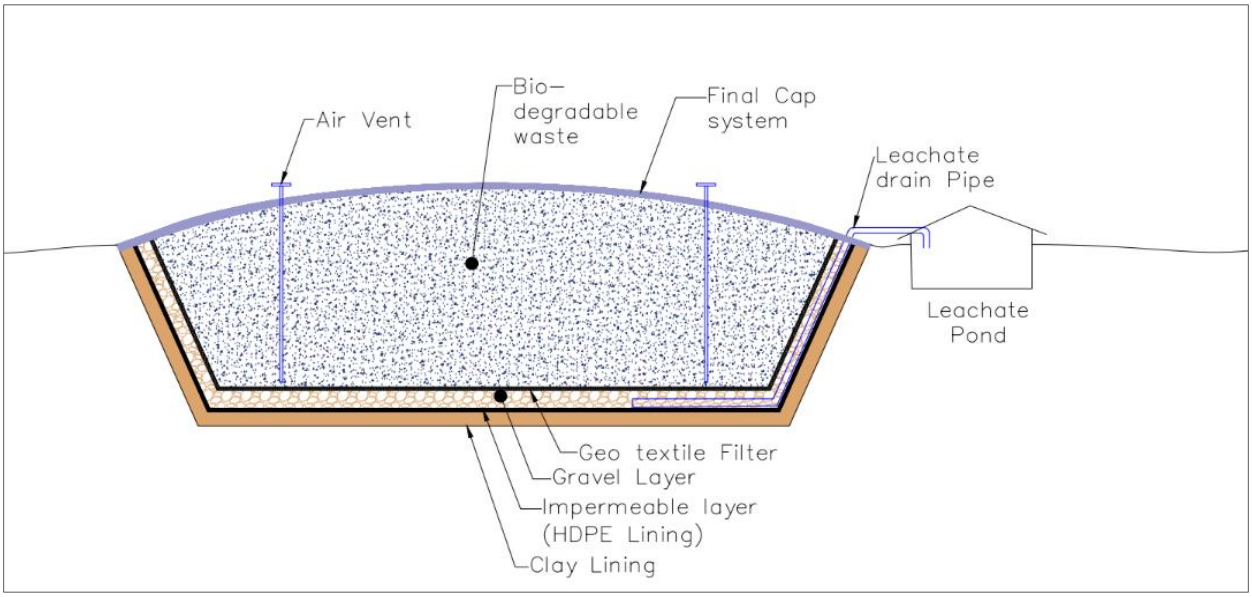


Figure 2: Landfill Composting Sketch

2.3.4.Leachate Handling

The proposed Integrated Waste Handling Facility will incorporate a robust leachate management system to prevent contamination of ground and surface water resources. Sanitary landfill operations and waste treatment activities can generate leachate, a highly polluted liquid formed when water percolates through waste. If not properly managed, leachate can contaminate both groundwater and surface water bodies. A well-engineered leachate drainage and collection system will be constructed beneath the residual waste management and disposal zones. The system will consist of the following layers (from top to bottom):

- A geo-textile filter (800 g/m²) designed to prevent contamination or plugging of the drainage system by fine solids;
- A drainage layer consisting of sand, gravel, or a thick plastic mesh that will collect leachate and facilitate its flow into the collection system;
- Perforated pipes, specifically designed to allow gravity flow of leachate towards low points for efficient collection and subsequent treatment.

The collected leachate will be pumped from the collection sumps to a temporary leachate storage pond within the facility. From the pond, the leachate will be transported off-site and discharged into a sewer system for treatment as an admixture with domestic sewage.

2.3.5.Deep Burial Facility

The proposed facility will incorporate a carefully designed deep burial system for the safe disposal of specific residual waste streams. This system will be used exclusively for certain non-recyclable, non-compostable hazardous residues that cannot be effectively managed through other treatment options. Deep burial will serve as the final disposal method for these limited waste fractions, ensuring they are isolated from the environment in a secure and controlled manner. The burial pits will be engineered with high

standards of environmental protection to prevent any contamination of soil and groundwater. The deep burial pits will be constructed with the following key safeguards:

- Impermeable liners (geomembrane or compacted clay liners; A protective non-woven geo-textile to prevent punctures in the HDPE sheet; A sheet of HDPE (at least 2 mm thick); compacted with 500mm of clay soil lining) installed at the base and sides of the pits to prevent leachate migration into the surrounding soil and groundwater,
- Leachate collection and control measures are integrated into the pit design to capture and manage any liquids that may be generated.
- Immediate covering of waste after placement with suitable cover material to minimize exposure, odour, vector attraction, and wind-blown litter.

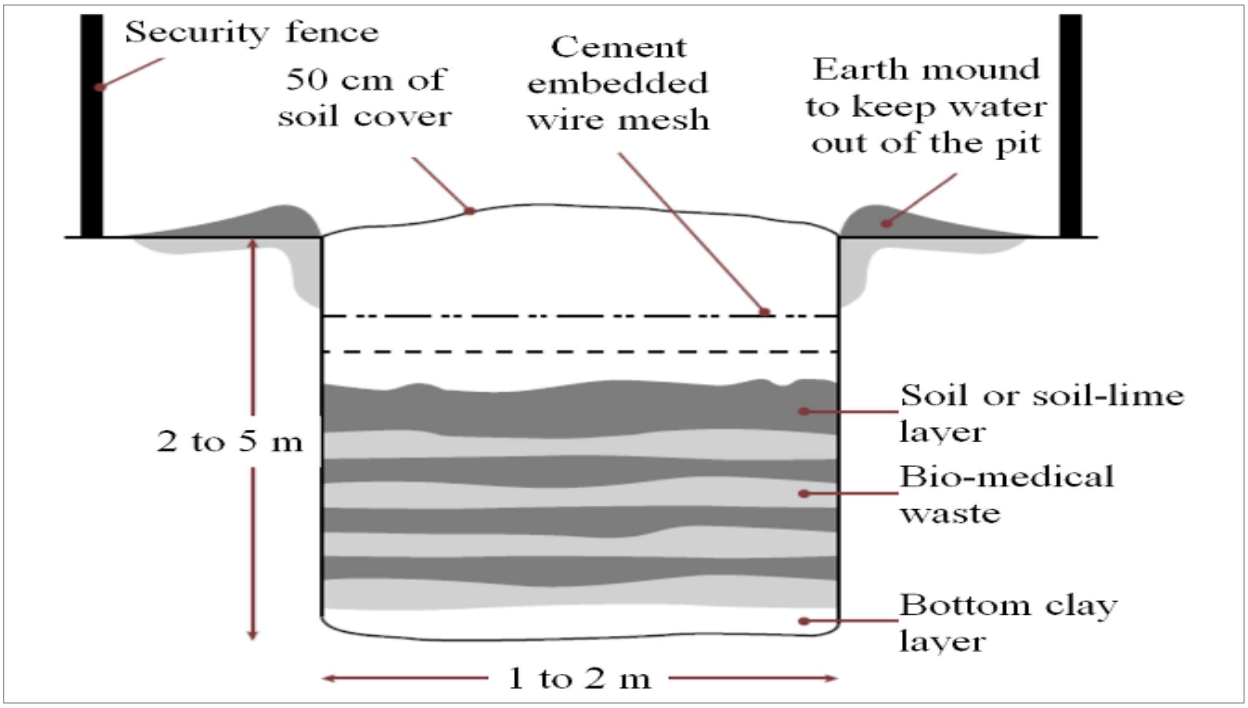


Figure 3: Diagrammatic sketch of standard for Waste Burial Pit

2.3.6.Recycling Used Oil Facility

The used oil recycling unit will treat waste oils from vehicles, industries, and generators. The process will involve filtration, separation of water and contaminants, and re-refining or recovery for reuse as industrial fuel or lubricants, in compliance with regulatory standards. This component will reduce environmental pollution and promote circular economy practices.

The used oil sludge handling facility will comprise of three oil storage tanks installed above ground with a capacity of 30,000 liters each, a loading and offloading area, and an oil/water interceptor. The tanks will be mounted on concrete slabs above a paved ground (2ft high) with a drain to channel the oil sludge into the oil/water interceptor. At the interceptor, oil will be separated from water. The end product is furnace oil which will be sold-off to industrial clients for further re-use or used within the site to run the incinerator

2.4. Support Ancillaries

2.4.1.Storm Water Drainage

As a critical ancillary infrastructure, the proposed waste handling facility will incorporate a comprehensive stormwater drainage system. This system will play a vital role in minimizing leachate generation by preventing clean stormwater from surrounding areas from entering the waste handling and residual disposal zones. Effective stormwater management will reduce the volume of leachate produced, lower the risk of groundwater and surface water contamination, and enhance overall operational efficiency of the facility. The stormwater drainage system will be designed and have the following components:

a) Perimeter Drains: Drains will be constructed surrounding the entire landfill and residual waste management area to intercept and divert stormwater originating from outside the facility, preventing it from flowing into the waste handling zones.
b) Dikes and Embankments: Dikes or embankments will be installed around active and future landfill cells to prevent stormwater generated from non-operational areas of the site from entering the waste layers.
c) Surface Drainage on Completed Areas: surface drains will be constructed to separate stormwater from leachate and efficiently channel clean runoff away from the landfill areas.

2.4.2.Spill Control

As part of the ancillary infrastructure for safe chemical and fuel storage, the proposed Integrated Waste Handling Facility will incorporate a robust bund wall system around all diesel storage tanks and other liquid storage facilities. A bund wall will be constructed surrounding the storage tanks. The bund wall will be constructed of brick or concrete with an oil-tight lining and will be fully sealed to the concrete base beneath the tank supports.

The capacity of the bunded area will be designed to hold at least 110% (10 per cent greater) of the total volume of the storage tanks contained within it. This shall provide adequate secondary containment in the event of tank failure, overflow, or spillage. The bund wall will be constructed using oil-proof materials and will be structurally capable of withstanding considerable liquid pressure in the event of an overflow or emergency situation.

No permanent drain will be incorporated into the bunded area. Instead, suitable facilities will be provided to safely remove any rainwater that may accumulate within the bund. A sump equipped with a semi-rotary hand pump will be installed for this purpose, allowing controlled removal of rainwater while preventing the escape of any spilled fuel or oil.

2.4.3.Decentralized Wastewater Treatment System (DEWATS)

The proposed project will incorporate a Decentralized Wastewater Treatment System (DEWATS) to effectively treat all wastewater generated on site. This will include wastewater from operational activities, staff sanitary facilities, and processes associated with leachate management. DEWATS is a low-energy, robust treatment technology that relies on a combination of natural and biological processes. The system will typically consist of anaerobic baffled reactors, constructed wetlands, and polishing ponds arranged in series to achieve effective treatment with minimal energy input and operational costs. The DEWATS unit will be designed to handle the expected wastewater volumes while ensuring high removal rates of organic matter, suspended solids, nutrients, and pathogens.

2.5. Project Activities

2.5.1.Construction Activities

The construction phase of the proposed Integrated Waste Handling Facility will be implemented in a phased and systematic manner to ensure safety, quality, minimal environmental disruption, and full compliance with all applicable regulatory requirements. All construction activities will be carried out under the supervision of qualified engineers and technical personnel, strictly following the approved designs and specifications outlined in Annexure.

Main Construction Activities

The construction works will generally proceed in the following sequential phases:

a) **Site Preparation and Clearance** The site at Chirima Cha Uha, Mazola sub-location, will undergo vegetation clearing, topsoil stripping, and leveling where necessary (Planned areas only). Only minimal vegetation will be removed, and cleared topsoil will be stockpiled for later use in landscaping and site rehabilitation.
b) **Earthworks and Site Grading**: Excavation and earthworks will be undertaken to create platforms for the various facility components, including the sorting and storage hall, composting area,

incineration unit, deep burial pits, leachate collection system, and access roads. Cut and fill operations will be carefully balanced to minimize soil erosion and off-site material movement.

c) **Civil and Structural Works**: Construction of foundations, reinforced concrete structures, bund walls, drainage channels, and perimeter fencing will be carried out. This phase will include:
   - Construction of the incinerator foundation and housing.
   - Lining of deep burial pits with impermeable geomembranes or compacted clay.
   - Installation of leachate collection pipes and drainage layers.
   - Construction of stormwater perimeter drains, dikes, and surface drainage systems on completed areas.
   - Building of the administrative block, and staff facilities.

d) **Installation of Specialized Systems**
   - Installation of the dual-chamber incineration system, including burners, chimney, wet scrubber, and control panel.
   - Construction and equipping of the composting unit (windrow pads or aerated systems).
   - Construction of bunded areas around diesel storage tanks with oil-tight lining and sump/pump facilities.
   - Laying of internal access roads, utility services (water, electricity, and sanitation), and fire-fighting infrastructure.

e) **Ancillary Infrastructure** Perimeter security fencing, green buffer zones, signage, and monitoring wells will be installed. Final landscaping and site restoration will be undertaken to improve aesthetics and control dust and erosion.

f) **Testing, and Commissioning:** Upon completion of civil and mechanical works, all systems (incinerator, leachate collection, stormwater drainage, and composting unit) will undergo rigorous testing and commissioning to verify performance and compliance with design specifications and NEMA standards. Staff training on operational procedures will also be conducted before the facility becomes fully operational.

2.5.2.Main Operational Activities

The proposed Integrated Waste Handling Facility will carry out its operations in a systematic and sequential manner to ensure efficiency, safety, and full environmental compliance. Project activities will follow a clear waste management hierarchy and optimized workflow designed to maximize resource recovery while minimizing environmental impacts. The facility's core activities will be performed in the following sequential order:

a) **Waste Reception and Weighing:** Incoming waste collection vehicles will be received at the designated reception area for accurate quantification and documentation of waste volumes.

b) **Waste Segregation and Sorting:** Waste will undergo manual segregation to separate recyclables, organic portions, and residual waste. Special attention will be given to identifying and isolating hazardous or special waste streams.

c) **Treatment and Processing**
   - Biodegradable organic waste (50–65% of the waste stream) will be directed to the composting unit for biological treatment.
   - Non-recoverable residual waste will be treated through the dual-chamber incineration system where appropriate.
   - Incinerator ash and other non-recyclable, non-compostable residues will be directed to the engineered deep burial pits.

d) **Recycling and Resource Recovery:** Recovered materials will be prepared for reuse or sale, contributing to the circular economy and generating revenue streams.

e) **Final Disposal of Residuals:** Only minimal residuals (incinerator ash and selected hazardous fractions) will undergo deep burial in lined pits with appropriate leachate controls.

f) **Asbestos Waste**: Strictly segregated upon receipt and managed as a hazardous waste stream in full compliance with the National Guidelines on Safe Management and Disposal of Asbestos (NEMA). Asbestos-containing materials will be received in properly packaged form (double-wrapped in heavy-duty plastic sheeting and clearly labeled). Final disposal of asbestos waste will occur in specially designated sections of the engineered deep burial pits, ensuring immediate covering, minimal disturbance, and long-term isolation to prevent fibre release and environmental or health risks.

2.6. By-products and Residual Waste Management

By-products: By-products will primarily arise from thermal and chemical treatment processes. Incineration activities will generate ash and slag as the main combustion by-products, which will be managed in accordance with applicable environmental and health standards.

Residual Waste: Residual waste will consist of materials that cannot be recovered or further treated. This includes:

- Asbestos waste, which will be disposed of in HDPE-lined burial pits in full compliance with the National Guidelines for Safe Management and Disposal of Asbestos (2013).
- Other residual wastes, such as contaminated personal protective equipment (PPE), spent filters, and rejected recyclables that cannot be processed safely.

All residual wastes will be securely stored, properly tracked, and disposed of within the designated hazardous waste section of the facility to ensure safe long-term containment and minimize environmental and health risks.

2.7. Gaseous Emissions

Operational processes, particularly the dual-chamber incineration system and any chemical treatment activities, will generate gaseous emissions including carbon dioxide (CO_2), water vapour, and trace amounts of particulates. These emissions will be effectively controlled through a dedicated Air Pollution Control System comprising wet scrubbers, filters, and a chimney stack. The chimney will have a minimum height of 10-metres above ground level (as specified in the incinerator design) to ensure adequate dispersion. All emissions will be managed to comply with the Environmental Management and Coordination (Air Quality) Regulations, 2024, and other relevant NEMA standards. Regular stack emission monitoring by accredited laboratories will be conducted to verify compliance.

CHAPTER 3: LEGAL, REGULATORY AND INSTITUTIONAL FRAMEWORK

3.1. Brief Overview

This chapter presents the applicable national and international environmental and social legislation, policies, and institutional frameworks governing waste handling facilities in Kenya, with specific reference to the proposed project (Integrated Waste Handling Facility). It outlines the key statutory and policy provisions guiding project planning, development, and operation, and identifies relevant international conventions to which Kenya is a signatory. Compliance with these instruments is essential to ensure the project aligns with both domestic regulatory requirements and global environmental and social commitments.

3.2. Kenya Policy Provisions

3.2.1. National Sustainable Waste Management Policy, 2021

The National Sustainable Waste Management Policy, 2021 provides the overarching national framework for sustainable waste management in Kenya. The overall goal of the Policy is to protect public health and the environment, as well as drive job and wealth creation, by establishing an enabling environment for sustainable, integrated waste management and the minimization of waste generation, thereby contributing to a circular economy. The Policy explicitly seeks to advance Kenya towards the realization of the Zero Waste principle, whereby waste generation is minimized or prevented at source. It further emphasizes that waste should be collected, separated at source, reused, recycled, and that the remaining residual waste stream is directed to secure, sanitary landfills.

The proposed facility fully aligns with the Policy by implementing an integrated approach that prioritizes waste segregation, composting of the high organic fraction (50–65%), material recovery and recycling, controlled incineration of suitable residuals, and secure deep burial for incinerator ash and limited hazardous streams (including asbestos) in engineered pits. This design supports the waste management hierarchy, promotes resource recovery and a circular economy, creates employment opportunities (especially for youth and the informal sector), and reduces reliance on uncontrolled dumpsites.

3.2.2. National Solid Waste Management Strategy, 2015

The National Solid Waste Management Strategy, 2015 provides a comprehensive national framework for improving solid waste management practices across Kenya. The Strategy promotes an integrated solid waste management (ISWM) approach that prioritizes waste minimization, segregation at source, recycling, composting, and resource recovery, with disposal as the last resort. Key objectives of the Strategy include:

- Phasing out uncontrolled and open dumpsites and promoting the development of modern, engineered sanitary waste management facilities and landfills.
- Enhancing waste collection coverage and efficiency throughout the country.
- Strengthening institutional capacity, stakeholder coordination, and public awareness on sustainable waste management.
- Encouraging greater private sector participation and investment in the waste value chain, including collection, recycling, composting, and treatment services.
- Supporting the transition toward a more sustainable, efficient, and environmentally responsible waste management system that aligns with the waste management hierarchy.

The proposed Integrated Waste Handling Facility is fully aligned with the National Solid Waste Management Strategy, 2015. The facility will incorporate waste reception and segregation, composting of the high organic fraction, material recovery and recycling, controlled incineration of suitable residuals, and secure deep burial for non-recoverable fractions (including incinerator ash and asbestos-containing waste). By establishing a modern, integrated waste management infrastructure in Kinango Sub-County, Kwale County, the project will contribute directly to the Strategy's goals of reducing reliance on uncontrolled dumpsites, promoting resource recovery, creating employment opportunities, and improving environmental and public health outcomes in the region.

3.2.3. National Environment Policy Sessional Paper No. 10 of 2014

The main goal of this Sessional Paper is to integrate environmental considerations into Kenya's national planning and management processes, thereby providing a clear policy framework for environmentally sustainable development. It emphasizes the sustainable management of the country's natural resources including unique terrestrial and aquatic ecosystems as a foundation for national economic growth and improved livelihoods.

To achieve this, the Sessional Paper promotes and supports environmental research, capacity development, and the application of innovative management tools. These include economic instruments such as incentives and disincentives, total economic valuation of ecosystem services, the use of indicators for sustainable development, and the full suite of environmental assessment and compliance mechanisms including but not limited to:

- Strategic Environmental Assessments (SEAs),
- Environmental Impact Assessments (EIAs), and Environmental Audits (EAs).

Relevance: *The proposed project aligns directly with the objectives of this Sessional Paper by incorporating environmental considerations into project design, construction, and operation. The EIA process ensures that potential impacts on land, biodiversity, water, and communities are assessed and mitigated. Moreover, the project supports national sustainability goals by generating clean, renewable energy, enhancing energy security, and contributing to green economic growth, while safeguarding sensitive ecosystems and promoting community well-being*.

3.2.4. Vision 2030

The Kenya Vision 2030 is the national long-term development blueprint aimed at transforming Kenya into a globally competitive and prosperous nation with a high quality of life by 2030, within a clean, safe, and sustainable environment. Anchored on the economic, social, and political pillars, the Vision emphasizes sustainable development, including the management of natural resources and environmental protection. Within the context of waste management, Vision 2030 recognizes the need to modernize solid waste handling systems, promote resource recovery, recycling, and safe disposal, and integrate environmentally sustainable practices into urban and rural development. Proper waste management is viewed as a key component for achieving public health, environmental quality, climate resilience, and sustainable industrial growth, contributing directly to the economic and social objectives of Vision 2030.

By supporting initiatives such as Integrated Waste Management Facilities, the country can reduce environmental pollution, recover valuable resources, generate green jobs, and advance towards a circular economy thereby aligning infrastructure development with the long-term goals of Vision 2030.

3.2.5. Kwale County Spatial Plan (2022–2032)

The Kwale County Spatial Plan (2022–2032) is the primary long-term spatial planning document for the county. It provides a strategic framework aimed at transforming the livelihoods of the people of Kwale and improving their quality of life. The Plan focuses on key pillars including creation of employment opportunities, poverty reduction, improvement of environmental conditions, delivery of essential infrastructure and services, optimal harnessing of the County's natural resources, and promotion of good governance.

A core emphasis of the Kwale County Spatial Plan is the recognition of the vulnerability of development interventions to the impacts of climate change. The Plan strongly advocates for climate-resilient land use planning and recommends that all proposed developments incorporate measures that enhance resilience, promote environmental sustainability, and contribute to a liveable environment for the county's residents. The proposed Integrated Waste Handling Facility by Streetcare Limited, located at Chirima Cha Uha in Mazola sub-location, Kinango Sub-County, aligns strongly with the objectives of the Kwale County Spatial Plan (2022–2032). The project will:

- Contribute to improved environmental conditions by addressing the county's challenges of uncontrolled dumpsites, open burning, and poor waste management through modern integrated waste handling practices.
- Support poverty reduction and job creation by generating direct and indirect employment opportunities in waste collection, sorting, composting, recycling, and facility operations, while integrating the informal waste sector.
- Promote climate change resilience by diverting organic waste from dumpsites (thereby reducing methane emissions), recovering resources through composting and recycling, and incorporating climate-smart design features such as stormwater management, leachate control, and vegetative buffers.
- Demonstrate sustainable land use by establishing a dedicated, well-engineered waste management facility on appropriately zoned land, consistent with the Plan's call for climate-resilient spatial development.

By implementing best practices in waste segregation, resource recovery, and environmentally sound disposal (including secure management of asbestos and other hazardous residues), the facility will support the Spatial Plan's vision of an industrious, self-sufficient people in a liveable environment. This project therefore represents a practical contribution toward the realization of the Kwale County Spatial Plan's goals of sustainable development, environmental protection, and climate resilience in Kinango Sub-County and the wider Kwale County.

3.2.6. The Constitution of Kenya, 2010

The Constitution of Kenya, 2010, adopted in August 2010, serves as the supreme legal foundation for environmental and social impact assessments in the country. It establishes a comprehensive framework to guide both current and future development, shaping national and sectoral legislation. Article 42 guarantees every person the right to a clean and healthy environment, including the obligation to safeguard it for the benefit of present and future generations through legislative and other appropriate measures.

The Constitution also embeds public participation as a central principle of governance. Articles 10, 42, and 69 collectively emphasize the involvement of citizens in environmental decision-making, ensuring inclusive management, conservation, and protection of natural resources. Article 10 specifically identifies citizen participation, sustainable development, and the protection of marginalized lands as national values and principles of governance. Article 69 outlines the State's obligations in environmental management, including the sustainable utilization of resources, promotion of public participation, and enforcement of environmental rights. ***Relevance*****:** *These constitutional provisions provide the legal foundation for the Environmental and Social Impact Assessment (ESIA) process for the project. They require that the project be implemented in a manner that safeguards environmental quality, ensures equitable and transparent land use, and incorporates public and stakeholder participation throughout its planning, construction, and operational phases*.

3.3. Relevant National Legal Frameworks

3.3.1. Environmental Management and Coordination Act Cap 387

The Environmental Management and Co-ordination Act (EMCA) is an Act of Parliament that establishes a legal and institutional framework for effective environmental management in Kenya. It serves as an umbrella law aimed at enhancing the coordination of various sectoral statutes related to the environment. As the principal environmental legislation in the country, EMCA affirms that every individual has the right to a clean and healthy environment. If this right is being, or is likely to be, violated, individuals have the right to seek legal redress.

To uphold this right, Part (VI) of the Act (Section 58) mandates that proponents of projects listed in the Second Schedule conduct Environmental Impact Assessment (EIA) and submit the EIA report to the National Environment Management Authority (NEMA) in the prescribed format, including the required information and fee. Additionally, Section 68 of the Act requires operators of existing projects to conduct environmental audits to assess their compliance with the commitments made in the EIA. Both the EIA and environmental audit reports must be submitted to NEMA for review and appropriate action.

3.3.2.Relevant Regulation under EMCA Cap 387

Table 5: Summary of Relevant EMCA Regulation

Regulation	Relevance
EMCA Impact Assessment and Audit) Regulations, 2003	The Environmental (Impact Assessment and Audit) Regulations, 2003, as amended, require that Environmental Impact Assessments (EIAs) and Environmental Audits (EAs) be undertaken by a registered lead expert or a firm of experts duly accredited by the National Environment Management Authority (NEMA). Such assessments must be carried out in accordance with approved Terms of Reference (ToR) developed during the scoping phase, ensuring that the scope of work adequately addresses all potential environmental and social impacts of the proposed project. In line with the regulations, the proposed project (Establishment of Integrated Waste Handling Facility) has been classified as a **High-risk** project due to its nature, and potential environmental and social interactions. Consequently, the law requires the preparation of a Comprehensive Environmental and Social Impact Assessment (ESIA) Study Report, which must be submitted to NEMA for review and licensing before project implementation can commence. ***Relevance:*** *This ESIA study has been undertaken by a NEMA-registered Environmental Impact Assessment Lead Expert, supported by a multidisciplinary team of sector specialists. The assessment process followed all statutory requirements, including baseline environmental studies, stakeholder consultations, impact identification and evaluation, and the formulation of mitigation and monitoring measures.*
EMCA (Waste Management) Regulations, 2024 (Legal Notice No. 178 of 2024)	The regulation operates under the Environmental Management and Coordination Act to provide a framework for the management of waste and abatement of pollution guaranteed under Article 42 of the Constitution and statutory guarantees of ensuring clean, safe and sustainable environment for all people. The regulations apply to the handling, storage, transportation, segregation and destruction of waste by providing for guidance, procedures and standards for environmental governance to ensure compliance in the waste management sector. **Relevance:** *The proponent will develop and implement the Waste Management Plan in compliance with the provisions of this regulation.*
EMCA (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009	This regulation prohibits any person from causing 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. It gives standards for maximum permissible noise levels for construction sites, mines, and quarries. It also gives maximum permissible noise levels for silent zones, places of worship, residential (indoor/outdoor), mixed residential; and commercial. **Relevance:** *Project work should be planned in a way that limits excessive noise and vibration, especially near sensitive receptors.*
EMCA (Water Quality) Regulations, 2024 (Legal Notice No. 177 of 2024	The regulations provide for the prevention of water pollution and protection of sources of water and apply to drinking water, water used for industrial purposes, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife and water used for any other purposes. They establish standards for wastewater management to ensure clean and healthy water resources and provision of standards for water for different uses. Section 5. A waste generator shall collect, segregate and dispose the waste in the manner provided in regulation 6 of these Regulations. **Relevance:** *The government shall engage qualified site operators who will conduct periodic site visits and ensure that all environmental and social parameters are effectively monitored in accordance with the Environmental Management Plan (EMP) outlined in this report.*
EMCA (Air Quality) Regulations, 2024 (Legal	The Regulations provide for prevention, control and abatement of air pollution to ensure clean and healthy air. They apply to internal combustion engines, premises,

Regulation	Relevance
Notice No. 180 of 2024	places, processes, operations or works to which the provisions of the EMCA and the Regulations made apply. The regulation is a significant improvement of the 2014 Regulations and introduces various improvements including emission testing from mobile sources. **Relevance:** *The project implementers shall ensure full compliance with the applicable Air Quality Regulations by conducting regular maintenance of machinery and equipment, as well as routine monitoring and measurement of atmospheric emissions to ensure adherence to permissible limits.*

3.3.3. The Water Act, 2016

The Water Act, 2016 operationalizes Articles 43 and 62 of the Constitution of Kenya, providing the framework for the regulation, management, and conservation of water resources, and the provision of water and sanitation services. It establishes the Water Resources Authority (WRA) as the principal regulator of water resources in Kenya, with the mandate to ensure sustainable, equitable, and efficient utilization of water. Under the Act, any abstraction of surface or groundwater, construction of water works, or discharge of effluent into a water body requires a water use permit from the WRA. The Act also provides guidelines for the protection of water catchments and riparian reserves to maintain ecological integrity. Section 94(1) of the Water Act, 2016 provides that: *"Nothing in this Act shall deprive any person or community of water services on the grounds only that provision of such services is not commercially viable."*

This clause reinforces the constitutional right to accessible and adequate water (Article 43(1)(d) of the Constitution of Kenya, 2010) and safeguards communities particularly those in underserved rural or arid areas from being excluded from water services purely on economic grounds. In relation to the proposed project in Kwale County, this provision will ensure that:

- Any water use for the project will not limit or restrict existing community access to water sources.
- Where project water abstraction is necessary, priority will be given to sustaining local domestic, livestock, and wildlife needs before other use.
- The project will adopt water conservation technologies (e.g., dry panel cleaning where feasible) to minimize water demand, thereby safeguarding the community's water security.
- Engagement with the Water Resources Authority (WRA) and local water service providers will ensure that water supply arrangements are equitable and sustainable.

By aligning with Section 94(1), the project will not only comply with statutory provisions but also upholds social responsibility commitments to protect community welfare.

3.3.4. The Occupational Safety and Health Act, 2007

The Occupational Safety and Health Act, 2007 (OSHA 2007) is a comprehensive legal framework aimed at ensuring the safety, health, and welfare of all workers and other persons lawfully present at workplaces. It applies to every workplace in Kenya whether temporary or permanent including offices, factories, schools, academic institutions, plantations, and construction sites. The primary objectives of OSHA 2007 are to:

- Secure the safety, health, and welfare of persons at work through the identification, elimination, and control of workplace hazards.
- Protect non-workers from risks to safety and health arising from activities conducted in the workplace.
- Establish an institutional mechanism for enforcement through the National Council for Occupational Safety and Health and the Directorate of Occupational Safety and Health Services (DOSHS).

For the proposed project proponent and its contractors will be obligated to comply fully with OSHA 2007 requirements throughout the project life cycle covering the design, construction, operation, and decommissioning phases. This entails:

- *Conducting initial and periodic workplace risk assessments.*
- *Providing adequate and well-maintained safety equipment and PPE to all personnel.*
- *Training workers on occupational safety, health, and environmental protection.*
- *Ensuring safe working conditions for all subcontractors and visitors to the site.*
- *Reporting any workplace accidents, incidents, or occupational diseases to DOSHS as required by law*.

Compliance with OSHA 2007 not only ensures adherence to legal requirements but also safeguards worker welfare, minimizes operational risks, and enhances project sustainability.

3.3.5. Sustainable Waste Management Act, 2022

The Sustainable Waste Management Act, 2022 (Act No. 31 of 2022) is Kenya's primary legislation establishing the legal and institutional framework for sustainable waste management. It promotes the constitutional right to a clean and healthy environment, the waste hierarchy (avoidance, reduction, reuse, recycling, recovery, and finally safe disposal), and a shift toward circular economy principles. The Act commenced on 26 July 2022.

Under Section 14(1), every county government is mandated to establish a materials recovery facility (MRF). These facilities are intended to serve as central points for waste processing. In accordance with Section 14(2), such facilities are used for the final sorting, segregation, composting, and recycling of waste, after which residual waste is transported to long-term storage or disposal facilities, including sanitary landfills. Furthermore, Section 14(3) requires that all materials recovery facilities be licensed by the Authority, namely the National Environment Management Authority, while Section 14(4) empowers the Cabinet Secretary to develop regulations on their establishment and management.

In addition to facility establishment, counties are required to ensure proper waste infrastructure development. Although broadly addressed across the Act, the obligation to develop waste recovery systems, recycling facilities, and disposal infrastructure such as sanitary landfills is reinforced under county waste management functions, including Section 17(b) and planning provisions. These provisions ensure that non-recoverable waste is safely managed while maximizing material recovery and reuse.

The Act also imposes strict licensing and operational requirements. Under Section 8(d), the Authority is responsible for issuing licenses for waste management activities, while Section 14(3) specifically applies this requirement to materials recovery facilities. Additionally, Section 21(2) mandates that waste service providers must deliver segregated waste only to licensed and designated facilities, thereby strengthening compliance and preventing illegal dumping or unregulated disposal.

3.3.6. The Physical and Land Use Planning Act, 2019 No. 13 of 2019

This Act of Parliament consolidates laws relating to the planning, use, regulation, and development of land in Kenya. It operationalizes provisions of the Constitution of Kenya, 2010, particularly Articles 60 (principles of land policy) and 66 (regulation of land use), and aligns land-use planning with sustainable development objectives. The Act establishes a clear framework for national, county, and inter-county physical and land use planning through the preparation and approval of plans such as:

- National Physical and Land Use Development Plan – guiding spatial development at the national level.
- County Physical and Land Use Development Plans – integrating land use with infrastructure, environmental protection, and socio-economic needs at the county level.
- Local Physical and Land Use Plans – covering towns, trading centres, rural settlements, and special planning areas.

Key provisions relevant to the proposed project include Section (56) Requirement for Development Permission: Any person intending to carry out development must obtain approval from the relevant County Physical and Land Use Planning authority including amongst others.

a) Public Participation – Planning processes must include meaningful engagement with local communities and stakeholders to ensure inclusivity and transparency.
b) Harmonization with Environmental Laws-Development proposals must integrate environmental management measures and comply with laws such as EMCA, 1999, and its regulations.
c) Special Planning Areas-The County Government may declare certain areas as Special Planning Areas if they have unique environmental, economic, or cultural significance, requiring more detailed planning controls.
d) Enforcement and Compliance-The Act empowers authorities to take action against developments undertaken without approval or in contravention of planning conditions. Project-Specific Compliance Measures will be required to:

- *Obtain formal development permission from the Kwale County Physical and Land Use Planning Office before construction begins.*
- *Submit detailed site layout plans, access road alignments, and ancillary facility locations for approval.*
- *Ensure that project design aligns with the County's Integrated Development Plan (CIDP) and County Spatial Plan.*
- *Provide for adequate buffer zones, landscaping, and drainage in line with planning consent conditions.*
- *Participate in public consultation sessions convened by the County to capture community views on land use impacts.*

Compliance with the Physical and Land Use Planning Act 2019 will ensure that the project's land use is well coordinated, environmentally sustainable, and compatible with the long-term spatial development vision Kwale County.

3.3.7. The Employment Amendment Act of 2022

This Act establishes the minimum terms and conditions of employment. The Act sets forth the relationship between an employer and a worker. It defines the benefits, duties and obligations of the employer and the worker, which includes contract of service, prohibition against forced labour, discrimination in employment, sexual harassment, payment of wages, leave, termination, and living amenities.

The Act requires written contracts for jobs longer than three months (Section 9–10), outlining terms like wages, working hours, and duties. Wages must be paid in legal tender and on time, with no unauthorized deductions (Sections 17–20). Employees are entitled to equal pay for equal work (Section 5(5)). (Section 27) and provides for 21 days of annual leave (Section 28), 90 days maternity and 2 weeks paternity leave (Section 29). Termination must be fair and follow due process (Sections 35–46), with notice or pay in lieu. Redundancy requires proper notice and severance pay (Section 40). Child labor is restricted, with strict limits on work by persons under 18 (Sections 56–61). Disputes are handled by the Employment and Labour Relations Court (Sections 87–90), and employers must keep records for at least five years (Section 74). Penalties apply for violations of the Act. **Relevance:** *During the project implementation phase, the proponent will engage a combination of full-time and casual workers to support various project activities. In line with national labor laws and international labor standards, the contractor shall be required to strictly observe the prevailing basic minimum conditions of employment, as provided under the Employment Act, 2022 to prevent Child labour*.

3.3.8. The Work Injury Benefits Act of (WIBA), 2007

The Work Injury Benefits Act, 2007 is legislation enacted to provide compensation to employees who suffer injuries, diseases, or death arising out of and during the course of employment. It applies to all employees in Kenya, whether employed on a permanent, casual, or contract basis, except members of the armed forces. (Section 7) Employers are required to obtain and maintain an insurance policy covering all their employees against work-related injuries and diseases. Failure to do so is an offence. Sections 10–13; An employer must report any workplace injury or accident to the Director of Occupational Safety and Health Services (DOSHS) within seven days. In the event of death, notification must be immediate. Sections 6, 16–24; Compensation is payable when an employee is injured, disabled, or dies due to work. Types of compensation include:

- Medical expenses
- Temporary or permanent disability benefits
- Compensation to dependents in the event of death

Disability compensation depends on the degree of incapacity. For permanent total disability, the employee is entitled to 80% of monthly earnings for up to 96 months, subject to limits. ***Relevance:*** *The proponent will ensure all employees are cover under life insurance cover and full compliance with the provisions of this Act*.

3.4. Social Risks Legislations

Table 6: Relevant Social Risks Legislations

Legislation	Relevance
The Sexual Offences Act 2006	The Sexual Offences Act, 2006 provides a comprehensive legal framework for the prevention, prosecution, and punishment of all forms of sexual offences in Kenya. It criminalizes a wide range of sexual violations, including rape, defilement, sexual harassment, exploitation, and indecent acts. Under the Act, employers, including contractors and implementing agencies, have a duty to: • Prevent and respond to any form of sexual offence occurring within the project environment • Implement Codes of Conduct for all workers prohibiting SH/SEA • Establish confidential and accessible Grievance Redress Mechanisms (GRMs) for reporting sexual offences The Act is particularly relevant during the construction and implementation phases of the project, where interactions between project workers and local community members especially vulnerable groups such as women, girls, and children may expose individuals to the risk of Sexual Harassment (SH), Sexual Exploitation and Abuse (SEA), and Gender-Based Violence (GBV).
HIV/AIDS Prevention and Control Act (Act No.14 of 2006, Revised in 2012)	The HIV and AIDS Prevention and Control Act (HAPCA), Act No. 14 of 2006, is a key piece of legislation in Kenya aimed at addressing the HIV/AIDS epidemic. It was revised in 2012 to enhance its provisions and align them with evolving public health needs and human rights standards. The Act mandates the government to promote public awareness about HIV/AIDS through comprehensive educational campaigns. These campaigns are to be conducted in schools, workplaces, prisons, and communities, focusing on scientifically proven approaches and encouraging HIV testing. The Contractor will make provision for Voluntary Counselling and Testing (VCT) services for employees and locals, as well as conduct training on HIV/AIDS awareness programmes throughout project lifecycle.

3.5. County Governments Act, 2012 (2020 Amendment)

The County Governments Act, 2012 is a foundational law that operationalizes the devolution provisions of Kenya's Constitution (2010). The Act outlines the roles, powers, and functions of county governments in governance, planning, service delivery, and development control within their respective jurisdictions. The Act mandates each county to prepare a County Integrated Development Plan (CIDP), which guides all development activities, including infrastructure, housing, and environmental conservation.

Under Part XI, the county governments have the authority to regulate land use, approve development applications, and monitor compliance with environmental and physical planning laws. The Act supports sustainable development and empowers counties to enforce policies that promote ecological sustainability, conservation of natural resources, and climate adaptation within urban environments. ***Relevance:*** *The County Government Act is highly relevant in several respects. First, the Act empowers the County Government of Kwale to oversee and regulate land use, environmental conservation, and economic activities within its jurisdiction. This includes issuing permits, enforcing local bylaws, and coordinating development initiatives that impact natural resources. Therefore, the proponent shall seek all relevant approvals before commencement of works.*

3.6. Kwale County Water and Sanitation Services Act, 2020

This is an act enacted by the Kwale County Assembly to provide a comprehensive legal and institutional framework for the provision, management, and regulation of water and sanitation services within Kwale County. It was assented in March 2020 and complements the National Water Act, 2016, while operationalizing the devolved function of water and sanitation services under the Fourth Schedule of the Constitution of Kenya 2010. The objectives of the act include:

- Establish a clear institutional framework for water and sanitation service delivery in Kwale County.
- Promote sustainable, equitable, and efficient provision of water supply and sanitation services.
- Ensure protection of water resources and prevention of pollution.
- Define roles for the County Government, water service providers, and other stakeholders.
- Provide for wastewater management, effluent standards, and related enforcement mechanisms.

The Act comprehensively addresses both water supply and sanitation services, with specific provisions dedicated to wastewater and effluent management. Section 62 mandates County Governments and licensed water service providers to ensure the provision of adequate sanitation infrastructure and services, thereby safeguarding public health and environmental quality. Section 63 defines wastewater management as the systematic process of collecting, treating, and safely disposing of or reusing wastewater, and emphasizes the need for appropriate systems to prevent environmental contamination.

Further, Section 64 requires that all wastewater and effluent discharges comply with prescribed standards, aligned with national Water Quality Regulations and the Environmental Management and Coordination Act (EMCA). In addition, Section 65 prohibits the unauthorized discharge of contaminated water or effluent into water bodies, drainage systems, or the surrounding environment, and establishes strict penalties and enforcement measures to ensure compliance and protect environmental integrity. ***Relevance:*** Any leachate from waste storage, treatment (e.g., biodigester, chemical neutralization), or incineration residues must be collected, treated, and discharged only after meeting effluent quality standards (Sections 63–65) of the act.

3.7. International Safeguard Frameworks

3.7.1.IFC Environmental and Social (E&S) Performance Standards

The IFC Environmental and Social (E&S) Performance Standards are widely regarded as the most comprehensive and practical framework in the industry. As part of the World Bank Group, the IFC offers a robust suite of guidance documents to help assess and manage environmental and social issues throughout the project development lifecycle. Beyond serving as a widely accepted benchmark for good practice, IFC guidance also forms the technical foundation for the Equator Principles the E&S framework adopted by banks and financial institutions for project finance. As a result, IFC standards have become the de facto international benchmark for responsible project financing worldwide. At its core, the IFC Policy on Environmental and Social Sustainability translates the organization's commitment to sustainable development into clear, actionable practice. The policy aims to:

- Strengthen the predictability, transparency, and accountability of IFC's decision-making;
- Support clients in better managing their environmental and social risks and impacts, while continuously improving performance; and
- Deliver meaningful, positive development outcomes on the ground.

The IFC Performance Standards (PS) on Environmental and Social Sustainability provide a comprehensive framework for identifying, managing, and improving project performance. They apply across the entire project lifecycle from planning and assessment, through construction and operations, to eventual closure and decommissioning. For this proposed project, the proponent is committed to fully complying with these Performance Standards throughout the life cycle of the proposed project. The IFC performance standards that shall form part of the project implementation include the following:

- **Performance Standard 1:** Assessment and Management of Environmental and Social Risks and Impacts

- **Performance Standard 2:** Labor and Working Conditions
- **Performance Standard 3:** Resource Efficiency and Pollution Prevention
- **Performance Standard 4:** Community Health, Safety, and Security
- **Performance Standard 5:** Land Acquisition and Involuntary Resettlement
- **Performance Standard 6:** Biodiversity Conservation and Sustainable Management of Living Natural Resources
- **Performance Standard 7:** Indigenous Peoples
- **Performance Standard 8:** Cultural Heritage,

Table 7: IFC Performance Standards on Environmental and Social Sustainability

ESS No.	ESS Title	Key Requirement	Relevance to the Project
PS1	Assessment and Management of Environmental and Social Risks and Impacts	PS1 underscores the importance of managing social and environmental performance throughout the life of a project by using a dynamic social and environmental management system. Specific objectives of this Performance Standard are: • To identify and assess social and environment impacts, both adverse and beneficial, in the project's area of influence; • To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment; • To ensure that affected communities are appropriately engaged on issues that could potentially affect them; and • To promote improved social and environment performance of companies through the effective use of management systems.	***Streetcare Limited*** has commissioned this Environmental and Social Impact Assessment to assess, manage, and monitor E&S risks and impacts of the proposed Project throughout the Project lifecycle. The ESIA has included all the issues and items specified in the PS1.
PS2	Labour and Working Conditions	The requirements set out in this PS2 have been in part guided by several international conventions negotiated through the International Labor Organization (ILO) and the United Nations (UN). Specific objectives of this Performance Standard are: • To establish, maintain and improve the worker-management relationship; • To promote the fair treatment, non-discrimination and equal opportunity of workers and compliance with national labor and employment laws; • To protect the workforce by addressing child labor and forced labor; and • To promote safe and healthy working conditions, and to protect and promote the health of workers	The Project activities will involve a workforce of approximately 10-15 employees, skilled and unskilled workers during the construction phase and around 6 workers and staff during the operations phase. The Project will have to align with IFC PS2 requirements for complying with labour standards, ensuring no forced labour throughout its supply chain, nondiscrimination and equal opportunity, appropriate labour accommodation requirements for temporary resting tent and provision of appropriate occupational health and safety management procedures.
PS3	Resource Efficiency and Pollution Prevention	This Performance Standard outlines a project approach to pollution prevention and abatement in line with international available technologies and practices. It promotes the private sector's ability to integrate such technologies and practices as far as their use is technically and financially feasible and cost-effective in the context of a project that relies on commercially available skills and resources. Specific objectives of this Performance Standard are: • To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; and • To promote the reduction of emissions that contribute to climate change	The IFC Performance Standard 3 (PS3): Resource Efficiency and Pollution Prevention is directly applicable to the proposed Integrated Waste Management Facility, as the project inherently deals with waste handling, treatment, recovery, and disposal activities that have significant potential to impact environmental quality and human health if not properly managed.

ESS No.	ESS Title	Key Requirement	Relevance to the Project
PS4	Community Health, Safety, and Security	This PS recognizes that project activities, equipment, and infrastructure often bring benefits to communities including employment, services, and opportunities for economic development. However, projects can also increase risks arising from accidents, releases of hazardous materials, exposure to diseases, and the use of security personnel. While acknowledging the public authorities' role in promoting the health, safety and security of the public, this PS addresses the project sponsor's responsibility in respect of community health, safety, and security.	The IFC Performance Standard 4 (PS4): Community Health, Safety, and Security is highly relevant to the proposed Integrated Waste Management Facility, as the project will involve activities that may pose risks to nearby communities if not properly managed. While the facility will provide socio-economic benefits such as employment and improved waste management services, it also introduces potential health and safety concerns that must be proactively addressed. To address these risks, the project will implement: • Air quality and odor control measures; • Proper containment systems for waste and leachate.
PS5	Land Acquisition and Involuntary Resettlement	Involuntary resettlement refers both to physical and economic displacement because of project-related land acquisition. Where involuntary resettlement is unavoidable, appropriate measures to mitigate adverse impacts on displaced persons and host communities should be carefully planned and implemented.	**Relevant:** Not triggered. The proposed site location does not belong to the community, is privately owned and there is no anticipated displacement of people**.**
PS6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	This Performance Standard reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote the use of renewable natural resources in a sustainable manner. This Performance Standard addresses how project sponsors can avoid or mitigate threats to biodiversity arising from their operations as well as sustainably manage renewable natural resources. Specific objectives of this Performance Standard are: • To protect and conserve biodiversity; and • To promote the sustainable management and use of natural resources through the adoption of practices that integrate conservation needs and development priorities.	The proposed project is located in an area that has been significantly modified by human activities, primarily agriculture and settlement. As a result, the site does not fall within or in proximity to any ecologically sensitive or legally protected areas, critical habitats, or areas of high biodiversity value. Despite the low ecological sensitivity of the site, the requirements of PS6 remain relevant in ensuring that project activities do not result in unnecessary degradation of the existing biodiversity. The project will therefore adopt appropriate mitigation measures to: • Minimize vegetation clearance and habitat disturbance; • Avoid introduction or spread of invasive species; and • Promote restoration of disturbed areas where feasible.
PS7	Indigenous Peoples	Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic,	**Relevant:** Not Triggered: The proposed Project site is not inhabited by any indigenous or underserved communities.

ESS No.	ESS Title	Key Requirement	Relevance to the Project
		social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. The objective of standard are: • To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples. • To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts. • To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner.	
PS8	Cultural heritage	Performance Standard 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities. objectives include: • To protect cultural heritage from the adverse impacts of project activities and support its preservation. • To promote the equitable sharing of benefits from the use of cultural heritage	**Not applicable:** The proposed Project does not border any site of cultural significance. However, in the unlikely event that any heritage or cultural resources are encountered during Project related activities, appropriate measures shall be undertaken.

3.8. IFC Environmental, Health and Safety (EHS) General Guidelines

In addition to the Performance Standards, the IFC provides sector-specific Environmental, Health, and Safety (EHS) Guidelines that offer detailed, practical recommendations. For the proposed Integrated Waste Management Facility (IWMF), the following IFC EHS Guidelines are particularly relevant:

a) **IFC General Environmental, Health, and Safety Guidelines**: These standards provide overarching guidance applicable to all sectors, including air emissions, wastewater management, waste handling, occupational health and safety, community health and safety, and resource efficiency. They form the baseline standards for environmental and social management across the project lifecycle.

b) **IFC EHS Guidelines for Waste Management Facilities 2007**: These are directly applicable to the proposed project and provide specific guidance on the design, operation, and closure of waste management facilities. Key areas include:

- Waste segregation, treatment, and disposal practices;
- Leachate and landfill gas management;
- Odour, noise, and dust control;
- Hazardous waste handling;
- Monitoring and reporting requirements.

c) **IFC EHS Guidelines for Water and Sanitation** (*where applicable*): Relevant for managing wastewater, stormwater runoff, and potential impacts on surface and groundwater resources associated with the facility.

d) **IFC EHS Guidelines for Occupational Health and Safety:** Applicable to ensure safe working conditions for personnel involved in waste handling, processing, and facility operations.

The proposed Integrated Waste Management Facility (IWMF) will be designed, constructed, and operated in alignment with the applicable IFC Environmental, Health, and Safety (EHS) Guideline. The project will adopt measures to prevent and minimize environmental pollution in line with IFC standards. This shall include but not limited to:

- Proper site planning to reduce impacts on surrounding land uses;
- Implementation of engineered landfill systems (e.g., liners, leachate collection, and treatment systems);
- Control of air emissions, including dust, landfill gas, and odor management;
- Surface water and groundwater protection through drainage systems and monitoring programs; and
- Resource efficiency practices such as waste segregation, recycling, and material recovery.

3.8.1. Incineration Standards Kenya

Incineration in Kenya is governed under the Environmental Management and Coordination Act (EMCA), Cap 387 which provides the overarching legal framework for environmental protection, and its subsidiary legislation, notably the Environmental Management and Co-ordination (Air Quality) Regulations, 2024. The Air Quality Regulations (2024) are specifically designed to:

- Prevent, control, and abate air pollution;
- Protect human health and the environment; and
- Regulate emissions from stationary sources such as incinerators.

Under these regulations, an incinerator is classified as a stationary source of air pollutants, and therefore subject to strict emission control, licensing, and monitoring requirement. The 2024 regulations define priority pollutants that must be controlled, many of which are directly associated with incineration:

- Particulate Matter (PM_{10} and $PM_{2.5}$);
- Sulphur Oxides (SOx);

- Nitrogen Oxides (NOx);
- Carbon Monoxide (CO);
- Volatile Organic Compounds (VOCs);
- Hydrogen Chloride (HCl);
- Heavy metals (e.g., Lead, Mercury); and
- Dioxins and furans (critical for incinerators).

3.9. Relevant Institutional Framework

Several government and regulatory institutions are mandated to oversee various components of environmental management, land use planning, water and sanitation services, Safety, and public infrastructure all of which are central to the proposed project. Outlined below represent institutions and their relevance but not limited to

Table 8: Relevant Institution

Institution	Mandate and Relevance
National Environment Management Authority (NEMA)	The National Environment Management Authority (NEMA) is a statutory agency established under the Environmental Management and Coordination Act (EMCA), Cap 387, as the principal instrument of the government in the implementation and coordination of all matters relating to the environment. The NEMA core mandate includes: • Formulating and implementing environmental policies and guidelines. • Supervising and coordinating environmental impact assessments and audits. • Enforcing environmental laws and standards. • Monitoring the state of the environment and issuing Environmental Impact Assessment (EIA) licenses. • Coordinating environmental protection activities at the national and county levels. NEMA plays a regulatory and oversight role, particularly in ensuring that all project activities are compliant with environmental laws and are sustainably implemented.
County Government of Kwale	As a devolved unit under the Constitution of Kenya, 2010, the County Government of Kwale holds significant jurisdiction over critical aspects of the proposed project. This includes authority over land use planning, local licensing, development approvals, and community engagement processes within its administrative boundaries. The County Government is mandated to: • *Formulate and implement County-level legislation and policies that guide sustainable development in alignment with national objectives;* • *Approve and regulate local development activities, including aquaculture, through development control mechanisms such as zoning, physical planning approvals, and building permits;* • *Facilitate public participation and stakeholder engagement, ensuring that the voices of local communities and interest groups are integrated into project planning and implementation;* • *Support local economic development, including job creation and value chain development within the fisheries and aquaculture sectors;* • *Ensure the integration of environmental considerations into local development decisions, particularly through collaboration with agencies such as NEMA.*

CHAPTER 4: BIOPHYSICAL AND SOCIO-ECONOMIC BASELINE INFORMATION

2.1. General Overview

This chapter presents a detailed description of the existing physical and biological conditions of the proposed project site and its surrounding areas that may be directly or indirectly affected by the project. Establishing these baseline conditions is essential for accurately predicting potential environmental impacts and for developing appropriate mitigation measures. The baseline characterization provides a benchmark against which any future changes to environmental quality, attributable to the project, can be measured. Data collection was therefore guided by the need to:

- Identify sensitive environmental receptors within and around the project area;
- Quantify existing environmental quality parameters; and
- Provide a scientifically defensible reference for impact prediction and management.

2.2. Administrative Setting of Kwale County

Kwale County is located in the coastal region of Kenya. Geographically, the County lies between Latitudes 3°03' and 4°45' South and Longitudes 38°31' and 39°31' East, encompassing a total area of approximately 8,270.2 km², of which 62 km² consists of water bodies such as rivers, wetlands, and portions of the Indian Ocean coastline. Kwale County is bordered by Taita-Taveta County to the north, Kilifi County to the northeast, the Republic of Tanzania to the south, and the Indian Ocean to the east. Its strategic location along the coastal corridor linking Mombasa and Tanzania provides access to major transport routes, trade corridors, and socio-economic hubs.

2.3. Project Location

The proposed Integrated Waste Handling Facility by Streetcare Limited will be situated at Chirima Cha Uha village in Mazola sub-location, Kinango Sub-County, Kwale County. The site is geographically georeferenced by GPS coordinates: **Latitude: -4.059603** and **Longitude: 39.346475**. A prominent nearby landmark is Chirima Cha Uha Primary School, situated approximately 1.8 kilometres from the project site.

Figure 4: Proposed Site Location (Google Map Extract)

2.4. Physical Environment

2.4.1.Physiography

Kwale County comprises four major topographical zones: the coastal plain, foot plateau, coastal uplands, and Nyika plateau.

a) The Coastal Plain is approximately 30m above sea level 30m and extends to 10 km inland, with the Mombasa-Lunga Lunga Road running almost along the centre of the plain. The coral reef runs almost parallel to the 250km coastline, 300m to 1000m away from the shoreline.
b) The Foot Plateau, which rises behind the Coastal Plain, lies between 60m and 135 meters above sea level. At the base of the Foot Plateau are Jurassic Rocks which are exposed in the northern part of the County. On the eastern edge of the plateau, there is a long ridge of sandhills composed of Magarini sands.
c) The Coastal Uplands (commonly known as the Shimba Hills), which rise steeply from the foot plateau, lies at an altitude of 150m to 462m and are composed of many sandstone hills that include the Shimba Hills (420m), Tsimba (350m), Mrima (323m) and Dzombo (462m). Apart from a few summits, the Uplands are more or less flat-topped.

The Nyika Plateau (also known as the hinterland) extends from the western edge of the Coastal Uplands as the terrain drops steeply to a plateau, which rises gradually from about 180m. It is a semi-arid area characterized by a basement rocks system except for occasional patches of reddish sandy soils and occupies over half of the County.

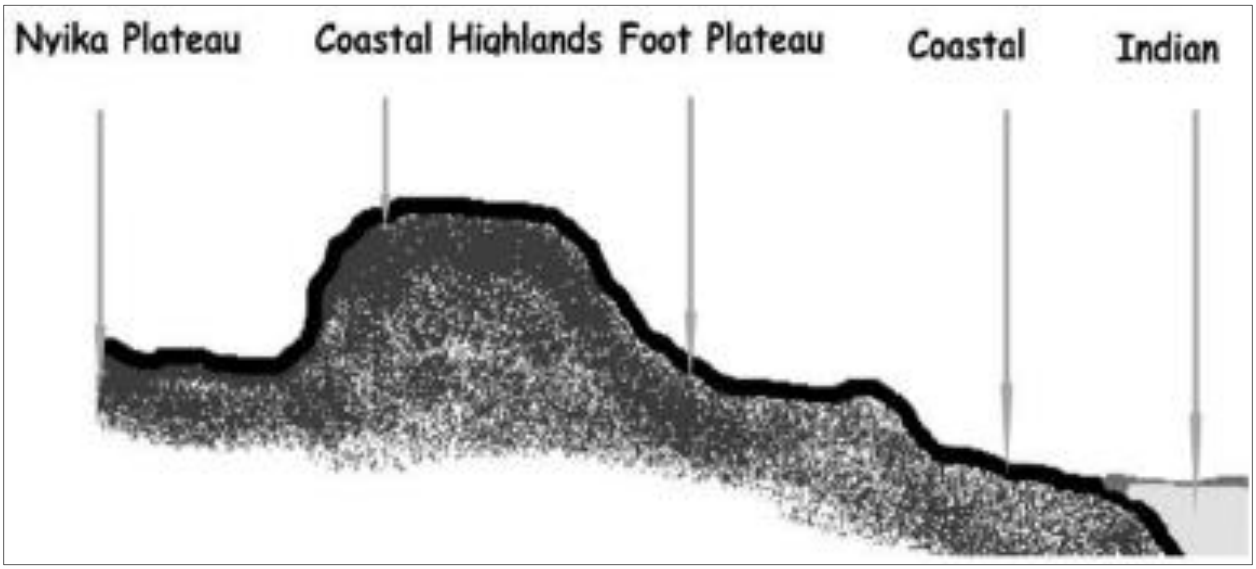


Figure 5: Cross-section of the topographical zones in Kwale County (Source: Kwale District & Mombasa Mainland South Regional Physical Development Plan 2004–2034)

The county's altitude ranges from sea level (0 m) to 420 m within the Shimba Hills, with the highest elevation reaching 842 m at Kilibasi Hill on the border with Taita/Taveta County. The proposed project site is situated on slightly undulating terrain, representing a transitional zone between the higher elevations of the Shimba Hills and the lower-lying Nyika Plateau.

2.4.2.Geology/geomorphology

Kwale County's geological structure is diverse, consisting of Basement System rocks, Karoo sediments, Jurassic formations, and intrusive igneous rocks. These formations host a wide range of mineral resources with varying economic potential. The major geological units and their characteristics are described in detail below.

Rock / Sediment Type	Location	Minerals / Materials Present	Detailed Description
Basement Rocks	Kinango	Limestone (in metamorphosed form), gemstones (garnet, tourmaline, quartz varieties)	Composed of ancient crystalline rocks such as gneisses, schists, quartzites, and granitoids formed under high pressure and temperature.
Karoo Sediments-Taru Formation	Taru	Sandstone, traces of coal	Layered sedimentary rocks dominated by easily split sandstones.
Karoo Sediments-Maji ya Chumvi Formation	Maji ya Chumvi	Rock slabs, minor coal	Hardened sedimentary layers suitable for quarrying.
Karoo Sediments–Mariakani Formation	Mariakani	Sandstone	Compact sandstones suitable for crushing.
Karoo Sediments–Mazeras Formation	Mazeras	Sandstone and arkose	Durable feldspar-rich arkosic sandstones.
Jurassic Rocks	Shimba Hills, Kinango, Waa	Limestone	Marine-origin limestones and calcareous sediments with karst features.
Intrusive Igneous Rocks	Dzombo, Chiruku, Mrima, Nguluku Hills, Dzirihini Hills	Rare earth elements (REEs), phosphates, niobium	Carbonatite and alkaline intrusive complexes rich in strategic minerals.

Other rock formations include the Magarini formation, which includes mineral depositions such as Titanium found in Maumba and Nguluku and Silica Sand found in Ramisi and Msambweni. Pleistocene sand facies formed during sea-level fluctuations and consisted of sands with coral debris are found in the places close to the beach line, especially in Ramisi and Majoreni. Soil distribution in Kwale County is largely influenced by the four major physiographic zones: the Coastal Plain, Foot Plateau, Coastal Uplands, and the Nyika Plateau, each characterized by distinct soil types and properties.

a) **Coastal Plain:** The Coastal Plain is dominated by sandy and loamy soils, which are typically shallow, partially saline, and poorly drained. These soils occur in Chale, parts of Msambweni, Funzi, Shimoni, and Wasini Island, as well as Muhaka, Ramisi, Majoreni, and Vanga in Lunga-Lunga Sub-county.
b) **Foot Plateau**: The Foot Plateau features deep, well-drained, and permeable loamy soils that are highly suitable for agricultural activities. This zone is mainly represented in the Matuga area.
c) **Coastal Uplands**: Soils in the Coastal Uplands have developed from unconsolidated sandy deposits, shale, and limestone. Their texture ranges from sand to loam and from loam to clay. These well-drained soils are found in Waa, Tsimba, Kundutsi, and Bongwe, as well as Shimba Hills, Kikoneni, Perani, Mkongani, Mbuguni, and Tsunza. Parts of Kinango and Mariakani also fall within this zone, although some of these areas exhibit partially drained soils.
d) **Nyika Plateau**: The Nyika Plateau is underlain by gritty sandstone, shale, and basement system rocks. The soils here are deep but poorly drained. They occur in Taru, Samburu, MacKinnon, Kilimangodo, and the western parts of Shambini

The proposed site lies within the transition zone between the highland and Nyika Plateau, a physiographic zone characterized predominantly by sandstone formations. These sandstones are typically deep, moderately compacted, and derived from ancient sedimentary processes associated with the plateau's underlying basement system rocks. The soils and geological materials in this zone are generally deep but poorly drained, reflecting the plateau’s gritty sandstone and shale composition.

2.4.3.Climate

The climate of Kwale County is categorized into three major climatic zones. These zones include; warm and humid, cool and wet and hot and dry. The warm and humid climate is experienced along the coastal strip. It extends inwards in areas such as Msambweni, Tiwi, Waa, Diani, Vanga, Shimoni and Matuga due to South-West Monsoon and North-Easterly winds, which bring changes to the rainfall and temperatures. Temperatures along these coastal areas range between 26^0C and 30^0C. Humidity within this zone is approximately 95% annually.

The cool and wet climate is mostly experienced within the coastal highlands in Kwale Town, Shimba Hills, Dzombo and Mrima due to canopy trees' elevation and vegetation cover. Humidity within these areas is also low. The hot and dry climate is experienced mainly in the ASAL areas of Kinango and parts of Lunga Lunga Sub-counties. Temperatures within these hinterland areas are higher than the coastal zone, ranging from about 30^0C to 40^0C, and humidity is approximately 60% annually. The average temperature in the County is approximately 22^0C.

Annual average rainfall ranges from 500mm in the rangelands of the Nyika Plateau to 1200mm in the high rainfall areas of the Coastal Strip. Shimba Hills and Dzombo receive the most rainfall, about 5000mm per annum. Kwale County is marked by a bi-modal rainfall pattern. The long rains are experienced from mid-March to May with a monthly average of between 75mm-240mm. The short rains occur from October to December with a monthly average of between 75mm-100mm. The mean annual rainfall is 1100 mm, with the long rains accounting for approximately 847 mm (77%), while the short rains provide only 253 mm (23%). January and February are the driest months, with less than 50 mm averages. Even though the County's rainfall is bimodal, this pattern has changed due to climatic change over recent years.

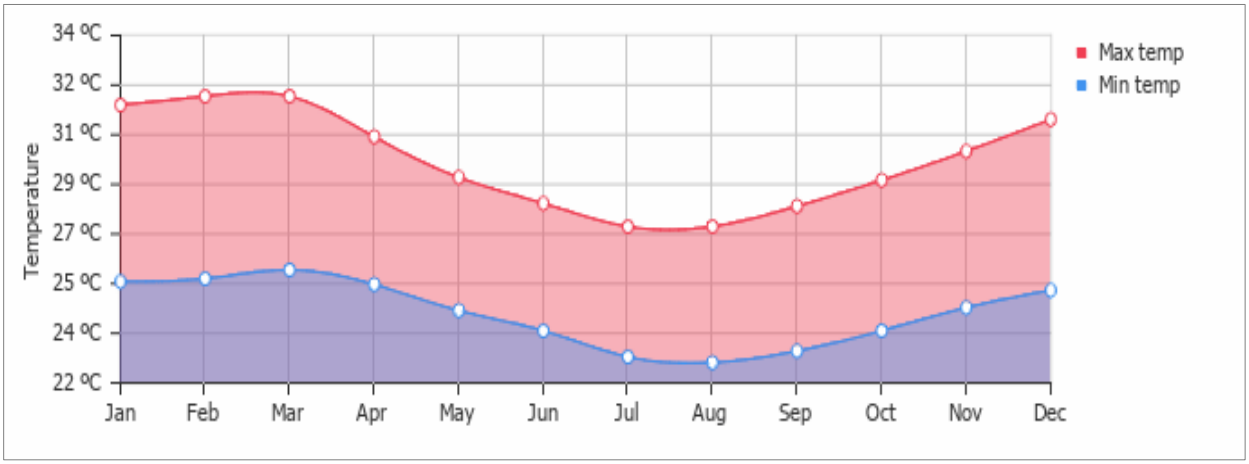


Figure 6: Climatic Condition of Kwale County.

2.4.4.Hydrology and Hydrogeology

The county is well-drained by seven (7) permanent rivers, supplemented by numerous seasonal rivers and tributaries that together form an extensive hydrological network. The principal drainage pattern follows the regional geological dip, flowing predominantly east to south-east toward the Indian Ocean. The proposed project site features a well-defined local drainage system, with an intermittent river located approximately 500 meters south of the site. Proper site design and drainage management will ensure that project activities do not disrupt natural water flows or negatively impact nearby watercourses.

Table 9: Rivers in Kwale County

River	Source	Areas Traversed	Endpoint
Marere	Marere Spring	Shimba Rainforest, Shimba Hills National Park	Indian Ocean at Bombo Creek
Mkurumudzi	Shimba Hills	Shimba Hills (Msambweni)	Indian Ocean at Gazi (Msambweni)
Umba	Usambara Mountains	Lunga-Lunga – Vanga	Indian Ocean at Vanga
Pemba	Marere Spring	Kinango area, Kinango–Tsunza	Indian Ocean at Bombo Creek
Ramisi	Chenze Ranges	Mwereni – Shimoni	Indian Ocean at Bod/Shimoni
Mwache	South Samburu	South Samburu	Indian Ocean at Mazeras
Mwachema	Majimboni–Msulwa	Majimboni, Gombato–Diani	Indian Ocean at Diani

Plate 3: Intermittent River (Source: Fieldwork)

A detailed baseline surface water quality assessment has been conducted, and the results are annexed to this report. This forms part of the key environmental indicators for the project. Regular monitoring of surface water quality will be implemented as part of the Environmental Management Plan. The analysis showed that most parameters were within acceptable limits, except for turbidity, which was elevated due to existing land use activities such as agriculture in the catchment area.

2.4.5.Land tenure, Zoning and Use

Land tenure in Kwale County is characterized by a combination of private ownership, communal arrangements, and informal occupation. According to the Kwale County CIDP (2013–2017), only 22.5% of landowners possessed formal title deeds. A recent household survey conducted by Geodev (K) Ltd in 2018 indicates that 32% of residents hold title deeds, 12% possess allotment letters, and 1% hold lease certificates. Despite these formal arrangements, a significant proportion of landowners, approximately 55%, do not have any legal documentation proving land ownership. The limited possession of formal land ownership documents is largely due to several factors, including uncollected title deeds from the land registry, communal ownership structures (particularly in community group ranches), and informal settlement or squatting on public lands or land owned by absentee landlords. These patterns reflect historical, socio-cultural, and administrative challenges that have influenced land distribution and registration in the County.

Table 10: Land Tenure Status

Land Status	Area (ha)	Percentage (%)
Adjudicated	1,354.45	16.5
Forest	247.09	3.0
Leases	315.94	3.8
Ranch	5,147.98	62.7
Ranch/Adjudication	930.34	11.3
Settlement Scheme	217.37	2.6

About 62.7% of the land in Kwale is under ranches. An estimated 16.5 % of the land is adjudicated, and 11.3% is currently undergoing the adjudication process. The average landholding size for Kwale County is 4.4 Acres and 100 Acres for small and large scales, respectively (*Kwale County CIDP, 2013*). According to the consultant field survey in 2018, Puma has the largest average landholding size of 19.23 acres per person, while Kinondo has the smallest landholding size of 1.85 acres per person. The mean landholding size for the County stands at 7.8 Acres. Wards located in the coastal plain, foot plateau, and coastal uplands have comparatively small landholding sizes, e.g., Kinondo (1.9 acres), Ukunda (2.7 acres), Waa/Ng'ombeni (2.7 acres), as compared to the region's further mainland in the Nyika plateau, e.g., Puma (19.2 acres), Samburu/Chengoni (18.8 acres), and Ndavaya (15.9 acres).

The proposed site is located in Mazola village. The dominant land uses in the project area and its immediate surroundings are agricultural activities and residential settlements. This baseline land use pattern has been considered in the environmental impact assessment, particularly in relation to surface water quality, where elevated turbidity levels were noted due to ongoing agricultural practices in the area.

2.5. Biological Resources

The County has a wide range of environmental resources, classified as either terrestrial or marine, playing a major role in socio-economic development. These resources serve as unique identifiers that give spatial character and provide invaluable environmental and ecosystem services.

2.5.1. Terrestrial Ecology

The County has a forest cover of about 5.4%, approximately 449.84 square kilometres. (44,984 Hectares). This cover is below the recommended forest threshold and the constitutional requirement of 10% of the total area. The forest cover includes the area covered by Kaya forests. There are twenty-two (22) Kaya forests. Of the twenty-two (22), five (5) forests have been surveyed, while 17 have yet to be surveyed. All the Kaya forests have not been secured with a physical fence to deter development intrusion, making them susceptible to land grabbing. Roughly 700 Hectares of the forest cover is not gazetted.

The Nyika Plateau, Puma location where the proposed project site is located, is characterized by an open savannah and woodland vegetation. The dominant species in this area is *Acacia commiphora*, which forms the primary canopy cover and contributes significantly to the local ecological structure. The vegetation is generally sparse to moderately dense, adapted to the semi-arid conditions and the plateau's well-drained soils. Other associated plant species include various shrubs and grasses that coexist with Acacia, providing ground cover and supporting local biodiversity.

Plate 4: Area Vegetation Cover

2.5.2. Terrestrial Mammals

The County has a unique niche of terrestrial wildlife species. Among the main faunal species found in the County are Sable antelopes, an endemic species of the Bovidae family. Other wild animals include elephants, eland, giraffes, yellow baboons, Angolan colobus, snakes, monkeys, Grimm's bushbucks, hyenas, leopards, buffalo, crocodiles, jackals, and waterbucks. These animals are found in Shimba Hills National Reserve, Mwaluganje Elephant Sanctuary, and within the ranches and along the migratory routes that they follow seasonally to travel to destinations such as Tsavo East and Tsavo West, Umba and Mkomazi National Park in Tanzania. Furthermore, the County is an international bird area hotspot with Kaya Kinondo and Kaya Diani recognized as Important Bird Areas (IBAs) among other IBAs globally. Over a hundred bird species, including 20 coastal bird species and different species of butterflies, are found in these areas.

The proposed Project area Chirima Cha Uha (Mazola village) exhibits low faunal biodiversity. Human activities including settlement and subsistence agricultural activities have significantly altered the natural habitat, reducing the presence of wild animals in the area. A comprehensive assessment of the biodiversity within the project area is presented in the detailed Biodiversity Report annexed to this document

2.6. Socio-Economic Baseline Condition

Kwale County is home to several administrative centres that serve as key hubs for governance, service delivery, and economic activities. Kwale Town, the county headquarters, holds the highest growth potential owing to its central administrative role. The town is expected to attract significant in-migration as people move in search of employment, business opportunities, and improved access to services. This growth is likely to be supported by expanded infrastructure development and increased investment activities. Other administrative centres, including Lunga Lunga, Kinango, Diani, and Samburu, along with various ward headquarters, also possess considerable potential for further development as important administrative and service hubs. These centres play a vital role in providing essential government services, facilitating local governance, and supporting socio-economic development within their respective sub-counties.

2.6.1.Population and Local Demographics

Kwale County is multi-ethnic, with the Digo and Duruma forming the majority. Other ethnic groups include the Kamba, Shirazi, Pemba, Waatha, Makonde, as well as other Kenyan communities, Europeans, Asians, and non-citizens in smaller numbers.

According to the 2019 National Household Population Census, the County's total population is 866,820, comprising 425,121 males (49%) and 441,681 females (51%). The census also recorded 18 intersex individuals. There are an estimated 173,176 households, with an average household size of 5.0. The County's annual population growth rate is 3.3%. Among the Sub-Counties, Kinango had the highest population in 2019 at 296,455, projected to reach 397,065 by 2028, though it has the lowest population density. Msambweni Sub-County had the lowest population of 177,620 in 2019, projected to reach 237,900 by 2028, but it recorded the highest population density of 432 persons per square kilometre. Population distribution is influenced by the availability of infrastructure, services, and favourable climatic conditions.

At the Ward level, Pongwe/Kikoneni has the largest population with 68,235 people, while Tiwi has the smallest at 23,914. Ukunda Ward has the highest population density at 1,784 people per square kilometre, whereas Puma Ward has the lowest at 22 persons per square kilometre. The proposed project area is home to both the Duruma and Kamba ethnic groups.

Table 11: Population and Household Size per Sub County and Ward

Sub-County	Ward	A	Pop. 2009	PD	HH Size	Pop. 2019	PD	HH Size	Pop. 2023	HH Size	Pop. 2028	HH Size
Matuga	Tsimba Golini	319.7	34,002	106.4	6,385	44117	138.0	9146	50235	10414	59089	12250
	Waa	82.6	37,783	457.4	7,095	50326	609.3	10847	57305	12351	67405	14528
	Tiwi	33.5	19,409	579.4	3,645	23914	713.9	7218	27230	8219	32030	9668
	Kubo South	186.6	23,466	125.8	4,407	35358	189.5	5480	40261	6240	47358	7340
	Mkongani	430.8	37,318	86.6	7,008	50280	116.7	8671	57253	9873	67344	11614
	TOTAL	**1,053.2**	**151,978**	**144.3**	**28,539**	**203995**	**193.7**	**41,362**	**232285**	**47098**	**273226**	**55399**
Kinango	Chengoni/Samburu	625.5	32,641	52.2	6,129	61598	98.5	9817	70140	11178	82503	13149
	Ndavaya	1,016.2	27,816	27.4	5,223	38173	37.6	6,110	43467	6957	51128	8184
	Puma	1,186.5	19,860	16.7	3,729	29903	25.2	4,891	34050	5569	40051	6551
	Kinango	314.7	32,571	103.5	6,116	41491	131.8	7601	47245	8655	55572	10181
	MacKinnon Road	1,188.6	31,128	26.2	5,845	48273	40.6	8,584	54967	9774	64656	11497
	Mwavumbo	278.0	31,902	114.8	5,991	43768	157.4	7613	49838	8669	58622	10197
	Kasemeni	223.9	33,642	150.3	6,317	44599	199.2	8042	50784	9157	59735	10771
	TOTAL	**4,833.4**	**209,560**	**43.4**	**39,352**	**307805**	**63.7**	**49,658**	**350491**	**56545**	**412267**	**66511**
Msambweni	Gombato Bongwe	40.1	34,846	869.0	6,544	44331	1105.5	12410	50479	14131	59376	16622
	Ukunda	28.5	38,629	1,355.4	7,254	52537	1843.4	15948	59823	18160	70367	21360
	Kinondo	150.9	22,857	151.5	4,292	32546	215.7	6772	37059	7711	43591	9070
	Ramisi	196.2	27,963	142.5	5,251	48276	246.1	10244	54971	11665	64660	13721
	TOTAL	**415.7**	**124,295**	**299.0**	**23,341**	**177690**	**427.4**	**45374**	**202332**	**51666**	**237994**	**60773**
Lunga Lunga	Pongwe/Kikoneni	295.0	51,842	175.7	9,735	54227	183.8	10602	61747	12072	72630	14200
	Dzombo	213.5	41,509	194.4	7,795	44983	210.7	7965	51221	9070	60249	10668
	Mwereni	1,176.2	34,628	29.4	6,503	55112	46.9	9,884	62755	11255	73816	13238
	Vanga	276.9	36,119	130.4	6,783	44101	159.3	8825	50217	10049	59068	11820
	TOTAL	**1,961.6**	**164,098**	**83.7**	**30,815**	**198423**	**101.2**	**37,276**	**225940**	**42445**	**265763**	**49927**
Kwale County	TOTAL	8,263.8	649,931	78.6	122,047	887,913		350,340	**1,011,048**	**197,754**	**1,189,250**	**232.610**

2.6.2.Population Density and Distribution

Kwale County recorded a population of 866,820 in the 2019 Kenya Population and Housing Census, yielding an average density of 105 persons per km². Population distribution across the county is uneven, with significant variations among sub-counties.

Kinango Sub-County had a population of 94,220 in 2019, spread over an area of approximately 1,614 km². This results in a low population density of about 58 persons per km² the lowest among Kwale's sub-counties. The sub-county's population consists primarily of both Duruma and Kamba ethnic groups. Settlement patterns are mainly concentrated around administrative centres, market areas, and accessible transport routes, leaving large parts of the sub-county sparsely populated.

2.6.3. General Population Structure

The population structure of Kwale County and Kinango Sub-County reflects a youthful demographic typical of many rural areas in Kenya. According to the 2019 Kenya Population and Housing Census:

Kwale County

- Total population: 866,820
- Males: 425,121 (49.0%)
- Females: 441,681 (51.0%)
- Age structure:
    - 0–14 years: 387,321 (44.7%)
    - 15–64 years (working age): 446,434 (51.5%)
    - 65+ years: 33,035 (3.8%)

This broad-based age structure indicates a high proportion of children and young people, with a significant dependency ratio driven by the large child population. The county has a youthful profile, with the majority of residents under 35 years of age.

Kinango Sub-County

- Total population: 94,220
- Males: 45,413 (48.2%)
- Females: 48,806 (51.8%)
- Age structure:
    - 0–14 years: 47,514 (50.4%)
    - 15–64 years: 43,145 (45.8%)
    - 65+ years: 3,560 (3.8%)

Kinango Sub-County exhibits an even higher proportion of children (0–14 years) compared to the county average, resulting in a higher child dependency burden. The working-age population (15–64 years) constitutes a smaller share, which has implications for labour availability and service delivery needs in the sub-county. The dominance of the youthful population in both the county and Kinango Sub-County presents opportunities for investment in education, skills development, and job creation, while also posing challenges for infrastructure and service provision in the proposed project area.

2.6.4. Poverty Levels

Kwale County experiences relatively high poverty levels compared to the national average. According to available data, the overall poverty headcount rate in the county stands at approximately 50.5%, with earlier estimates (2015/16) indicating around 47% of the population living below the national poverty line. Food poverty affects a significant portion of residents, with a headcount rate of about 35.8%, while child poverty remains a concern at around 54.3%. These challenges are compounded by limited access to essential services such as improved sanitation, electricity, and financial inclusion, which are below national averages.

Poverty distribution within the county is uneven, with Kinango Sub-County recording the highest poverty headcount rate among Kwale's constituencies at **54.8%** (based on 2019 KPHC). This makes Kinango one of the poorer areas in the county, where the majority of the population relies on subsistence agriculture in a semi-arid environment prone to droughts and low productivity.

2.7. Infrastructures and Utilities

2.7.1. Water and Sanitation

The County's water demand was estimated at 51,961 m³/day in 2015 and projected to reach 67,582 m³/day by 2020. By 2030, the water demand is expected to increase further to approximately 92,817 m³/day. Domestic water demand constitutes the largest share compared to other uses. The existing water supply system in Kwale County comprises two main categories:

a) **Bulk water supply:** Bulk water refers to potable water distributed to consumers through pipelines or non-potable water delivered via tankers. The primary institution responsible for bulk water supply in the county is the Kwale Water and Sewerage Company (KWAWASCO). Its main water sources include Marere Springs, Mzima Springs, Mkanda Dam, Nyalani Dam, and the Tiwi wellfield.

b) **Community water supply:** Community-managed systems also play a significant role. Mkanda Dam is the largest community water supply scheme in the county. It is a 16-metre-high reservoir with a storage capacity of 1.26 million cubic metres, operated by the local community. Water from the dam is pumped to a raw water treatment plant that serves Mwabandari, Kikoneni, and surrounding areas.

Despite these supply systems, Kinango Sub-County faces significant challenges in water and sanitation services. The sub-county lacks adequate sanitation infrastructure, with the majority of households relying on pit latrines.

2.7.2. Transport and other Infrastructure

The County's transport structure is made up of the following modes: road, railway, air, water, and non-motorized transport. Road Transport is the main mode of transport in Kwale County. The County has a total of 3475.13 Kms of classified roads. The roads are broadly categorized as international trunk roads, national trunk roads, regional roads, County roads, and rural access roads.

- International trunk roads: These roads traverse the County, linking one country to another country. Kwale County is traversed by two international highways- A14 and A109. The A14 highway connects the port city of Mombasa and Kwale Counties via Ng'ombeni- Diani -Msambweni- Lunga Lunga and further connects to Tanzania. The road is bitumen surfaced and measures approximately 95.7 km. A109 connects Mombasa to Nairobi and further to the Malaba border. The segment that traverses Kwale County is bitumen surfaced and measures approximately 52km. The roads have influenced the development of trading centres, including Tiwi, Waa, Kombani, Msambweni, and Lunga Lunga along the A14 road and Samburu, Taru, and Mackinnon Road along the A109 road.

- Inter-County roads: These are roads that connect areas within the County and neighbouring counties. These roads include Wundanyi-Mwatate-Rukanga Kuranze-Kibaoni to Lunga-Lunga, Lunga Lunga-Kinango- Samburu- Silaloni, which connects to Kilifi County, Kinango-Mariakani Kaloleni-A7, and Dongo-Kundu bypass. The two major towns in the County are Kwale and Ukunda, and are interconnected via A14 and C106 trunk roads. Kinango and Lunga-Lunga are also accessible from Ukunda-Diani via the two roads and from Kwale via the C106 road. The A14 international trunk road also links Ukunda-Diani to Msambweni and Lunga-Lunga. Other roads linking smaller centres include Lunga Lunga-Vanga Road, Kinango Vigurungani- Samburu-Mnago Wa Dola Guruguru road, an inter-County and intra-County Road, and Kinango-MariakaniKaloleniC107 Mavueni road. Kidimu-Shimoni road is another significant road that connects the A14 highway from Kanana to Shimon.

Table 12: Summary of surface conditions and length for classified roads in Kwale County

CLASSIFIED ROADS					
	Length (km)				Total Length (km)
Surface Type	Good	Fair	Poor	Under Construction	
Paved	97.477	28.995	59.56	6.891	192.89
Gravel	200.421	991.893	437.803	0	1630.12
Earth	108.297	653.862	747.632	0.407	1510.20
Other (Track)	0	54.868	87.055	0	141.92
Sub-Total	406.165	1729.618	1332.05	7.298	3475.13
Condition (%)	11.69%	49.77%	38.33%	0.21%	100.00%

The proposed project site is located along the major transport corridor connecting Kinango to Mtaa and Maji ya Chumvi.

2.7.3.Energy

The coverage of electricity connection in the County is currently at approximately 43.10%, according to the analysis done by the KPLC. The number of connections in rural areas has risen significantly recently, following the Rural Electrification Authority (REA) and the National Government-led initiative of Last Mile Connectivity. Kwale has a high potential for solar energy production due to longer sunshine hours daily. It is among the 14 counties earmarked for the Kenya Off-Grid Solar Access Project (KOSAP) programme, whose key components include the establishment of mini-grids for community facilities, enterprises, and households.

Ukunda ward has the highest electricity coverage at 77.1%, while Mackinnon Road, Ndavaya, and Chengoni-Samburu in Kinango Sub- County are the least connected at 10.3%, 17.4%, and 18.5%, respectively. The primary energy sources for cooking are wood fuel, charcoal, and LPG. The types of cooking sources depend on the socioeconomic capability of a household. The use of firewood is predominant in rural areas, whereas the utilization of LPG is in urban areas. 73.9% of households use wood fuel as the primary cooking source. The use of Charcoal and LPG accounts for 21.7% and 1.4%, respectively. The overreliance on wood fuel negatively affects the tree cover, which stands at 10%.

2.7.4.Education

Literacy is a critical driver of socio-economic development. It equips individuals with the knowledge and skills required to secure gainful employment, engage in income-generating activities, promote entrepreneurship, and adopt technological innovations. Beyond its economic benefits, literacy empowers citizens to participate effectively in social and political decision-making, exercise their fundamental rights, and lead dignified lives. In Kwale County, the overall literacy rate stands at 57%, significantly below the national average of 79%. Access to primary education is generally reasonable, with the average distance to the nearest primary school being 1.33 km well within the recommended maximum of 2 km. However, notable disparities exist across the county. In MacKinnon Road and Puma wards, students travel considerably longer distances of 3.15 km and 2.8 km, respectively, to reach the nearest primary school. These longer distances can hinder consistent school attendance and negatively affect educational outcomes. These variations underscore the need for targeted interventions to improve educational access and enhance literacy development, particularly in underserved wards of the county, including parts of Kinango Sub-County within the proposed project area. The proposed project site is located in close proximity to Chirima Cha Uha Primary School, approximately 1.5 km away. This proximity offers potential opportunities for collaboration and community engagement in education-related initiatives.

Plate 5: Chirima Cha Uha Primary School

2.7.5.Health Care Facilities in the County

Kwale County has a total of 260 healthcare facilities, which provide services ranging from primary care to specialized referral services. The facilities are distributed as follows:

Table 13: County Healthcare Facilities

Facility Type	Number	Description / Location
County Referral Hospital	1	Located in Msambweni; serves as the main referral center for the County
Sub-County Hospitals	3	Provide secondary-level healthcare in key sub-counties
Health Centres	11	Offer outpatient and minor inpatient services
Dispensaries	123	Provide basic health services at the community level
Community Units	121	Focus on preventive care and community health services

The distribution of these facilities ensures that basic healthcare is accessible across the County, although the density and capacity of facilities vary, with urban centers generally having better access compared to remote and rural areas. The average distance to the nearest health facility within the County is 7 kilometres; however, WHO recommends an average distance of five (5) kilometres confirming the shortage of facilities.

2.7.6.Disease Prevalence and Morbidity

The five most common diseases recorded in the health facilities in the County are Malaria, Respiratory diseases such as influenza, diarrhea, stomachaches and other diseases that include accidents, i.e., fractures and injuries, Bilharzia, Hypertension, Pneumonia, Rheumatism (joint pains) and Urinary Tract Infection. These diseases contribute to the County's morbidity, which stands at 22.5 per cent. County HIV prevalence is estimated to stand at 5.9%, with women having a higher rate at 70% and men at 30%. The County is estimated to have 1.6% of the total number of people living with HIV in Kenya.

2.7.7.Economic Activities and Household Income

The County contributes about 1.1% of Kenya's Gross Domestic Product (GDP). It is among the counties with a small share of GDP. The economy of Kwale is driven by several sectors: agriculture, tourism, mining, fishing, trade and commerce, and manufacturing. Kwale County is divided into seven agro-ecological zones based on agricultural potential. These zones primarily comprise areas of medium and marginal potential for crop production, as well as rangelands suited for livestock rearing. Assessment of land suitability for rain-fed agriculture indicates that only a small portion of the County's arable land is highly productive. Specifically:

- About 11% of the arable land is highly suitable for rain-fed agriculture.
- Approximately 28% are moderately suitable.
- Around 29% are of low suitability.
- The remaining 30% is considered unsuitable for rain-fed agriculture.

These variations in suitability are influenced by factors such as soil fertility, rainfall patterns, topography, and existing land management practices. The distribution of highly and moderately suitable lands informs agricultural planning, investment, and sustainable land use strategies within the County. The main economic activities within rural settlements are crop farming, mostly for subsistence, and livestock farming. The rural settlement pattern in the County constitutes Clustered, semi, Hamletted, and Dispersed or isolated layouts.

CHAPTER 5: CONSIDERATION OF ALTERNATIVES

3.1. Introduction

This chapter presents an analysis of the various alternatives considered for the proposed Integrated Waste Handling Facility in Kwale County. The assessment evaluated the site location, technological, design, and operational options to identify the most feasible, cost-effective, and environmentally sustainable approach for achieving the project's objectives. By systematically comparing the potential environmental, social, and economic impacts of each alternative including the No-Project Scenario, this chapter provides a clear rationale for the selection of the preferred option. The analysis demonstrates compliance with national environmental requirements under the Environmental Management and Coordination Act (EMCA), Cap 387 and best international standards. The key alternatives considered include:

- No-Project Alternative,
- Site Alternatives, and
- Technological Alternatives

3.2. The No Action Alternative

The No-Project Alternative assumes that the proposed Integrated Waste Handling Facility would not be developed. In this scenario, the management of hazardous and non-hazardous wastes in the larger Coast region and surrounding areas would continue through existing informal or inadequate systems, such as open dumping, uncontrolled burning, or reliance on distant facilities. Continued reliance on current practices would exacerbate environmental and public health risks. Asbestos waste, if improperly handled, could release carcinogenic fibres into the air and soil, posing long-term respiratory and cancer risks. Biomedical wastes (e.g., sharps, infectious materials) could spread diseases such as hepatitis, HIV, or bacterial infections through scavenging or poor containment. Condemned goods (expired pharmaceuticals, spoiled food, or defective products) and other wastes would contribute to groundwater contamination via leachate and air pollution from burning.

Socio-economically, the absence of waste handling facility would limit job creation, skills development, and safe waste handling capacity in the Country and the larger coast regions. Public health burdens and environmental degradation would likely increase with population growth and rising waste generation.

The No-Project Alternative fails to address the growing waste management gap in the Country and contravenes national policies on sustainable waste management especially EMCA (Waste Management) regulation 2024 and public health protection. It offers no environmental or socio-economic benefits and would result in significantly higher long-term negative impacts compared to the proposed establishment of an integrated waste handling facility.

3.3. Site Alternatives (Location)

Several potential sites within Kwale County were evaluated based on accessibility, environmental sensitivity, land availability, and socio-economic factors. The preferred site is located within the low-density area of Kinango Sub-County (Mazola sub location).

- Alternative sites in more urban or densely populated areas (e.g., near Diani, Kinango, Mazeras and Kwale Town): These alternatives (sites) were rejected due to higher population density, greater risk of nuisance (odour, traffic, dust), and potential conflicts with tourism and residential land uses.
- Remote hinterland sites with poor accessibility: These sites (Proposed site location) offered lower social impacts due to minimal direct interaction with communities and lower environmental pressure on populated areas.
- Sites near sensitive ecosystems (e.g., close to water bodies, wetlands, or prime agricultural land): These were rejected due to the high risk of leachate contamination of groundwater and surface water, soil degradation, and potential disruption of biodiversity and local livelihoods.

The selected site is strategically located in Chirima Cha Uha village, Mazola sub-location, along the major transport corridor connecting Kinango to Mata and Maji ya Chumvi, approximately 1.8km from Chirima Cha Uha Primary School. The chosen site offers the most suitable balance of accessibility, operational efficiency, and acceptable levels of social and environmental impact for the proposed Integrated Waste Handling Facility. Its position in a relatively low-density area of Kinango Sub-County which will minimize the direct community exposure.

3.4. Technological Alternatives

Various technological options were evaluated for the safe and sustainable management of wastes. The assessment considered environmental performance, public health protection, operational feasibility, cost effectiveness, compliance with Kenyan regulations (including the Environmental Management and Coordination Act (Waste Management) Regulations 2024, and National Guidelines for Safe Management of Health Care Waste), and alignment with international best practices. Technologies were analyzed specifically for the key waste streams: asbestos, biomedical wastes, condemned goods, and other hazardous/non-hazardous wastes as outlined below.

Asbestos Waste: Asbestos-containing materials are highly hazardous due to the risk of releasing carcinogenic fibres.

- Uncontrolled dumping or open storage: Not considered. This approach would lead to airborne fibre dispersion, soil and water contamination, and severe long-term health risks to nearby communities.
- Chemical dissolution or thermal conversion: Considered advanced but not considered at this stage due to high capital costs, technical complexity, and limited local expertise in Kenya.
- Encapsulation and secure landfilling: Preferred option. Asbestos waste will be double-bagged or wrapped in heavy-duty, labelled, leak-proof containers, then disposed of in a dedicated, engineered, lined landfill cell with impermeable barriers, leachate collection systems, and restricted access.

Rationale: Encapsulation and secure landfilling are the most practical, cost-effective, and compliant method in the Kenyan context. It minimizes fibre release while allowing long-term monitoring, in line with Kenya's 2006 ban on asbestos use.

Biomedical Wastes: Biomedical waste poses significant risks of disease transmission (e.g., hepatitis, HIV, bacterial infections).

- Open burning or co-disposal with general waste: Not considered due to incomplete pathogen destruction, dioxin and furan emissions, and non-compliance with national and international standards.
- Autoclaving or microwave treatment: Suitable for lower-risk infectious waste. This non-burn technology uses high-pressure steam or microwave energy to sterilize waste at 121–134°C, achieving up to 99.99% pathogen destruction, followed by volume reduction through shredding.
- High-temperature incineration: Preferred option for high-risk infectious and pathological wastes. Modern incinerators operate at 800–1,100°C with gas scrubbers, baghouse filters, and continuous emission monitoring to meet stringent air quality standards.

Rationale: Incineration ensures complete pathogen destruction and significant volume reduction (up to 90%). Autoclaving/microwaving serves as a complementary non-burn option for suitable fractions, reducing air pollution. The integrated system balances environmental protection with operational reliability in a county setting.

Condemned Goods (expired pharmaceuticals, chemicals, spoiled items)

- Informal disposal or open dumping: Not considered due to risks of environmental contamination, drug resistance, and public health hazards (e.g., poisoning), and
- High-temperature incineration: Preferred. Non-recyclable condemned goods undergo crushing or encapsulation before incineration (for combustible fractions) or disposal in secure landfill cells.

Rationale: Incineration safely destroys active pharmaceutical ingredients, while secure landfilling contains residuals, preventing leaching into groundwater.

Other Wastes (general hazardous and non-hazardous streams)

- Open dumping or uncontrolled burning: Not considered.
- Segregation, recycling, composting, or material recovery: Incorporated where possible to promote resource efficiency and circular economy principles, and
- Integrated treatment combining secure landfilling (for residuals): Preferred.

Rationale: This approach will reduce overall waste volume, recover value from recyclable fractions, and ensure safe containment of non-treatable residues.

Preferred technological approach: The facility will adopt an integrated waste management system that will include but not limited to:

a) High-temperature incineration with emission controls for high-risk biomedical and combustible wastes;
b) Encapsulation and engineered secure landfilling for asbestos and non-combustible hazardous residuals; and
c) Recycling and recovery for suitable non-hazardous fractions.

This integrated approach was selected over standalone technologies because it offers superior environmental performance (reduced emissions and leachate risks), better public health protection, operational flexibility for varying waste volumes, and cost-effectiveness in the context of Kenya's growing waste generation. It also supports compliance with national requirements while minimizing long-term liability. All technologies will incorporate robust mitigation measures, including leachate and gas collection systems, regular environmental monitoring, worker health and safety protocols, and community engagement to address concerns near sensitive receptors such as Chirima Cha Uha Primary School.

3.5. Alternative Land Use

In addition to the No-Project, Site, and Technological Alternatives, alternative land-use options for the selected site in Chirima Cha Uha village, Mazola sub-location, were evaluated. The assessment considered the site's characteristics, including its location, relatively low population density, proximity to Chirima Cha Uha Primary School (approximately 1.5km), and the surrounding semi-arid environment in Kinango Sub-County. Alternative land-use options considered:

Agricultural or Livestock Development

The site could be used for crop farming or grazing, taking advantage of the rural setting and the reliance of local communities on subsistence agriculture. However, this option was not considered due to the area's low agricultural productivity caused by semi-arid conditions, limited rainfall, and poor soil fertility. Furthermore, converting the site to agriculture would fail to address the pressing Country-wide challenge of safe hazardous waste management (including asbestos, biomedical, condemned goods, and other wastes). It could also expose local food chains to contamination risks if waste management practices elsewhere remain inadequate.

No Development (Leave Vacant)

Leaving the site undeveloped was considered but ultimately scoped out, as it would represent a missed opportunity to provide essential public infrastructure in an underserved sub-county facing high poverty levels and sanitation challenges.

The proposed use of an Integrated Waste Handling Facility represents the most appropriate and sustainable land use for the site. It directly addresses a critical county need by providing safe, compliant management of hazardous wastes while aligning with the national policies on integrated waste management and environmental protection.

Rationale for Preferred Land Use (Integrated Waste Handling Facility)

The selected land use maximizes the site's accessibility and location advantages, creates employment opportunities in Kinango Sub-County (Mazola sub location) will support and improved public health outcomes, and minimizes long-term environmental risks compared to continued informal waste practices. With appropriate mitigation measures such as buffer zones, fencing, emission controls, and community engagement any residual social or environmental impacts can be effectively managed.

CHAPTER 6: PUBLIC CONSULTATION, PARTICIPATION & INFORMATION DISCLOSURE

4.1. Introduction

Public participation is a vital component of the Environmental and Social Impact Assessment (ESIA) process and should be incorporated throughout the entire project lifecycle from design and construction to operation and eventual decommissioning. It provides an opportunity for stakeholders to express their opinions, concerns, and suggestions regarding the proposed project. This consultative and inclusive approach fosters transparency, enhances project acceptability, and ensures that decision-making is informed by the views and interests of the affected and interested parties.

4.2. Objectives of Public Consultation

Kenya, recognized as one of the African countries with a progressive constitution, upholds the public's right to participate in decision-making processes that may affect them. Article 10(2)(a) of the Constitution identifies public participation as a fundamental principle of governance. This commitment is further reflected in the Environmental Management and Coordination Act (EMCA), Cap 387, and the EMCA (Environmental Impact Assessment and Audit) Regulations of 2003, both of which contain clear and stringent provisions mandating public involvement in environmental decision-making processes. The process ensures that all stakeholders are provided with this opportunity as part of a transparent process which allows for a robust and comprehensive environmental study.

Public participation in Environmental and Social Impact Assessments (ESIA) is designed to provide sufficient and accessible information to Interested and Affected Parties (I&APs) in an objective manner, enabling them to understand the potential impacts of proposed projects and to contribute meaningfully to the decision-making process. Key objectives of public participation include but are not limited to:

- Disseminate information about the proposed project to the community members or project affected parties,
- Collect views and concerns to be considered in the ESIA,
- Evaluate community perceptions of the project's positive and negative impacts, and
- Gather concerns regarding Environmental and Social Impacts, as well as potential implementation challenges.

4.3. Approach to Stakeholder Engagement

Stakeholder engagement for the proposed project was conducted using a staged and structured approach, aligned with the various phases of project development. This approach ensured that consultation activities were timely, targeted, and responsive to the evolving information needs and objectives at each stage of the project. It also promoted effective communication, transparency, and meaningful participation of all Interested and Affected Parties (I&APs) throughout the project lifecycle. The engagement process was organized around two primary phases:

1. Design and Feasibility/Due Diligence Engagement: During this initial phase, stakeholders were consulted to identify potential environmental, social, and economic impacts associated with the proposed project. Key objectives included:
    - Informing the community and regulatory authorities about the project concept and scope.
    - Gathering preliminary input on local concerns, expectations, and priorities.
    - Identifying sensitive receptors and potential mitigation measures early in the project design. Engagement activities at this stage included site visits, initial public notices, focused group discussions, and meetings with key regulatory agencies. The information collected informed site selection, preliminary design, and feasibility assessments, ensuring that potential impacts were considered before detailed planning.
2. Environmental and Social Impact Assessment (ESIA) Process Engagement: This phase focused on formal consultation in line with EMCA (EIA/EA) Regulations, 2003, ensuring compliance with legal requirements. Objectives included:

- Sharing detailed information on the plant operations, anticipated environmental and social impacts, and mitigation measures.
- Collecting stakeholder feedback and concerns to refine the Environmental and Social Management Plan (ESMP) and operational procedures.
- Ensuring inclusive participation, allowing all I&APs, including local communities, government agencies, and civil society groups, to provide input. Engagement during the ESIA process included public notices, on-site postings, community meetings, written submissions, and one-on-one consultations with affected parties. The feedback obtained will be documented and integrated into project operational protocols, and mitigation strategies to ensure sustainable and socially responsible operations of the batching plant.

By implementing a phased stakeholder engagement approach, the project ensured that consultation activities were systematic, transparent, and responsive to community needs, regulatory requirements, and operational realities, thereby enhancing project acceptance, minimizing potential conflicts, and promoting sustainable development outcomes.

4.4. ESIA Process Engagement

4.4.1. Notification of Interested and Affected Parties

A3-sized site notices, written in both English and Kiswahili, have been displayed at strategic locations within and around the operational project site, as well as in public areas. These notices informed local communities and Interested and Affected Parties (I&APs) about the plant's operational activities and invited their participation in the Environmental Impact Assessment (EIA) process, in accordance with the requirements of the EMCA (EIA/EA) Regulations, 2003. The notices included technical information on plant operations, production processes, and environmental management measures, and also outlined how I&APs can submit feedback or comments. Following the completion of the EIA study, further stakeholder consultations will be conducted to present the assessment findings, address any concerns, ensure that community and I&AP input is incorporated into the planning of the proposed project.

PUBLIC NOTICE

Streetcare Enterprises Limited

We, **Streetcare Enterprises Limited** (The Proponent) are proposing to set up a Waste Integrated Handling Facility on L.R No: 1681 -Mazola Adjudication, Kinango Sub-County, Kwale County.

We are therefore writing to invite the public (project affected/interested persons) for our meetings to be held on **27th March 2026, 10th April 2026** and **17th April 2026** at the project site as from **10 a.m.**

The agenda for the meeting will be presentation of the project proposal by the experts as well as seeking views/opinions from interested/affected persons/stakeholders for presentation to the National Environment Management Authority (NEMA).

Please email us on ***streetcare.ltd@gmail.com*** for any clarifications.

Figure 7: Notification for Public Participation

4.4.2. Public Participation Feedback

The first public consultation meeting was held on **27th March 2026** in Chirima Cha Uha project site. This was followed by the second meeting held on **17th April 2026**, also held at the same venue. Both forums/Barazas were attended by the Senior Chief, the Assistant Chief, and the larger Mazola community members from the surrounding villages.

The deliberations provided a platform for open discussion on various aspects of the proposed development, including its potential social, economic, and environmental impacts on the surrounding communities. Key topics explored during these sessions included anticipated project benefits, concerns regarding possible disruptions, and opportunities for corporate social responsibility (CSR) initiatives aimed at enhancing local welfare. Community members actively engaged by raising questions and sharing their perspectives about the proposed development. For a comprehensive overview of the public engagement, including detailed minutes of the meeting and responses from structured questionnaires, please refer to the annexure of this report.

Plate 6: Area Assistant Chief Addressing Community During Public Consultation

Plate 7: Community Members Referring to Project Documentation

Plate 8: Upstanding Project Proponent Showing Project Concept to Community Members

CHAPTER 7: ANTICIPATED PROJECT IMPACTS AND MITIGATION MEASURES

5.1. Introduction

The proposed Integrated Waste Handling Facility is expected to generate both positive and negative environmental and social impacts. Effective management of negative impacts and enhancement of positive effects are essential to minimize environmental harm and maximize benefits to local communities. This section presents an assessment of the anticipated impacts during both the construction and operational phases of the project. The evaluation considers potential effects on:

- *Land use: Changes in land cover and compatibility with existing activities such as agriculture, and residential settlements.*
- *Biodiversity: Potential disturbance to local flora and fauna, including any species of conservation concern.*
- *Soil and water resources: Risks of erosion, contamination, or depletion of surface and groundwater.*
- *Air quality and noise levels: Dust emissions and noise from machinery and plant operations.*
- *Visual and landscape character: Alterations to the natural and built environment aesthetics.*
- *Socio-economic conditions: Employment opportunities, income generation, and potential displacement of local activities.*
- *Cultural heritage: Effects on archaeological, historical, or culturally significant sites within the project area.*

The assessment provides a framework for designing mitigation measures, monitoring programs, and management strategies to ensure that the project is conducted in an environmentally responsible and socially beneficial manner.

5.2. Impact Assessment Methodological Approach

The methodological approach for assessing potential environmental and socio-economic impacts of the proposed project involves identifying, evaluating, and prioritizing impacts arising during construction and operation, along with associated facilities. The process begins with scoping to determine potential areas of impact, followed by a significance assessment to guide appropriate mitigation, enhancement, and management measures. The assessment considers impacts on environmental, biological, and socio-economic resources within the Project Area of Influence (AoI). Overall, the key steps of the ESIA process included impact identification, evaluation of significance, development of mitigation measures, and integration of these measures into the project's management framework:

Aspect	Narrative
Impact prediction	To determine what could potentially happen to resources or receptors because of the Project and its associated activities – potential impacts are identified during the ESIA scoping phase.
Impact evaluation	To evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource or receptor
Mitigation and enhancement	To identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts
Residual impact evaluation	To evaluate the significance of impacts assuming effective implementation of identified mitigation and enhancement measures

5.2.1. Identification and Characterization of Impacts

An 'impact' is any change to a resource or receptor caused by the presence of a project component or by a project- related activity. Impacts can be negative or positive and are defined in terms of their

characteristics, including the impact's type (*direct, indirect, induced, cumulative*) and the impact's spatial and temporal features (i.e. *extent, duration, scale and frequency*). Types of impacts are described as below:

- **Direct:** applies to an impact which can be clearly and directly attributed to a particular environmental or social parameter (e.g. dust generation directly affects air quality).
- **Indirect:** applies to impacts which may be associated with or subsequent to a particular impact on a certain environmental or social parameter (e.g. high levels of dust could entail nuisance and health effects to workers on site).
- **Induced:** applies to impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project.
- **Cumulative:** applies to impacts that arise as a result of an impact and effect from the Project interacting with those from another activity to create an additional impact and effect.

Table 14: Impact Characterization Criteria

Duration	Short-term: impacts with relatively short duration with respect to the whole duration of the project (e.g. limited to five-year period).	Long-term: Impacts whose effects last longer than a period of five years, but limited to within the project lifetime.	Permanent: Impacts that cause a permanent change in the baseline conditions and therefore also evaluated as irreversible.
Extent	Local: Impact affecting the environment or communities within the Project AoI.	Regional: Impact affecting a wider area or socio- economic asset of importance going beyond the communities in the Project Area of Influence	National: Impact extending to the national level, or affecting assets of national importance
Frequency	One-off/ Occasional: Impacts that occur once only or occasionally.	Intermittent: Impacts that occur periodically or repeatedly	Continuous: Impacts that happen continuously
Intensity/Impact scale	Low: Limited impacts not causing any change or causing change hardly distinguishable from background conditions	Medium: Impacts causing change, but not affecting the core structures/functions of the resource/receptor	High: Impacts causing evident changes of core structures/functions of the resource/receptor
Likelihood	Unlikely: The event is unlikely but may occur at some time during normal operating conditions	Possible: The event is likely to occur at some time during normal operating conditions.	Likely: The event will occur during normal operating conditions (i.e. it is essentially inevitable).

5.2.2.Evaluation of Impacts

A consistent approach to the assessment of impacts was followed to enable environmental and social impacts to be broadly compared across. A set of generic criteria were used to determine impact significance and were applied across the various environmental and social parameters. Environmental and social impacts were quantified as much as possible. For cases where quantification was not possible/applicable, a qualitative assessment was conducted using professional expert judgement, experience and available knowledge, and including the consideration of stakeholder views. Where there were limitations to the data, and/or uncertainties, these were recorded in the relevant sections, along with any assumptions made during the assessment. In order to determine the significance of each impact, two overall factors were considered:

- Magnitude and nature of impacts,
- The importance and/or sensitivity of the environmental and social receiving parameter, as determined during the assessment of baseline conditions

5.2.3.Magnitude of Impact

Once impacts are characterized as per the above table, they are assigned a 'magnitude' which is typically a function of some combination (depending on the subject receptor) of the following characteristics:

- *Duration*

- *Extent*
- *Frequency*
- *Scale*.

Magnitude is a continuum from small to large, along which evaluation requires professional judgement and experience. Each impact is evaluated on a case-by-case basis and the rationale for each determination is noted. Magnitude designations for negative effects are *negligible, small, medium and large*. The magnitude designations themselves are universally consistent, but the definition for the designations varies by issue. In the case of a positive impact, no magnitude designation is assigned as it is considered sufficient for the purpose of the impact assessment to indicate that the Project is expected to result in a positive impact.

Table 15: Magnitude Characterization

Impacts/Aspect	Narrative
Negligible Magnitude Impact	These impacts results in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes are regarded as having no impact and characterized as having a negligible magnitude.
Low Magnitude Impact	Affects a specific area, system, aspect (physical), group of localized individuals within a population (biological) and at sufficient magnitude to result in a small increase in measured concentrations or levels. (physical) over a short time period (one plant/animal generation or less but does not affect other trophic levels or the population itself), and localized area.
Moderate Magnitude Impact	Affects a portion of an area, system, aspect (physical), population or species (biological) and at sufficient magnitude to cause a measurable numerical increase in measured concentrations or levels. (physical) and may bring about a change in abundance and/or distribution over one or more plant/animal generations but does not threaten the integrity of that population or any population dependent on it (physical and biological).
High Magnitude Impact	Affects an entire area, system (physical), aspect, population or species (biological) and at sufficient magnitude to cause a significant measurable numerical increase in measured concentrations or levels (physical) or a decline in abundance and/ or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations (physical and biological). A high magnitude impact may also adversely affect the integrity of a site, habitat or ecosystem.

5.2.4. Assessment of Impact Significance

In order to assess the significance of an impact, the sensitivity of the receiving environmental or social parameter is considered in association with the magnitude of the impact, according to the matrix shown in Table below;

Table 16: Impact Significance Matrix

Significance of the Impact		Magnitude and Nature of the Impact		
		Low	Medium	High
Sensitivity of Receptors	Low	Not significant	Minor	Minor
	Medium	Minor	Minor	Moderate
	High	Minor	Moderate	Major

N/b

Severity Levels	1 (Negligible)	2 (Low)	3 (Moderate)	4 (High)	5 (Very High)

While the above matrix provides a framework for the determination of significance and enables comparison across environmental and social parameters, a degree of professional judgement is required, and some parameter-specific factors considered in making a determination of impact significance.

5.2.5. Mitigation Potential and Residual Impacts

A key objective of an Environmental Impact Assessment (EIA) is to identify and define socially, environmentally and technically acceptable and cost- effective mitigations measures to avoid, reduce, remedy or compensate for potential negative impacts, and to enhance potential environmental and social benefits. Impacts with negligible and low significance usually do not require any additional mitigation measure. This means that these impacts are within acceptable limits because:

- They are very unlikely to happen; and/or
- The sensitivity of receiving environment is very low; and /or
- Project designs have installed sufficient control mechanisms.

For *Negligible* and *Low significance*, impacts should inherent control measures fail, the implementation of additional control measures should ensure impacts remain acceptable. Impacts with medium significance, deemed as significant impacts, require additional mitigation measures to reduce the impacts at acceptable levels. These impacts can be minimized in order to reach negligible or low levels that are also deemed as acceptable level of impacts (using effective control measures). Impact with high significance generally requires imperative mitigation to reduce the significance to lower levels before proceeding with the Project. Positive impacts should be subject to enhancement measures where possible.

5.2.6. Cumulative Impacts

Cumulative impacts result from combination of an impact from the proposed project with an impact from another activity/project. How the impacts and effects are assessed is strongly influenced by the status of the other activities (e.g. already in existence, approved or proposed) and how much data is available to characterize the magnitude of their impacts. The approach for assessing cumulative impacts is to screen potential interactions with other projects based on:

- *Projects that are already in existence and are operating.*
- *Projects that are approved but not yet built or operating.*
- *Projects that are a realistic proposition but are not yet built*.

5.3. Positive Impacts (Construction and Operation) Phases

e) **Employment Opportunities:** There are limited opportunities for employment in the areas where the proposed project is to be located (Lolgorian). Unemployment is a common issue reported by the stakeholders consulted during public participation. The Project's activities are expected to generate indirect and direct economic activity in the surrounding communities such

as through outsourcing contracts for various services to local vendors, and employment opportunities by the Project.

f) **Stimulation of Local Economy**. The Project will, through direct employment and induced indirect mechanisms (such as more economic activity resulting from improved infrastructure), will stimulate economic activity in the region, thereby contributing to poverty alleviation and improvements to community well-being.

5.4. Negative Impact (Construction Phase)

5.4.1. Habitat Loss and Destruction (Ecology and Biodiversity)

During the construction phase, the project will involve extensive site clearing and the development of infrastructure, including the processing plant, storage facilities, access roads, and associated buildings. These activities are expected to result in the loss of approximately 10 acres of habitat, primarily affecting existing vegetation and land cover. While the area is not within any protected or sensitive ecological zones, the removal of vegetation may lead to localized impacts such as soil erosion, dust generation, and temporary disturbance to any terrestrial fauna present.

Mitigation Measures

- Vegetation clearance will be restricted strictly to designated construction areas to minimize unnecessary habitat loss.
- Sensitive areas, if identified during construction, will be clearly demarcated and protected as “no-go zones.”
- Clearing activities will be undertaken in a phased manner to minimize large-scale habitat disturbance at any given time.
- Indigenous vegetation will be replanted in buffer areas and non-operational spaces where feasible.
- A biodiversity monitoring program will be implemented to observe changes in vegetation cover and wildlife presence during construction.
- Workers will receive environmental awareness training to discourage disturbance or hunting of wildlife within and around the project site.
- Where feasible, collaboration with local communities will be encouraged in tree planting and habitat restoration initiatives within surrounding areas.

5.4.2. Soil Disturbance and Erosion

Construction activities associated with the proposed facility will involve excavation, earthworks, grading, and movement of heavy machinery. These activities have the potential to disturb the natural soil structure and expose topsoil to erosion. Excavation and levelling works may destabilize soil profiles and increase susceptibility to erosion, particularly during rainfall events. Movement of heavy construction equipment and vehicles may also lead to soil compaction, reducing soil porosity and infiltration capacity. Reduced infiltration may increase surface runoff and alter localized drainage patterns. Additionally, exposed soil surfaces during construction may be vulnerable to erosion caused by stormwater runoff and wind action, potentially leading to sediment transport to surrounding areas if not properly managed.

Mitigation Measures

- Earthworks and excavation will be restricted to designated construction areas.
- Construction boundaries will be clearly demarcated to prevent disturbance outside the project footprint.
- Temporary drainage systems such as diversion channels, silt traps, and sediment control structures will be installed to manage runoff and prevent sediment transport.
- Stormwater management measures will be implemented to control surface water flow across the site.

- Limit the movement of heavy machinery to designated pathways to prevent widespread soil
- Compaction,
- Use diversion channels or berms to redirect clean water away from disturbed soils and
- reduce erosion risk,
- Progressive rehabilitation of disturbed areas will be undertaken where construction activities have been completed.
- Regular inspections will be conducted to identify early signs of erosion or sedimentation, particularly after heavy rainfall events.
- Adaptive management measures will be applied where necessary to strengthen erosion control structures and ensure effective soil protection

5.4.3. Disturbance to Flora, Avifauna and Habitats

The construction of project facilities will lead to habitat loss and potential fragmentation, which may reduce the availability of food and shelter for terrestrial fauna, particularly small mammals, reptiles, and invertebrates. While mobile species such as birds and larger mammals are likely to relocate to adjacent areas, some less-mobile individuals may suffer accidental mortality during site clearing and earthworks. The installation of fencing around the project site throughout the life of the facility may act as a barrier to the movement of certain wildlife species. While herpetofauna (reptiles and amphibians) and small mammals are likely to navigate through gaps or openings in the fence, larger terrestrial animals may be restricted in their movement across the site. Birds, being highly mobile, will not be impeded and can easily fly over the barriers.

Mitigation Measures

- Vegetation clearance will be limited to the minimum area required for construction activities.
- Environmentally sensitive areas identified during construction will be protected through clear demarcation.
- Where feasible, existing vegetation outside the construction footprint will be retained to maintain ecological stability.
- Buffer zones will be maintained around the project site where possible to preserve vegetation and provide refuge habitats.
- Workers will be prohibited from hunting, trapping, or disturbing wildlife within the project area.
- Environmental awareness training will be provided to all construction personnel.
- Periodic monitoring will be conducted to assess changes in vegetation and wildlife presence during construction.

5.4.4. Air Quality (Air Pollution)

Construction activities associated with the proposed plant are likely to generate temporary air emissions that may affect local air quality. The primary sources of air pollution during construction will include dust generated from land clearing, excavation, grading, and movement of construction vehicles. Dust emissions may arise from exposed soil surfaces, transportation of construction materials, and movement of vehicles along unpaved access roads. In addition, exhaust emissions from construction machinery and vehicles may contribute to localized air pollution. These emissions may cause temporary nuisance to nearby residents, workers, and road users if not properly controlled.

Mitigation Measures

- Water will be regularly sprayed on exposed surfaces and construction areas to suppress dust generation.
- Internal access roads will be periodically wetted to control dust emissions.
- Construction vehicles will adhere to designated speed limits to minimize dust generation.

- Trucks transporting loose materials will be covered to prevent dust dispersion.
- Construction machinery and vehicles will be regularly serviced and maintained to minimize exhaust emissions.
- Workers exposed to dust will be provided with appropriate personal protective equipment such as dust masks.
- Routine monitoring and visual inspections will be conducted to ensure effective dust control measures are maintained

5.4.5. Traffic Impacts

Construction activities will require the transportation of construction materials, equipment, and workforce to and from the project site. As a result, an increase in vehicular traffic is expected along access roads serving the project area. Heavy trucks transporting construction materials such as cement, aggregates, steel, and machinery may increase traffic volumes on local roads. This increase in traffic could lead to temporary disruptions to normal traffic flow and pose potential safety risks to road users, pedestrians, and nearby communities. Construction vehicles may also contribute to increased noise, dust generation, and wear on existing road infrastructure.

Mitigation Measures

- A Traffic Management Plan will be developed and implemented to regulate vehicle movement during construction.
- Construction vehicles will adhere to designated speed limits to enhance road safety (10-20 Kp/H.
- Drivers will be trained on safe driving practices and compliance with road safety regulations.
- Construction materials will be transported during designated hours to minimize disruption to local traffic.
- Vehicles and equipment will be regularly inspected and maintained to ensure safe operation.
- Appropriate road safety signage will be installed along access routes where necessary and use of traffic Marshall be deployed.

5.4.6. Noise and Vibration Impacts

During the construction phase, noise and vibration will be generated by construction equipment and vehicles. The intensity of these impacts will depend on the type of equipment used, its operational duration, and the distance to nearby receptors.

Noise is perceptible differently depending on the change in sound level: a 3 dB change is just noticeable, 5 dB is clearly noticeable, and a 10 dBA change is perceived as a doubling or halving of the ambient noise. The operation of construction machinery such as excavators, bulldozers, haul trucks, and compressors will cause a temporary incremental increase in ambient noise levels, which can attenuate with distance. However, if the cumulative increase in ambient noise is significant, it may cause nuisance or disturbance to nearby communities, workers, and wildlife. Vibration impacts are expected to be localized and minor, primarily affecting areas immediately adjacent to heavy machinery operation.

Mitigation Measures

- Maintaining a buffer distance between high-noise equipment and sensitive receptors,
- Scheduling noisy activities during daytime hours to reduce disturbance,
- Using well-maintained and low-noise machinery.
- Implementing noise barriers or enclosures around particularly loud equipment, and
- Adhere to EMCA (Noise and Vibration) Regulation 2009 provisions.

5.5. Socio-Economic Impacts During Construction

5.5.1. Social Disturbance Factors (Population Influx)

The Project will likely attract an influx of people seeking direct employment or other economic opportunities. This influx of workers may place added pressure on already underdeveloped infrastructure and services in local communities. Influx of people may lead to heightened risks such as the spread of communicable diseases, unplanned development, social tensions, law and order issues and conflict. There may also be increased risks of social concerns such as petty crime, alcohol and substance abuse, or conflicts between workers and community members if not properly managed. However, the project will also generate employment opportunities during construction, particularly for unskilled and semi-skilled labor from the surrounding communities.

Mitigation Measures

- Preference will be given to hiring local community members for unskilled and semi-skilled positions.
- A Worker Code of Conduct will be developed and enforced to regulate worker behavior on and off the project site.
- Workers will undergo induction training covering acceptable conduct, community relations, and environmental responsibilities.
- A grievance redress mechanism will be established to allow community members to report concerns related to project activities,
- Carry out awareness campaigns in the surrounding communities in relation to in-migration related risks and impacts,
- Access to the construction site will be controlled to prevent unauthorized entry.

5.5.2. Impacts from Migrant Workers (Disease Transmission)

The presence of a construction workforce may lead to increased interactions between workers and local communities. In some cases, this may increase the risk of transmission of communicable diseases, including sexually transmitted infections (STIs) such as HIV/AIDS. The risk may arise from increased social interaction, particularly in nearby trading centres where workers may seek accommodation, goods, and services.

Mitigation Measures

- An HIV/AIDS awareness and prevention program will be implemented for all workers,
- Workers will receive health education on disease prevention and responsible behavior,
- Voluntary counselling and testing services will be promoted in collaboration with local health facilities,
- Condoms will be made readily available to workers, and
- The Worker Code of Conduct will prohibit illegal or exploitative activities and promote responsible interactions with local communities

5.5.3. Community Health and Safety

Construction activities may pose potential health and safety risks to workers and nearby communities. These risks may arise from dust emissions, noise from construction equipment, vehicle movements, and the operation of heavy machinery. Activities such as excavation, lifting operations, equipment installation, and transportation of materials may create hazards if not properly managed. Additionally, improper handling of construction materials or hazardous substances could pose risks to both workers and surrounding communities.

Mitigation Measures

- A comprehensive Construction Health and Safety Plan (C-HSP) will be developed and implemented in accordance with the Occupational Health and Safety Act, 2007 and best international practices,
- Workers will receive training on occupational health and safety procedures, including the use of personal protective equipment,
- Appropriate PPE will be provided and mandatory use enforced for all construction personnel,
- Emergency response procedures will be established to address accidents, fires, chemical spills, or medical emergencies, and
- Regular safety inspections and toolbox talks will be conducted to reinforce safe working practices.
- Hazardous materials will be properly stored and handled according to established safety protocols.

5.6. Negative (Bio-Physical Impact) for Operational Phase

During the operation phase, the main concerns are air emissions (especially dioxins, particulates, and asbestos fibers), wastewater/ash management, and worker exposure to infectious, chemical, or fibrous hazards. These impacts are manageable with modern engineering controls, rigorous SOPs, regular monitoring (stack emissions, ash toxicity, effluent), and compliance with standards like WHO, national biomedical/hazardous waste rules, and asbestos regulations. Without proper controls, risks include long-term health effects (cancer, respiratory disease) and localized pollution. Well-run integrated facilities typically result in net positive environmental and health outcomes by safely containing and destroying hazardous streams.

5.6.1. Air Quality (Pollution)

Incineration of biomedical and condemned goods can release particulate matter (PM), SO_2, NO_x, dioxins/furans (especially from chlorine-containing materials), heavy metals (e.g., mercury), and volatile organic compounds if air pollution control devices (e.g., scrubbers, activated carbon, high-temperature chambers) are inadequate or poorly maintained. On the other hand, asbestos handling, sorting, or processing can release respirable asbestos fibers into the air, posing long-term inhalation hazards. Proper wetting, containment, and negative-pressure systems are essential to minimize fiber release.

Mitigation Measures

- Install and maintain advanced Air Pollution Control Devices on incinerators including quencher, venturi scrubber, wet alkali scrubber, activated carbon injection, and baghouse filters to control particulate matter (PM), dioxins/furans, HCl, NOx, SO_2, and heavy metals,
- Operate dual-chamber incinerators at high temperatures (primary ≥800–850°C, secondary ≥1050–1100°C ±50°C) with minimum 2-second gas residence time and ≥99% combustion efficiency,
- Use wet methods (water spraying/misting) during handling, sorting, and bagging avoid breaking, sawing, or dry handling to prevent asbestos fiber release,
- Implement fugitive dust and odor control including covered storage areas, rapid waste processing, and regular vehicle/road wetting,
- Develop and strictly follow an Incinerator Operations Manual and integrated Waste Management Plan,
- Ensure regulatory compliance (e.g., national biomedical/hazardous waste rules, asbestos regulations, WHO guidelines),
- Conduct preventive maintenance on all equipment and stock consumables (scrubbing media, etc.).and
- Ensure continuous emission monitoring, regular stack testing, and high stack height (e.g., 30m) for better dispersion.

5.6.2. Surface Water Quality (Pollution)

Wastewater generation from scrubber systems (for incinerators), floor/vehicle washing, and condensate. This can contain acids, heavy metals, or pathogens if not neutralized and treated. Leachate risks from storage areas or ash disposal if liners fail; improper ash handling (from biomedical/incineration) can contaminate groundwater or soil with toxins or pathogens. In addition, asbestos fibers are generally not highly mobile in water/soil but can contaminate if waste is not properly sealed.

Mitigation Measures

- Treat all wastewater (scrubber effluent, floor wash, vehicle wash) through an on-site Effluent Treatment Plant (ETP) with neutralization, coagulation, and recycling of treated water,
- Use lined storage areas, secondary containment, and proper leachate collection systems; test and stabilize ash before disposal in authorized secure landfills,
- Double-bag or seal in leak-tight containers (≥6-mil plastic) while wet; never allow loose fibers to contact soil or water.
- Ensure the Asbestos landfill is properly covered (≥6 inches non-asbestos material), and
- Separate clean and contaminated runoff, with sedimentation ponds or treatment before discharge into the environment.

5.7. Socio-Economic Impact for Operational Phase

5.7.1. Inappropriate Disposal of Waste

Potential spread of infections or vector-borne diseases (flies, rodents) if odors or waste attract pests; low risk with good operation but higher if failures occur. Nuisance issues: Odors, traffic from waste transport, and visual impacts from the facility. Positive impacts: Proper centralized treatment reduces overall environmental burden by preventing illegal dumping, open burning, or mixing of hazardous streams, thus protecting groundwater, air, and public health compared to decentralized poor practices.

Mitigation Measures

- Ensure proper waste segregation, and tracking (barcoding/manifest systems) to prevent mixing of waste streams,
- Regular environmental monitoring (air, water, soil, ash toxicity) and third-party audits; maintain records for regulatory compliance,
- Greenbelt development around the facility for visual/noise/odor buffering,
- Prefer non-incineration alternatives (autoclaving, microwaving, chemical disinfection) for suitable biomedical waste where feasible to reduce emissions,
-

5.7.2. Occupational Health and Safety

Infection and sharps risks (biomedical waste) needle-stick injuries, exposure to bloodborne pathogens (HIV, HBV, HCV), bacteria, or viruses among waste handlers and operators. Chemical/toxic exposure from pharmaceuticals in condemned goods (cytotoxic drugs, antibiotics), solvents, or mercury. In addition, asbestos exposure can lead to high risk of asbestosis, lung cancer, or mesothelioma from inhaling fibers during unpacking, sorting, or bagging; no safe exposure threshold exists. Other hazards including thermal burns (incinerators), ergonomic strains, noise, slips, and chemical spills are major EHS risks associated with the proposed facility.

Mitigation Measures

- Ensure appropriate PPEs e.g. respirators (N-100/P-100 or supplied-air for high-risk tasks), full-body suits, gloves, and boot cover especially for asbestos, sharps, and infectious materials. Include decontamination zones and procedures,

- Conduct comprehensive worker training on segregation, handling protocols, emergency response, and hazard recognition; regular medical surveillance (e.g., lung function tests for asbestos workers),
- Only licensed/certified personnel shall be allowed to handle asbestos. Procedures like wetting and containment; air monitoring for fiber levels; no eating/smoking in work areas shall be strictly enforced,
- Develop and implement a Site Safety Plan with clear SOPs, site control, monitoring, and emergency procedures.

5.8. Social Impacts

The establishment and operation of the proposed project is expected to result in a range of social impacts within the project area and its surroundings. These impacts may be both positive and negative depending on how the project activities are implemented and managed.

5.8.1. Labour Influx

The construction and operational phases of the proposed plant are likely to attract job seekers from outside the immediate project area. This **labour influx** may occur as individuals move into the surrounding communities in search of employment and other economic opportunities associated with the project. While the project will generate significant employment opportunities and economic benefits, the arrival of additional workers may also place pressure on existing local services and social infrastructure. An increased population within the project area may lead to higher demand for housing, water supply, sanitation facilities, healthcare services, and other basic social amenities. In areas where these services are already limited, the sudden increase in population could strain available resources. In addition, labour influx may contribute to a rise in the cost of living, particularly with regard to rental housing, food prices, and other essential goods and services. This situation may affect vulnerable members of the host community if demand exceeds local supply.

Labour influx can also potentially lead to social challenges such as conflicts between local residents and incoming workers, increased pressure on community infrastructure, and changes in social dynamics. If not properly managed, it may also increase the risk of communicable disease transmission and other social concerns.

Mitigation Measures

- The project proponent will give priority to qualified local residents for employment opportunities, particularly for unskilled and semi-skilled positions, in order to reduce the need for external labour.
- Where external workers are required, the proponent will ensure that appropriate accommodation arrangements are made to avoid unnecessary pressure on local housing facilities
- All project workers will be required to adhere to a strict code of conduct that promotes respectful engagement with local communities and discourages any form of misconduct.
- Continuous engagement with the local community will be undertaken to address emerging concerns and maintain good relations between workers and residents.
- The project will provide adequate facilities within the project site to minimize pressure on community services.
- Awareness programs on public health issues, including prevention of communicable diseases, will be implemented for both workers and the surrounding communities.
- Where feasible, the proponent may collaborate with local authorities and communities to support improvements in key infrastructure and services.

5.8.2. Gender-Based Violence and Harassment (GBVH)

The establishment and operation of the plant may present potential risks related to gender-based violence and harassment (GBVH), particularly during the construction phase when a relatively large workforce may

be present in the project area. Labour influx and increased interaction between workers and the local community may sometimes lead to social tensions or inappropriate behavior if proper safeguards are not put in place.

GBVH may include harassment, intimidation, exploitation, or other forms of misconduct directed at women, girls, and other vulnerable groups within the community or workplace. Such risks may arise in situations where workers interact frequently with local residents, particularly in areas where social protection mechanisms and awareness are limited. In addition, unequal power dynamics, economic vulnerability, and the presence of temporary workers may increase the likelihood of harassment or exploitation if not adequately addressed. If such issues occur, they may negatively affect the safety, dignity, and wellbeing of community members, particularly women and girls. They may also undermine social cohesion and trust between the project proponent and the host community. For these reasons, it is important that preventive and responsive measures are put in place to minimize the risk of GBVH associated with the project.

Mitigation Measures

- The project proponent will implement a strict zero-tolerance policy against all forms of gender-based violence, harassment, and exploitation within the workplace and surrounding communities.
- All employees and contractors will be required to sign and adhere to a code of conduct that clearly prohibits harassment, abuse, discrimination, and exploitation.
- Regular training and sensitization programs will be conducted for workers and management on GBVH prevention, respectful workplace behavior, and community relations;
- A confidential and accessible grievance reporting system will be established to enable workers and community members to report cases of harassment or misconduct safely.
- The project will work with local leaders and community members to raise awareness about GBVH risks and available reporting channels.
- The proponent will promote equal employment opportunities for women and ensure that the workplace environment is safe, respectful, and free from discrimination.
- Where necessary, the project will collaborate with local administration and relevant institutions to address any reported cases and ensure appropriate action is taken.

5.8.3.Risk of Disease Transmission Including HIV and AIDS

The construction and operational phases of the facility may increase the risk of disease transmission within the project area and surrounding communities. The presence of a relatively large workforce, including workers from outside the local area, may lead to increased interaction between project workers and members of the host community. Such interactions, combined with population movement and congregation of workers, may increase the likelihood of the spread diseases.

One of the key public health concerns associated with labour influx in large development projects is the potential increase in the spread of HIV and AIDS, as well as other sexually transmitted infections (STIs). The movement of workers into the project area, particularly where workers are separated from their families for extended periods, may increase the risk of high-risk social behavior that could contribute to the transmission of HIV and other infections. If not properly addressed, this may have long-term public health implications for both the workforce and the surrounding community. Without appropriate preventive measures, these factors may place additional pressure on existing health services and potentially affect the health and wellbeing of both workers and the host community.

Mitigation Measures

- Regular sensitization and awareness campaigns will be conducted for workers and surrounding communities to promote understanding of HIV and AIDS prevention.
- Educational materials on HIV prevention, safe practices, and general health awareness will be distributed at the workplace.

- The project will collaborate with local health authorities and organizations to support HIV testing, counseling, and treatment services;
- Access to condoms and health promotion information will be made available to workers as part of workplace health programs;
- Workers may undergo routine health checks to monitor general health and prevent the spread of communicable diseases;
- Proper sanitation and hygiene facilities will be provided within the project site to reduce the spread of infectious diseases;
- Training programs will emphasize personal hygiene, disease prevention, and responsible social behavior; and
- The project will work closely with community leaders to raise awareness on public health issues affecting the project area.

8. CLIMATE RISK AND VULNERABILITY ASSESSMENT

8.1. Introduction

Climate change is one of the greatest threats facing the world in the 21st century. If not addressed, it will have significant and long-lasting impacts on the lives of people around the globe. Taking action to mitigate and adapt to climate change is therefore not optional, but an urgent necessity. While the effects of climate change are already being observed, it is generally accepted that if the global temperature rise reaches 1.5°C above pre-industrial levels, the impacts on natural and human systems will be severe and potentially irreversible. These impacts include: -

- Loss of ecosystems, sea-level rise, and more frequent,
- Severe weather events, such as droughts, and
- Heatwaves, and storms,

The adoption of the Paris Agreement on Climate Change, followed by its signing by nearly 200 countries, marked a historic turning point in global climate action. Under the Paris Agreement, signatory nations committed to limiting the average global temperature increase to well below 2°C, aiming for 1.5°C. In line with this global goal, Kenya has committed to developing and implementing an ambitious Climate Action Plan (CAP) under C40's Deadline 2020 programme. This plan will align with international climate targets and contribute to mitigating climate change impacts at both the national and global levels.

8.2. Kenya Climate

Kenya's climate is highly diverse, with variations primarily influenced by altitude. The highlands experience a moderate mean annual temperature of around 15°C, while the lowland areas in northern and eastern Kenya can reach temperatures as high as 29°C. In contrast, the coastal region and the shores of Lake Victoria in the far west enjoy a tropical climate, with temperatures typically ranging between 23°C and 27°C. Annual precipitation in Kenya varies significantly across the country, with amounts ranging from as low as 200mm in the arid northern and eastern regions, characterized by steppe landscapes, to more than 1,600 mm in the western areas. The highland regions of Kenya experience a more moderate climate, with annual precipitation totals ranging between 800 mm and 1,000 mm.

Kenya has two rainy seasons (bimodal precipitation regime) – a major one from March to May and a minor one from October to December[1].

8.2.1.Projected Climate Changes

In response to rising greenhouse gas (GHG) concentrations, air temperatures over Kenya are projected to increase by 1.2 to 3.2°C (very likely range) by 2080, relative to the baseline year of 1876. The extent of this temperature rise will depend on the future GHG emissions scenario (Figure below). Compared to pre-industrial levels, median climate model projections indicate a temperature increase of approximately 1.4°C by 2030, and 1.7°C by both 2050 and 2080, under the low emissions scenario (RCP2.6). Under the medium to high emissions scenario (RCP6.0), median temperature increases are projected to reach 1.3°C by 2030, 1.6°C by 2050, and 2.2°C by 2080.

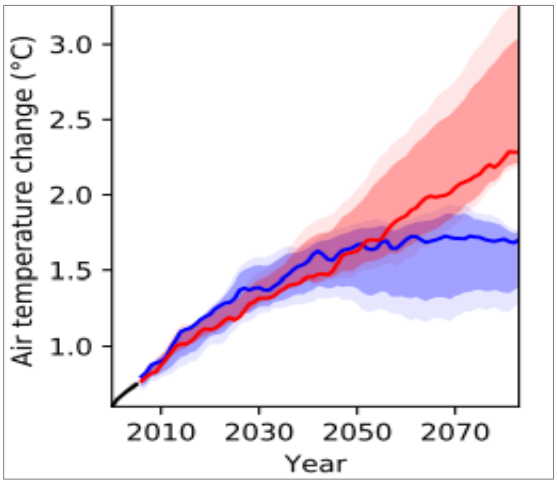


Figure 8: Air temperature projections for Kenya for different GHG emissions scenarios.

[1] Climate Risk Profile: Kenya

8.2.2.Very Hot Days

In line with rising mean annual temperatures, the annual number of very hot days (days with daily maximum temperature above 35°C) is projected to rise substantially and with high certainty, in particular over central and eastern Kenya. Under the medium/high emissions scenario RCP6.0, the multi-model median, averaged over the whole country, projects 25 more very hot days per year in 2030 than in 2000, 36 more in 2050 and 59 more in 2080. In some parts, especially in northern and eastern Kenya, this amounts to about 300 days per year by 2080.

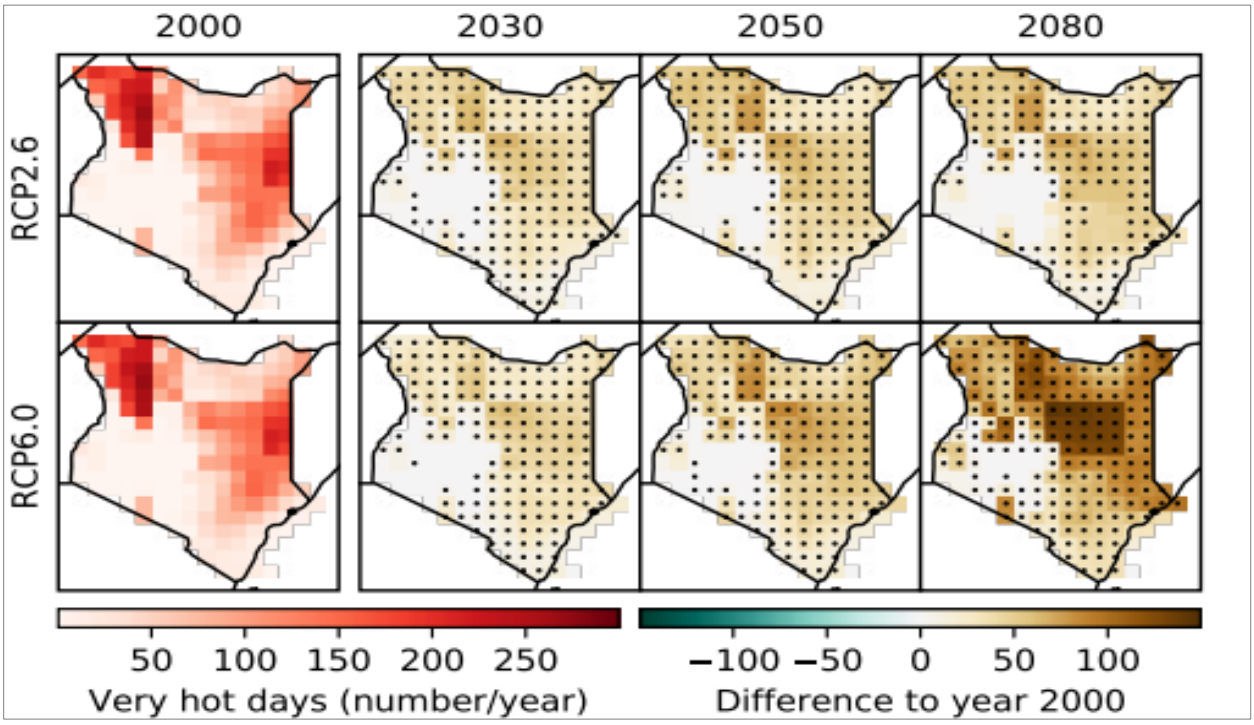


Figure 9: Projections of the annual number of very hot days (daily maximum temperature above 35 °C) for Kenya for different GHG emissions scenarios.

8.2.3.Sea Level Rise

In response to globally increasing temperatures, the sea level off the coast of Kenya is projected to rise (Figure 4). Until 2050, very similar sea levels are projected under both emissions scenarios. Under RCP6.0 and compared to year 2000 levels, the median climate model projects a sea level rise by 10 cm in 2030, 21 cm in 2050, and 40 cm in 2080. This threatens Kenya's coastal communities and may cause saline intrusion in coastal waterways and groundwater reservoirs.

8.2.4.Precipitation

Future projections of precipitation in Kenya are less certain than those for temperature change, primarily due to the high natural year-to-year variability in rainfall patterns. Among the three climate models used for this analysis, one model predicts either no change or a slight decrease in mean annual precipitation under the RCP6.0 scenario, while the other two models project an increase under the same emissions scenario. For the RCP2.6 scenario, median model projections suggest a slight increase in precipitation towards 2030, followed by an overall decrease towards the end of the century. Under RCP6.0, however, the projected increase in precipitation is expected to intensify after 2050, with an estimated rise of 53 mm per year by the end of the century, compared to 2000 levels. Higher emissions pathways indicate an overall wetter future for Kenya, with increased rainfall likely in certain regions.

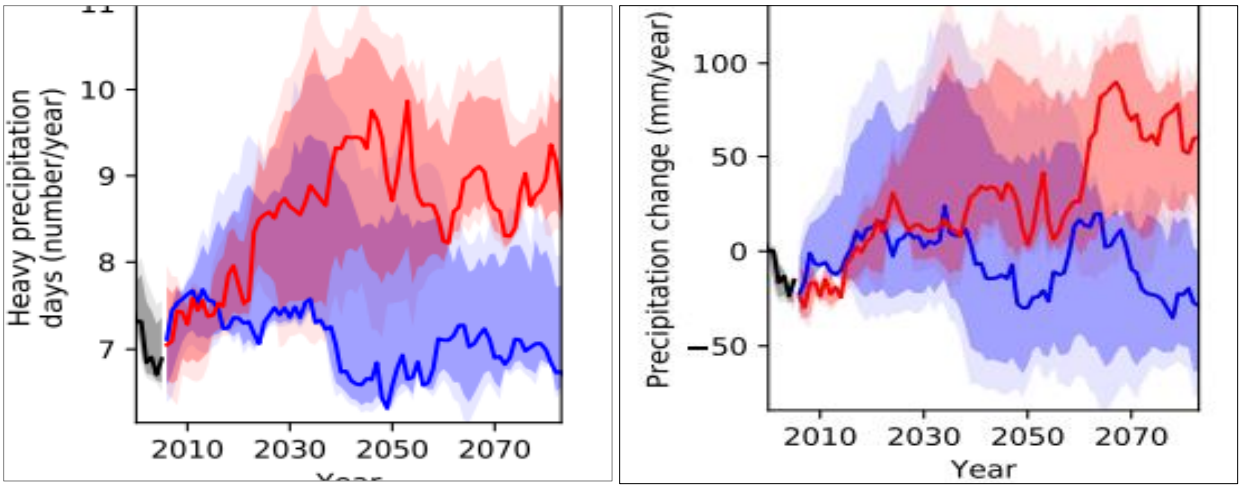


Figure 10: Projections of the number of days with heavy precipitation over Kenya for different GHG emissions scenarios, relative to the year 2000

In response to global warming, heavy precipitation events are expected to become more intense in many parts of the world due to the increased water vapour holding capacity of a warmer atmosphere. At the same time, the number of days with heavy precipitation events is expected to increase. This tendency is also found in climate projections for Kenya as outlined in the Figure above, with climate models projecting an increase in the number of days with heavy precipitation, from 7 days per year in 2000 to 9 days per year in 2080 under RCP6.0. Under RCP2.6, the number of days with heavy precipitation remains unchanged.

8.3. Climate Change Impacts to Key Sectors

Sector	Narrative
Infrastructure	Climate change is projected to severely impact Kenya's transport infrastructure through extreme weather events like floods and droughts. High precipitation and temperatures will cause infrastructure damage, leading to increased maintenance costs. Since road transport is vital for agriculture, trade, and access to services, especially in rural areas, investing in climate-resilient road networks is essential. Additionally, road transport accounts for 99% of non-aviation transport GHG emissions in Kenya. Extreme weather events will have devastating impacts on human settlements and economic sites, particularly in densely populated urban areas like Nairobi and Mombasa. Informal settlements, which often lack stable infrastructure and are built in high-risk areas such as riverbanks and coastal zones, are especially vulnerable. These areas experience severe flooding, leading to loss of housing, water contamination, and even death. Residents, who typically have low adaptive capacity due to poverty and lack of infrastructure, are particularly affected.
Ecosystems	Climate change is expected to significantly impact tropical ecosystems, though the exact extent remains uncertain. Rising temperatures, more frequent and intense droughts, and changing conditions are putting wetlands, river systems, and forests at risk of transformation. These changes can lead to habitat loss for both plants and animals, disrupt forest succession, and increase the spread of invasive species. Additionally, factors such as low agricultural production and population growth may drive further agricultural expansion, leading to deforestation, land degradation, and forest fires, which will negatively affect biodiversity.

Sector	Narrative
Agriculture	Smallholder farmers in Kenya face growing challenges due to the unpredictability of weather patterns caused by climate change. Since most crops rely on rainwater, yields are increasingly affected by erratic rainfall, while the limited use of irrigation (only 28% of the potential irrigated area in 2003) further exacerbates the situation. This is due to poor extension services, irrigation management, lack of credit, and technical equipment. The primary irrigated crops are vegetables, fruit, coffee, rice, and maize. The uncertainty in water availability projections translates into high variability in drought predictions. According to median projections, the national crop land area exposed to drought annually will only slightly increase due to global warming, though other models predict a much stronger rise. Under RCP6.0, the range of drought exposure for crop land widens from 0-0.8% in 2000 to 0-1.6% in 2080, with the very likely range increasing from 0-1.9% to 0-9.8%. Some models project a fivefold increase in drought exposure, while others show no change. Climate change will have a negative impact on yields of millet and sorghum.
Water Resources	Current projections of water availability in Kenya show high uncertainty, with median models suggesting an increase under RCP6.0 and no change under RCP2.6. However, when factoring in population growth (SSP2 projections), per capita water availability is projected to decline significantly by 73% under RCP2.6 and 63% under RCP6.0 by 2080, compared to 2000 levels. While population growth is the primary driver, these projections emphasize the need for investment in water-saving measures. Regional projections show varying trends: under RCP2.6, water availability will decrease by up to 25% in western Kenya and increase by up to 25% in southern Kenya by 2080. Under RCP6.0, the focus shifts to eastern Kenya, where water availability is expected to increase by up to 80%.

8.4. Climate Baseline and Projected Hazards in Kwale County

Kwale County experiences a tropical monsoon climate with bimodal rainfall (long rains March–July; short rains October–December). Average temperatures range between 21–25°C, with coastal areas receiving >1,000 mm annual rainfall and western/semi-arid zones <500–750 mm. Key climate hazards identified in the Kwale CCCAP 2022–2027 and CIDP 2023–2027 include:

- Floods and intense rainfall (rapid-onset): Frequent in Lunga Lunga, Jego, River Umba, and Ramisi areas;
- Droughts and dry spells (slow-onset);
- Sea-level rise, coastal erosion, and saltwater intrusion: Threatens low-lying coastal zones (relevant for any facility near Diani/Ukunda or Msambweni),

8.4.1. Climate Vulnerability Assessment for the IWHF

Vulnerability is evaluated using the standard framework of Exposure plus Sensitivity – Adaptive Capacity. The assessment is site-specific but assumes a typical peri-urban or coastal-adjacent location in Kwale County.

Component	Key Vulnerabilities for IWHF	Significance
Exposure	Flooding (leachate overflow, site inundation); drought (water scarcity for treatment/dust control); sea-level rise/saltwater intrusion (groundwater contamination, effluent discharge issues); extreme heat (odour generation, fire risk).	High (coastal/low-lying siting)

Component	Key Vulnerabilities for IWHF	Significance
Sensitivity	Dependence on water for leachate treatment and operations; potential for GHG emissions (incineration/landfill gas); hazardous waste handling during disasters (increased medical/asbestos waste post-floods).	Moderate to High
Adaptive Capacity	Modern lined facilities, emergency plans, and integration with county services (KWAWASCO, Disaster Risk Management).	Moderate (can be strengthened)

Overall Vulnerability Rating: Moderate to High without adaptation. The project could exacerbate climate impacts if unmitigated (e.g., methane from poor waste handling) but offers mitigation co-benefits by diverting waste from open dumpsites.

8.4.2. Climate Adaptation and Mitigation Measures

The following measures follow the mitigation hierarchy and are fully integrated into the project ESMP. The adaption and mitigation measures align with Kwale CCCAP 2022-2027 priorities in disaster risk management, water/blue economy, health/sanitation, and human settlements.

Adaptation Measures (Building Resilience)

a) **Infrastructure Design and Siting**:
   - Elevate critical structures (reception, treatment units, incinerator) by at least 1–1.5 m above projected 2050 flood levels (per Kwale CCCAP hazard mapping).
   - Install flood barriers, improved drainage, and bunded storage areas.
   - Use climate-resilient materials (e.g., corrosion-resistant).

b) **Water and Leachate Management** (linked to Kwale County Water and Sanitation Services Act, 2020):
   - Rainwater harvesting and storage systems for operational water needs.
   - Enhanced leachate collection/treatment with overflow contingency storage.
   - Drought contingency: Greywater recycling and water-efficient technologies.

c) **Disaster Preparedness**:
   - Integrate early warning systems (linked to NDMA/KMD) into the Emergency Response Plan.
   -

d) **Health and OHS**:
   - Heat-stress monitoring and shaded/rest areas for workers.
   - Vector-borne disease surveillance (malaria, dengue) during wet periods.

Mitigation Measures (Reducing Project GHG Footprint)

- Prioritize source segregation, recycling, and composting to minimize landfill/incineration volumes (aligns with Sustainable Waste Management Act 2022 and NDC waste actions).
- Install solar PV for auxiliary power (reducing diesel dependency), and
- Annual GHG inventory and reporting to support Kenya's NDC tracking

The Proponent shall conduct a detailed site-specific climate risk screening (using Kwale CCCAP hazard maps) during detailed design and allocate dedicated budget for climate adaptation (approximately 10–15% of capital costs). This will ensure full compliance and long-term viability of the facility.

9. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

9.1. Brief Overview

The purpose of the Environmental and Social Management and Monitoring Plan (ESMMP) is to ensure that the social and environmental impacts and risks identified during the Environmental and Social Impact Assessment (ESIA) process are effectively managed throughout the construction, operation, and decommissioning phases of the Project. The ESMP outlines the mitigation and management measures to which the proponent (**Streetcare Enterprises Limited**) is committed, and it demonstrates how the Project will allocate organizational capacity and resources to implement these measures.

Furthermore, the ESMMP details the scheduling of mitigation and management activities and ensures that the Project complies with all applicable laws and regulations in Kenya, as well as relevant policies. The key objectives of the ESMMP are to:

- Formalize and disclose the program for environmental and social management; and
- Provide a structured framework for implementing environmental and social management initiatives.

In accordance with recognized best practice principles, the ESMMP prioritizes proactive measures to minimize, and where feasible, prevent adverse environmental and social impacts, while simultaneously enhancing positive outcomes. These principles have underpinned the development and execution of the ESIA process, ensuring a systematic and evidence-based approach to impact management. The ESMMP provides detailed information on the management and mitigation measures that will be implemented to address potential impacts during the following phases of the Project:

- Pre-construction and construction activities;
- Operation; and
- Decommissioning

9.2. Environmental and Social Management Plan (ESMP)

This section outlines the potential adverse impacts, mitigation measures, monitoring and management responsibilities during construction and operation phases of the proposed project. The purpose of ESMP is to:

- Provide an institutional mechanism with well-defined roles and responsibilities for ensuring that measures identified in ESIA designated to mitigation potentially adverse impacts are implemented.
- List all suggested mitigation measures and control technologies, safeguards identified through the ESIA process.
- Provide Project monitoring program for effective implementation of the mitigation measures and ascertain efficacy of the environmental management and risk control systems in place; and
- Assist in ensuring compliance with all relevant legislations at local, County and national level for the Project.

9.3. Monitoring

To implement the ESMP, the on-site team will adhere to a time-bound and action oriented Environmental and Social Action Plan to implement the mitigation measures provided for each of the identified environmental and social impacts. This ESMP will be monitored on a regular basis, quarterly or half-yearly, and all outcomes would need to be audited in accordance with existing EHS and NEMA environmental policies. The monitoring process will cover all stakeholders including contractors, laborers, supplier, and local community impacted by the proposed project activities and associated facilities thereby increasing the effectiveness of suggested mitigations measures

Potential Impact	Mitigation Measures	Responsible Party	Frequency	Cost Estimate (Ksh)
Construction Phase				
Habitat Destruction and Disturbance	• Restrict vegetation clearance strictly to designated project areas to minimize unnecessary habitat loss. Clearly demarcate and protect "no-go" zones, including sensitive habitats and buffer areas, to prevent accidental disturbance during construction activities, • Implement progressive rehabilitation by replanting indigenous vegetation on non-operational areas, road verges, and buffer zones, • Support conservation initiatives in adjacent ecosystems local community conservancies to enhance habitat protection, wildlife monitoring, and ecological connectivity, • Establish a biodiversity monitoring program to track changes in vegetation cover, wildlife movement patterns, and species diversity within and around the project site. • Undertake periodic reviews of monitoring data and apply adaptive management by adjusting mitigation strategies where necessary to address emerging impacts or trends • Engage local communities in tree planting and habitat restoration initiatives, thereby enhancing project ownership, creating livelihood opportunities, and ensuring long-term sustainability of restored habitats. • Integrate local ecological knowledge into biodiversity monitoring programs to improve understanding of wildlife movement and habitat health, while strengthening collaboration between the project and surrounding communities	Contractor, Proponent	Monthly, with annual biodiversity audits	1,500,000.00
Noise and Vibration	• Maintain equipment in good condition; install silencers, • Limit construction to daytime hours, • Provide ear protection (earplugs, earmuffs) for exposed workers, • Erect temporary noise barriers near sensitive areas., • Inform communities in advance of high-noise activities.		Weekly; during noisy operations	

Potential Impact	Mitigation Measures	Responsible Party	Frequency	Cost Estimate (Ksh)
Soil Degradation and Erosion	• Restrict excavation and earthworks to designated project footprints to minimize unnecessary soil disturbance and preserve surrounding areas. • Clearly demarcate and enforce boundaries of working areas using visible markers or fencing to prevent accidental disturbance of soils outside the construction zones • Install temporary drainage structures such as channels, silt traps, and check dams to effectively manage surface runoff, minimize soil erosion, and control sedimentation during construction • Design and implement site drainage systems that effectively collect stormwater and channel it into a designated reservoir. This approach will minimize uncontrolled surface runoff, reduce erosion risks, and allow harvested water to be stored for potential reuse (e.g., dust suppression, irrigation of rehabilitated areas), • Replant cleared areas and establish buffer zones with indigenous vegetation to stabilize soils, reduce erosion, and promote ecological recovery. • Implement progressive rehabilitation throughout the construction phase, restoring disturbed areas as soon as activities are completed, rather than deferring restoration until project decommissioning • Conduct routine site inspections to identify early signs of soil erosion, sediment deposition, or compaction, particularly after heavy rainfall events. • Adopt adaptive management practices by adjusting or reinforcing mitigation measures (e.g., strengthening drainage structures, reseeding vegetation, or soil aeration) based on monitoring outcomes to ensure continued effectiveness.	Contractor, Proponent	Weekly	500,000
Waste Generation	• A Waste Management Plan (WMP) will be developed for the construction phase, emphasizing waste minimization at source, segregation for reuse, recycling of recoverable materials, and safe disposal of residual waste in compliance with the Waste Management Regulations, 2024, • Provision of adequate colour-coded bins on-site to facilitate segregation of waste streams (organic, recyclable, and hazardous) at the source, • The Contractor shall provide adequate temporary ablution facilities on-site and will be fully responsible for the safe treatment and/or removal of sewage waste to licensed off-site facilities, • The Contractor shall ensure that any company engaged for sewage waste removal is accredited, licensed, and holds the necessary permits from relevant regulatory authorities	Contractor, Proponent	Weekly	1,200,000

Potential Impact	Mitigation Measures	Responsible Party	Frequency	Cost Estimate (Ksh)

Occupational Health & Safety (OHS)	• Develop a comprehensive Construction Health & Safety Plan in compliance with the Occupational Health and Safety Act, 2007, identifying risks and specifying mitigation protocols,
	• Provide adequate PPE to all workers and deliver training on proper usage.
	• Conduct regular site inspections and third-party audits to ensure effective implementation of all health and safety measures,
	• All workers and contractor personnel involved in the construction of the facility shall undergo comprehensive Environmental Health and Safety (EHS) training prior to commencing work including,
	  ○ Safe operation of machinery, working in confined spaces, lifting procedures, and use of personal protective equipment (PPE).
	  ○ Proper handling and disposal of construction waste, dust and noise mitigation, and protection of local flora and fauna.
	  ○ Procedures for accidents, fire incidents, chemical spills, and medical emergencies.
	  ○ Worker–community interactions, prohibitions on illegal activities, and adherence to workplace behavioural standards
	• Toolbox Talks will be conducted regularly on-site as part of the Environmental, Health, and Safety (EHS) program. These short, focused sessions aim to reinforce safe working practices, raise awareness of environmental and social responsibilities, and provide updates on emerging site risks.
		Contractor, Proponent	Weekly; daily checks for PPE use	2,000,000

Traffic & Access Disruptions	• The Proponent and Contractor shall develop and implement a comprehensive Traffic Management Plan (TMP) that includes:
	  ○ Vehicle safety protocols and designated speed limits on project and public roads.
	  ○ Guidelines for responsible driver and passenger behaviour, including strict prohibitions on drug and alcohol use.
	  ○ Defined hours of operation and mandatory rest periods for drivers.
	  ○ Designated rest stops along transport routes.
	  ○ Procedures for accident reporting, investigation, and corrective actions to minimize recurrence.
	• All project vehicles shall be regularly serviced and maintained to ensure safe and reliable operation.
	• Vehicles operating on the project site shall adhere to a speed limit of 20 km/h or less to reduce accident risk and improve safety for workers and nearby communities.
		Contractor, Proponent	Daily; during deliveries	To be determined

Potential Impact	Mitigation Measures	Responsible Party	Frequency	Cost Estimate (Ksh)
Community Health & Safety	• The appointed Contractor will develop a worker induction programme that includes a Code of Conduct. The Code will be presented to all workers (including subcontractors and their workers), explained in detail, and signed by each individual to ensure commitment to appropriate behaviour on and off the Site, • All workers will be required to sign the Code of Conduct at the start of their contract. Any worker found in contravention will face disciplinary procedures, which may include dismissal, to ensure compliance and maintain social order, • The contractor will establish and implement an accessible grievance procedure for local communities. This mechanism will allow community members to lodge complaints related to contractor or employee behaviour, with timely and transparent responses provided to ensure accountability and maintain good community relations, • The Proponent, in collaboration with the appointed Contractor, shall develop and implement a monitoring system to control site access. Unauthorized entry will be strictly prohibited, and all visitors will be required to report to the site office for registration and authorization prior to accessing the project area.	Contractor, Proponent, and DOSH	Weekly	2,000,000
Labor Influx / Social Impacts	• The project proponent will give priority to qualified local residents for employment opportunities, particularly for unskilled and semi-skilled positions, in order to reduce the need for external labour. • Where external workers are required, the proponent will ensure that appropriate accommodation arrangements are made to avoid unnecessary pressure on local housing facilities • All project workers will be required to adhere to a strict code of conduct that promotes respectful engagement with local communities and discourages any form of misconduct. • Continuous engagement with the local community will be undertaken to address emerging concerns and maintain good relations between workers and residents. • The project will provide adequate facilities within the project site to minimize pressure on community services. • Awareness programs on public health issues, including prevention of communicable diseases, will be implemented for both workers and the surrounding communities. • Where feasible, the proponent may collaborate with local authorities and communities to support improvements in key infrastructure and services.	Contractor, Proponent, Ministry of Labour	Monthly	To be determined

Potential Impact	Mitigation Measures	Responsible Party	Frequency	Cost Estimate (Ksh)
Gender-Based Violence & Harassment	• The project proponent will implement a strict zero-tolerance policy against all forms of gender-based violence, harassment, and exploitation within the workplace and surrounding communities. • All employees and contractors will be required to sign and adhere to a code of conduct that clearly prohibits harassment, abuse, discrimination, and exploitation. • Regular training and sensitization programs will be conducted for workers and management on GBVH prevention, respectful workplace behavior, and community relations; • A confidential and accessible grievance reporting system will be established to enable workers and community members to report cases of harassment or misconduct safely. • The project will work with local leaders and community members to raise awareness about GBVH risks and available reporting channels. • The proponent will promote equal employment opportunities for women and ensure that the workplace environment is safe, respectful, and free from discrimination. • Where necessary, the project will collaborate with local administration and relevant institutions to address any reported cases and ensure appropriate action is taken.	Contractor, Proponent, MoH and County Government	Monthly; quarterly review	2,500,000

Potential Impact	Mitigation Measures	Responsible Party	Frequency	Cost Estimate (Ksh)
Spread of Communicable Diseases (STIs, HIV/AIDS, Waterborne)	• The contractor shall develop and implement a comprehensive HIV/AIDS and disease transmission Policy for all workers directly associated with the Project. The policy will include an information document that: ○ Provides education and awareness on prevention, testing, and treatment. ○ Outlines workplace protocols for supporting affected employees without discrimination. ○ Ensures that all workers receive induction training covering HIV/AIDS and disease risks, prevention strategies, and access to healthcare services. ○ Encourages voluntary counselling and testing (VCT) in collaboration with local health facilities. ○ The Proponent and Contractor shall ensure that male and female condoms are made readily available to all employees and contractor workers during both the construction, • The Worker Code of Conduct for all Project personnel shall explicitly outline guidelines governing worker–worker interactions, worker–community interactions, and the development of personal relationships with members of local communities, • The Worker Code of Conduct will explicitly forbid all project personnel from engaging in illegal activities, including but not limited to the use of commercial sex workers and transactional sex, • Accommodation should be provided to external workers in accordance with good international practice on workers' accommodation.	Contractor, Proponent, MoH and County Government	Monthly	1,500,000

Aspects	Proposed Mitigation Measures	Responsible Party	Timeframe	Cost Estimates
Operation Phase				
Air Emissions/odours (incineration, chemicals)	• Install and maintain advanced Air Pollution Control Devices on incinerators including quencher, venturi scrubber, wet alkali scrubber, activated carbon injection, and baghouse filters to control particulate matter (PM), dioxins/furans, HCl, NOx, SO_2, and heavy metals, • Operate dual-chamber incinerators at high temperatures (primary ≥800–850°C, secondary ≥1050–1100°C ±50°C) with minimum 2-second gas residence time and ≥99% combustion efficiency, • Use wet methods (water spraying/misting) during handling, sorting, and bagging avoid breaking, sawing, or dry handling to prevent asbestos fiber release, • Implement fugitive dust and odor control including covered storage areas, rapid waste processing, and regular vehicle/road wetting,	Operator/Proponent	Continuous/monthly/quarterly monitoring	200,000.00

Aspects	Proposed Mitigation Measures	Responsible Party	Timeframe	Cost Estimates
	• Develop and strictly follow an Incinerator Operations Manual and integrated Waste Management Plan, • Ensure regulatory compliance (e.g., national biomedical/hazardous waste rules, asbestos regulations, WHO guidelines), • Conduct preventive maintenance on all equipment and stock consumables (scrubbing media, etc.).and • Ensure continuous emission monitoring, regular stack testing, and high stack height (e.g., 30m) for better dispersion. • No burning of any waste on site shall be allowed. •			
Climate Change	• Regularly inspect and maintain landfill cover layers to ensure their integrity. Promptly repair any cracks, erosion, or breaches in the cover to minimize uncontrolled release of landfill gas into the atmosphere, • Implement phased capping of completed landfill cells to limit gas emissions and enhance stabilization. Rehabilitated areas should be vegetated to improve carbon sequestration and reduce surface emissions, • Promote biodiversity conservation and revegetation programs within and around the facility using indigenous plant species. This will enhance carbon sequestration capacity while also supporting ecological restoration, •	Facility Manager	Annually	500,000.00

Hydrology	• Runoff from outside of the operational footprint must be diverted and released to the environment,
	• Dirty water catchments must be separated from clean water catchments,
	• Direct runoff from clean water catchments to the environment.
	• Contain all potentially contaminated runoff arising from dirty water catchments
	• Only undertake waste management activities within areas protected by a dirty water catchment,
	• All hazardous chemicals (new and used) and waste streams must be handled in such a manner that they do not pollute surface water. This will be implemented by means of the following:
	  ○ Pollution prevention through basic infrastructure design such as waste storage containment, hard standing, and containment bunds.
	  ○ Pollution prevention through education and training of workers;
	  ○ Monitoring of sub-surface seepage to confirm the leachate is fully contained.
	• Formulate an Emergency Preparedness and Response Plan for operations and ensure adherence to it during any incident, discharge, or spillage of chemicals.
		Operations Manager	Monthly	300,000.00

Aspects	Proposed Mitigation Measures	Responsible Party	Timeframe	Cost Estimates
	• Good housekeeping practices should be implemented and maintained by timely clean-up of accidental spillages. In addition, spill cleaning kits and material safety data sheets for chemical and hazardous substances should be accessible.			
Leachate/soil-water contamination.	• Designed cells and burial sites with high mobility high toxicity constituents with additional 1m thick compacted clay under the basal liner, • Construct the containment barrier systems of the cells and leachate holding structures as per approved engineering design, • All hazardous waste must be assessed prior to acceptance to the facility. The concentrations of high mobility - high toxicity parameters must be kept on record for waste identified as containing these, • Wastes requiring treatment prior to disposal, must be treated and the efficacy of the treatment must be confirmed prior to their disposal in the waste disposal facility, • Monitor and maintain the integrity of the containment barriers in all operational cells to ensure that each achieves the design permeabilities, • Record water quality of surface water network on a quarterly basis for the first 3 years. Thereafter, the monitoring program should be optimized in terms of monitoring frequency and parameters.	Operator	Continuous	800,000.00
Alteration of drainage paths and surface water flows	• Appropriate design and implementation of appropriately sized stormwater management infrastructure shall be undertaken, • Where stormwater is diverted or concentrated, attenuation structures such as retention ponds, detention basins, or infiltration systems shall be incorporated into the detailed design, • Stormwater management infrastructure shall be designed to separate clean and contaminated water. Clean runoff should be diverted away from the Integrated Waste Handling Facility (IWF) through channels, berms, or drains to prevent flooding and reduce the volume of water requiring treatment, • Perimeter berms and lined drainage channels shall be constructed around the facility to prevent external stormwater from entering operational areas and to safely convey runoff away from critical infrastructure.	Facility Manager	Annually	Nil
Proliferation of the Invasive House Mouse	• Construct and maintain perimeter bunds and physical barriers around the Waste handling Facility (WMF) to restrict rodent movement within the site and prevent their migration into surrounding areas. All entry and exit points should be well controlled and sealed where necessary to minimize escape routes., • Implement a comprehensive Integrated Pest Management (IPM) plan within the WMF that includes regular monitoring, trapping, baiting, and environmentally safe rodent control methods,	Operations Manager	Monthly	150,000.00

Aspects	Proposed Mitigation Measures	Responsible Party	Timeframe	Cost Estimates
	• Ensure that waste, particularly organic waste, is promptly compacted, covered, and stored in designated areas to reduce food sources that attract rodents. Avoid accumulation of waste outside controlled zones, • Maintain high standards of site cleanliness by ensuring timely waste removal, minimizing litter, and eliminating potential rodent nesting sites such as debris piles and overgrown vegetation.			
Proliferation of opportunistic Avifaunal Species	• All waste materials should be promptly covered using soil, tarpaulins, or other suitable cover materials to minimize exposure. Waste storage areas should be well secured to prevent access by birds and other scavengers, • Waste deposited in landfill cells should be compacted and covered on a daily basis to reduce odours and limit attraction to scavenging bird species, • Use bird control measures such as visual deterrents (e.g., reflective tapes, scare devices), • Ensure that waste is not left exposed for prolonged periods and that litter is promptly collected within the facility to reduce attraction to avifaunal species, • Fast-track the processing or covering of organic waste, which is highly attractive to birds, through composting or immediate disposal, • Install and maintain perimeter fencing to restrict access to the facility and limit entry points for scavengers, • Conduct routine monitoring of bird activity within and around the site to identify trends and implement additional control measures where necessary.	Operations Manager	Monthly	100,000.00
Insecurity/Social conflicts	• Fence off the entire site boundary using durable and secure materials, and implement strict access control measures. Entry points should be limited and monitored through security personnel, access logs, and surveillance systems such as CCTV cameras, • Engage trained security guards to monitor the facility on a 24-hour basis, ensuring that unauthorized persons, including informal waste pickers, do not access operational areas, • Install clear warning and informational signage around the site indicating restricted areas, potential hazards, and authorized access points only, • Conduct sensitization programs within surrounding communities to inform residents and informal waste pickers about the risks associated with accessing the site, including exposure to hazardous wastes • Ensure that any authorized personnel involved in waste handling are provided with appropriate PPE and trained on safe waste handling practices to minimize risks of injury and disease.	Operations Manager/	Weekly	150,000.00

Aspects	Proposed Mitigation Measures	Responsible Party	Timeframe	Cost Estimates
Community Health and Safety	• Establish adequate buffer zones between the facility and nearby receptors such as residential areas, schools, and public facilities to minimize impacts related to noise, odour, and air quality , • Implement odour control strategies including prompt waste covering, use of odour neutralizing agents, and proper operation of composting and landfill systems to minimize unpleasant smells, • Apply dust suppression measures such as regular watering of access roads and exposed surfaces, and ensure waste transportation vehicles are covered to prevent littering and dust emissions, • Develop and implement a traffic management plan to regulate movement of waste trucks, designate specific routes, and minimize congestion and disturbance to local communities, • Establish a community liaison office and a clear grievance redress mechanism to allow local residents to raise concerns and receive timely feedback and resolution, and • Conduct periodic monitoring of nuisance parameters (noise, odour, dust/smoke) and take corrective action where thresholds are exceeded.	Health & Safety Officer	Weekly	50,000.00
	• Ensure that the Emergency Preparedness and Response Plan (EPRP) adequately addresses potential incidents such as traffic accidents, spillages, and hazardous material releases during waste transportation and handling, • The facility shall be secured through perimeter fencing, controlled access points, and surveillance systems. Only authorized personnel shall be permitted entry into the site. Security measures should include trained personnel, access logs, and monitoring systems to prevent unauthorized access and ensure safe operations, • Waste picking within the facility shall be strictly prohibited due to associated health, safety, and security risks. Clear policies, signage, and enforcement mechanisms shall be implemented to prevent informal waste picking activities, • personnel involved in waste transport and site operations shall receive training on safe handling procedures, emergency response, and compliance with EMCA (Waste Management) Regulation 2024, • Waste transport vehicles shall be well-maintained, covered, and operated by trained drivers to prevent spillages, accidents, and nuisance impacts along transport routes.	Health & Safety Officer		
	• Ensure that all waste, particularly biomedical and organic waste, is properly segregated, handled, and treated (e.g., through incineration or controlled disposal) to eliminate or reduce pathogens before final disposal,	Health & Safety Officer		

Aspects	Proposed Mitigation Measures	Responsible Party	Timeframe	Cost Estimates
	• Restrict unauthorized access to the site through perimeter fencing, security personnel, and access control systems to prevent community exposure to contaminated materials, • Install and maintain adequate sanitation facilities, including handwashing stations with soap and clean water for workers, to prevent the spread of infectious agents, • Ensure proper collection, containment, and treatment of leachate and wastewater to prevent contamination of surface and groundwater sources that may be used by surrounding communities, • Implement measures to control disease vectors such as flies, rodents, and other scavengers through proper waste covering, pest control programs, and good housekeeping practices, • Require all workers handling waste to use appropriate PPE (e.g., gloves, masks, boots), and ensure proper training on hygiene and infection prevention, and • Conduct regular health screening for workers and implement community awareness programs on hygiene, disease prevention, and safe waste practices.			
Health and Safety Risks	• Ensure appropriate PPEs e.g. respirators (N-100/P-100 or supplied-air for high-risk tasks), full-body suits, gloves, and boot cover especially for asbestos, sharps, and infectious materials. Include decontamination zones and procedures, • Conduct comprehensive worker training on segregation, handling protocols, emergency response, and hazard recognition; regular medical surveillance (e.g., lung function tests for asbestos workers), • Only licensed/certified personnel shall be allowed to handle asbestos. Procedures like wetting and containment; air monitoring for fiber levels; no eating/smoking in work areas shall be strictly enforced, • Develop and implement a Site Safety Plan with clear SOPs, site control, monitoring, and emergency procedures., • Limit access to hazardous areas and use signage to warn on • asbestos, chemical hazards, and high-noise zones, • Ensure full compliance with the provisions of Occupational Safety and Health Act (OSHA), 2007.	Health & Safety Officer	Daily	1,300,00.00

9.4. Monitoring

An effective monitoring framework for an Integrated Waste Handling Facility is essential to ensure compliance with environmental regulations, operational efficiency, and protection of public health. Monitoring involves the systematic collection and analysis of data on key environmental and social parameters throughout the facility's lifecycle. This typically includes monitoring of air quality (e.g., dust, odors, and gaseous emissions), surface and groundwater quality, noise levels, and soil conditions to detect any potential contamination.

Table 17: Environmental Monitoring Parameters

Category	Monitoring Indicator / Parameter	Target / Limit (Typical)	Frequency	Method / Location
Air Emissions (Incinerator Stack)	Particulate Matter (PM), CO, NOx, SO_2, HCl, Heavy metals (Hg, Pb, Cd), Dioxins/Furans	As per national standards (e.g., PM <150 mg/Nm³ at 12% CO_2) (EMCA (Air Quality) Regulation 2024	Continuous Monitoring	Stack emission points
Asbestos-Specific	Airborne asbestos fibers	<0.1 fibers/cc (8-hr TWA); <0.01 fibers/cc (clearance)	Periodic (every 6 months or after changes)	Personal breathing zone & work area sampling
Fugitive / Ambient Air	PM, VOCs, Odors	Below ambient air quality standards	Monthly/ As needed	Facility perimeter & downwind
Water / Effluent	pH, BOD, COD, TSS, Heavy metals, Coliforms/Pathogens	Zero liquid discharge or discharge standards	Daily / Weekly	ETP outlet
Leachate & Groundwater	Heavy metals, Organics, pH, Asbestos fibers (if applicable)	Below groundwater standards	Monthly / Quarterly	Monitoring wells (up & down-gradient)
Ash / Residue	Toxicity Characteristic Leaching Procedure	Non-hazardous classification	Before each disposal batch	Ash storage / disposal point
Occupational Exposure	Asbestos fibers, Pathogens (surface/air), Chemical vapors	Below OSHA/WHO exposure limits	Every 6 months or process change	Worker breathing zone & work areas
Process Parameters	Primary & Secondary chamber temperatures	Primary ≥850°C; Secondary ≥1050–1100°C	Continuous recording	Incinerator chambers
Waste Management	Segregation efficiency, Storage duration, Manifest compliance	100% proper segregation; <48–72 hrs storage	Daily logs	Waste receipt & storage areas
Occupational Health & Safety	Incident/Accident rate (needle-stick, exposure, injuries)	As low as reasonably practicable	Continuous logging	Site records & medical surveillance
Community / Nuisance	Odor complaints, Noise levels, Vector presence (pests)	Minimal / Zero complaints	Monthly / As needed	Perimeter & community feedback

9.5. Decommissioning Phase

The decommissioning phase of the plant involves the planned shutdown, dismantling, and removal of plant equipment, structures, and materials, while ensuring minimal environmental impact and restoration of the site to a safe and stable condition. Proper decommissioning also ensures compliance with NEMA guidelines, Occupational Health and Safety (OHS) requirements, and Kwale County Government environmental regulations and bylaws.

9.5.1. Decommissioning Activities

The decommissioning phase will begin with thorough planning and documentation:

- Decommissioning Plan: the proponent shall develop a detailed plan outlining the scope of work, project schedule, assigned responsibilities, and environmental safeguards. This plan should also address contingency measures for unforeseen circumstances.
- Pre-Decommissioning Site Assessment: Comprehensive site assessment shall be conducted to identify hazardous materials (e.g., fuels, chemicals, admixtures), waste streams, and environmentally sensitive areas, including soil, vegetation, and nearby water bodies.
- Regulatory Notifications: Notification to relevant authorities, including NEMA, and NCCG, and obtain all necessary permits and approvals prior to commencing decommissioning activities. This ensures compliance with national environmental regulations and industrial standards.

9.5.2. Activities

The decommissioning phase will be undertaken at the end of the plant's operational life and will involve the dismantling of structures and equipment, proper waste disposal, site remediation, and restoration to ensure the site is returned to a safe and ecologically stable condition. All planned activities will be executed in accordance with national environmental regulations, NEMA guidelines, and occupational safety standards.

Decommissioning Phase	Key Activities
Equipment and Structure Removal	Dismantling of machinery, silos, conveyors, storage tanks, and ancillary structures
Waste Management	Management of generated waste
Site Remediation and Restoration	Restoration of site to stable and ecologically sound condition
Occupational Health and Safety (OHS)	Protecting workers during decommissioning
Utilities Decommissioning	Safe disconnection and removal of utilities

Table 18: Decommissioning Management Plan

Activity	Description & Mitigation Measures	Responsible Party	Monitoring Indicators	Frequency
Planning and Documentation	– Develop a detailed Decommissioning Plan with scope, schedule, responsibilities, and environmental safeguards – Conduct pre-decommissioning site assessment to identify hazardous materials and sensitive receptors. – Obtain all regulatory approvals from NEMA and other authorities.	Plant Manager / Environmental Officer	Approval documentation; completion of pre-assessment report	Once, prior to decommissioning
Equipment and Structure Removal	– Dismantle machinery, silos, conveyors, storage tanks, and ancillary structures following engineering safety standards. – Salvage and recycle reusable materials (steel, concrete, timber) to reduce waste. – Remove foundations/paved surfaces where necessary; – stabilize remaining areas to prevent erosion.	Plant Engineer / Contractor	Completion checklist; quantity of materials salvaged/recycled	During decommissioning
Waste Management	– Segregate hazardous and non-hazardous wastes. – Engage licensed, NEMA-approved contractors for removal of chemicals, fuels, and contaminated equipment. – Reuse concrete residues where safe or dispose at approved facilities. – Prohibit burning, dumping, or discharge to stormwater or land.	Environmental Officer / Waste Contractor	Waste disposal records; compliance audits; absence of illegal dumping	During decommissioning
Site Remediation and Restoration	– Decontaminate areas used for chemicals, fuel handling, or washout ponds. – Grade and level the site for proper drainage. – Re-vegetate with native plant species. – Remove or neutralize temporary containment structures after site stabilization.	Environmental Officer / Plant Engineer	Soil and water quality tests; successful vegetation establishment; Site stability	During decommissioning / post-decommissioning inspection
Occupational Health and Safety (OHS)	– Provide PPE for all personnel. – Conduct risk assessments for high-risk activities (crane operations, heavy lifting, chemical handling). – Maintain first aid kits, fire extinguishers, and spill kits – Train first aiders and fire marshals.	Safety Officer / HSE Officer	PPE compliance; Incident and near-miss reports; training records	Daily / weekly during decommissioning
Utilities Decommissioning	– Disconnect water, electricity, and fuel connections safely. – Remove storage tanks, pipelines, and pumps after proper cleaning and decontamination.	Plant Engineer / Utilities Manager	Verification of safe disconnection; Residual contamination testing	During decommissioning
Monitoring and Reporting	– Monitor environmental parameters (dust, noise, runoff) during dismantling. – Prepare a Decommissioning Report including all activities, waste handling, and site restoration status. – Submit the report to NEMA.	Environmental Officer / Plant Manager	Monitoring logs; Submission of report; compliance with regulatory standards	Continuous / post-decommissioning

10. CONCLUSION AND RECOMMENDATIONS

10.1. Conclusion

The proposed Integrated Waste Handling Facility (IWHF) in Kwale County represents a timely and strategic intervention to address the growing challenge of sustainable waste management in the Country as well as the coastal regions due to rapid urbanization, tourism growth, and increasing generation of domestic, commercial, industrial, medical, and hazardous wastes (including asbestos and used oils).

The ESIA study was conducted in accordance with the Environmental Management and Coordination Act (EMCA) Cap 387 and the Environmental (Impact Assessment and Audit) Regulations 2003, the Sustainable Waste Management Act 2022, the Environmental Management and Coordination (Waste Management) Regulations 2024 (Legal Notice 178/2024), the Kwale County Water and Sanitation Services Act 2020 (No. 2 of 2020) (particularly Sections 62–65 on wastewater and effluent management) and other relevant National and County Laws. The ESIA study has comprehensively identified both positive and negative environmental and social impacts across the project lifecycle (construction/establishment, operation, and decommissioning).

Key Positive Impacts include:

- Significant improvement in public health and environmental quality by reducing open dumping, illegal disposal, and associated pollution of water bodies, soils, and coastal ecosystems,
- Creation of direct and indirect employment opportunities during operation, skills development, and revenue generation for the County Government and national agencies through licenses, permits, and fees, and
- Promotion of circular economy principles through waste segregation, recycling, recovery, and resource valorization, aligning with the national Sustainable Waste Management Act 2022.

Negative Impacts, when unmitigated, could include air emissions and odours from treatment processes, leachate and effluent risks to water resources, occupational health and safety hazards (especially from hazardous wastes), noise, traffic, and minor social tensions. However, these impacts are predictable, mostly site-specific or localized, and of low to moderate significance. They can be effectively avoided, minimized, or mitigated to acceptable levels through the comprehensive Environmental and Social Management Plan (ESMP) presented in this report.

In general, the proposed IWHF is environmentally, socially, and economically viable. With the full implementation of the recommended mitigation measures, monitoring plan, and stakeholder engagement commitments, the project will deliver net positive benefits to the Country while safeguarding the right to a clean and healthy environment as enshrined in the Constitution of Kenya 2010 (Article 42).

10.2. Recommendation

Based on the findings of the ESIA study, the following recommendations are made:

- **Approval and Licensing:** NEMA is hereby recommended to grant an Environmental Impact Assessment License for the proposed Integrated Waste Handling Facility, subject to the strict implementation of the ESMP contained in this report. The Proponent must also secure all ancillary permits, including Waste handling, transport, treatment, and disposal licenses under the 2024 Waste Management Regulations.

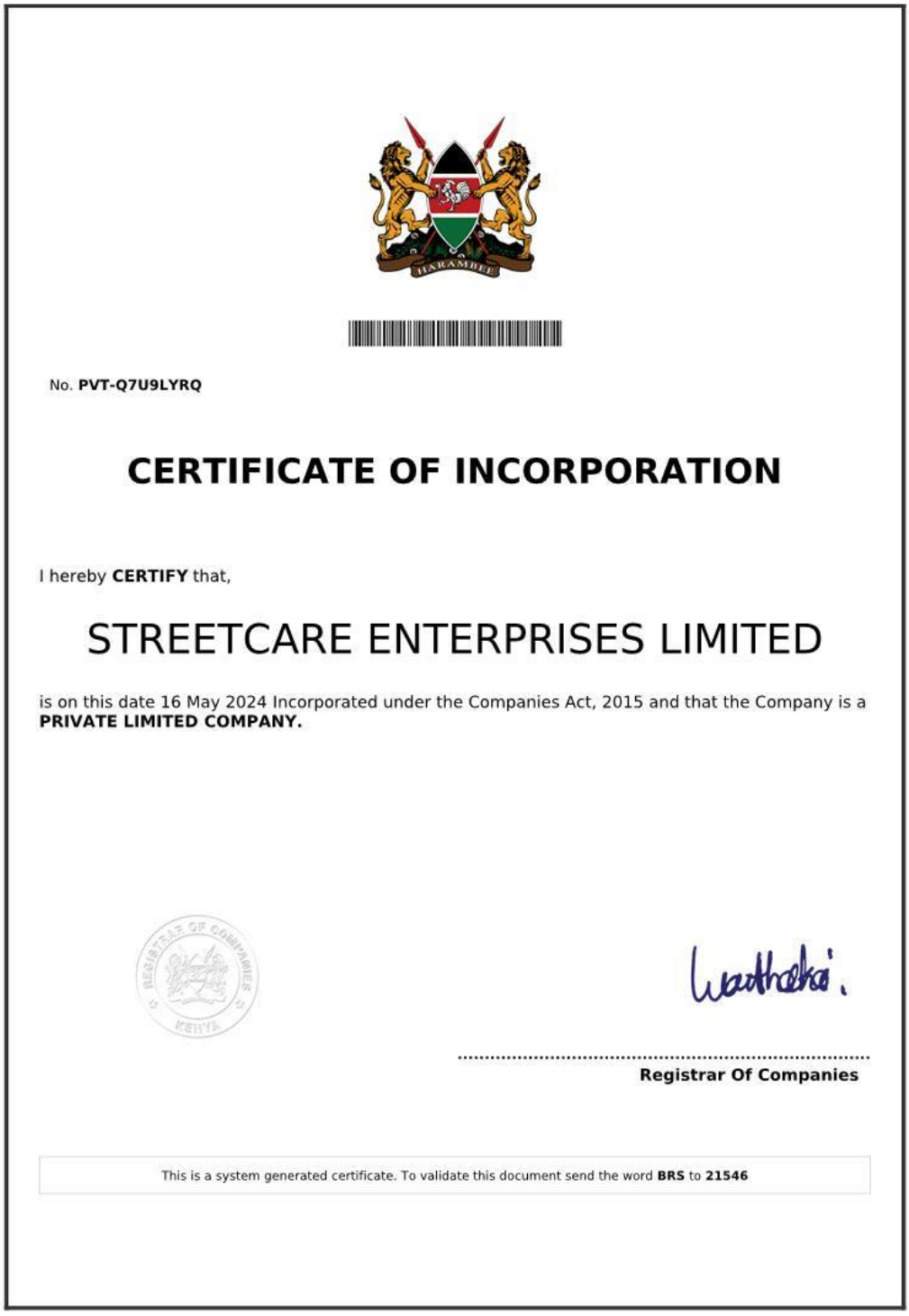
- **Monitoring and Reporting**:
    - Conduct quarterly environmental monitoring (Air, Noise, Water Quality, Leachate) by NEMA-accredited laboratories, with results submitted to NEMA and the County Government.
    - Maintain a robust waste tracking system and incident logging, with immediate notification to authorities for any significant spills, fires, or exposures.

- **Stakeholder Engagement and Grievance Management**
    - Continue proactive engagement with local communities and county departments throughout project implementation,
    - Operationalize the project-specific GRM with clear timelines, anonymous channels, and zero tolerance for retaliation or SEA/SH.
- **Capacity Building and Compliance**
    - Provide mandatory induction and refresher training for all staff and contractors on waste handling (especially hazardous and asbestos), PPE use, emergency response, and environmental procedures.

The Proponent is committed to responsible project implementation and will collaborate closely with NEMA, Kwale County Government, and other Regulatory bodies to realize the full potential of the proposed facility while minimizing any residual adverse effects. It is therefore our considered opinion that the proposed Integrated Waste Handling Facility be approved and allowed to proceed.

Appendices

Annex (A): Certificate of Incorporation & KRA Pin



No. **PVT-Q7U9LYRQ**

CERTIFICATE OF INCORPORATION

I hereby **CERTIFY** that,

STREETCARE ENTERPRISES LIMITED

is on this date 16 May 2024 Incorporated under the Companies Act, 2015 and that the Company is a **PRIVATE LIMITED COMPANY.**

Registrar Of Companies

This is a system generated certificate. To validate this document send the word **BRS** to **21546**

Annex (B): Land Lease Agreement

Annex (C) Certified Bill of Quantity (BOQ)

Annex (D): Architectural Drawings

Annex (E) Expert EIA License