



**COUNTY GOVERNMENT OF KIAMBU**  
**KARURI MUNICIPALITY**  
**DEPARTMENT OF MUNICIPAL ADMINISTRATION AND**  
**URBAN DEVELOPMENT**

**SOLID WASTE MANAGEMENT PLAN**

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## **Acronyms and Abbreviations**

- **SWM** – Solid Waste Management
- **MRF** – Material Recovery Facility
- **PPPP** – Public–Private–People Partnership
- **NEMA** – National Environment Management Authority
- **CBD** – Central Business District
- **KUSP** – Kenya Urban Support Program
- **EIA** – Environmental Impact Assessment
- **CBO** – Community-Based Organization
- **AfDB** – African Development Bank
- **UNDP** – United Nations Development Programme
- **GIZ** – Deutsche Gesellschaft für Internationale Zusammenarbeit (German Development Agency)
- **USAID** – United States Agency for International Development
- **JICA** – Japan International Cooperation Agency

## Glossary of Key Terms

<b>Term</b>	<b>Definition</b>
<b>Biodegradable Waste / Organic Waste</b>	Waste that can decompose naturally, including food scraps, garden waste, and crop residues.
<b>Circular Economy</b>	An approach that emphasizes reducing, reusing, and recycling resources to minimize waste and environmental impact.
<b>Composting</b>	The process of converting organic waste into nutrient-rich soil conditioner through controlled decomposition.
<b>Hazardous Waste</b>	Waste that poses risks to human health or the environment, including medical waste, chemicals, batteries, and used oil.
<b>Household Waste</b>	Waste generated from residential activities such as cooking, cleaning, and gardening.
<b>Institutional Waste</b>	Waste generated from institutions such as schools, hospitals, churches, and government offices.
<b>Material Recovery Facility (MRF)</b>	A facility where mixed waste is sorted to recover recyclables and other reusable materials.
<b>Municipal Solid Waste (MSW)</b>	The solid waste generated within a municipality, including household, commercial, institutional, and public space waste.
<b>Private Waste Collector</b>	Licensed operators contracted or permitted to provide waste collection and transportation services.
<b>Recyclables</b>	Materials that can be processed and reused, including plastics, paper, glass, metals, and cartons.
<b>Segregation at Source</b>	Sorting waste at the point of generation into categories such as organic, recyclable, and hazardous to improve recovery.
<b>Solid Waste Management (SWM)</b>	The process of collection, transport, processing, recycling or disposal, and monitoring of solid waste.
<b>Tipping Fees</b>	Charges paid by waste collectors or generators to dispose of waste at designated dumpsites or facilities.
<b>Waste Diversion</b>	The process of redirecting waste away from disposal sites through recycling, composting, or other recovery methods.
<b>Waste Minimization</b>	Reducing the quantity and environmental impact of waste generated through prevention, reuse, and sustainable consumption.
<b>Waste Segregation</b>	Separating waste into different categories based on type, hazard, or recyclability to improve management efficiency

## Preface

This Solid Waste Management Plan for Karuri Municipality has been prepared to guide sustainable waste management practices within the municipality. The plan reflects the commitment of the County Government, municipal authorities, private sector actors, and community stakeholders to improve waste collection, segregation, recycling, composting, and disposal.

The preparation of this plan has involved consultations with municipal staff, private waste service providers, community organizations, and development partners. It seeks to address the challenges posed by population growth, urban expansion, and changing consumption patterns, while promoting environmental protection, public health, and financial sustainability.

This document is intended to serve as a practical guide for municipal planners, policymakers, and stakeholders involved in solid waste management, providing a roadmap for coordinated action and long-term improvements in waste services across Karuri Municipality.

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## **Executive Summary**

Karuri Municipality currently generates an estimated 194–240 tons of solid waste per day, primarily from residential, commercial, institutional, and industrial sources. Organic waste dominates the waste stream, followed by recyclables such as plastics, paper, metals, and glass, while hazardous waste constitutes a smaller but high-risk component.

This Solid Waste Management Plan outlines strategies to strengthen waste collection systems, promote waste segregation at source, enhance recycling and composting initiatives, and improve waste disposal practices. The plan also emphasizes the importance of institutional coordination, capacity development, public awareness, and sustainable financing in achieving effective waste management.

The plan is structured into short-term (0–3 years), medium-term (3–5 years), and long-term (5+ years) actions, including:

- Expanding and optimizing waste collection services
- Conducting public awareness campaigns and community engagement
- Establishing Material Recovery and composting facilities
- Strengthening regulatory compliance and enforcement
- Promoting circular economy approaches and waste diversion

Through the implementation of this plan, Karuri Municipality aims to create a cleaner, healthier, and more sustainable urban environment, while contributing to national and global goals on environmental protection, public health, and sustainable urban development

# **1. Introduction**

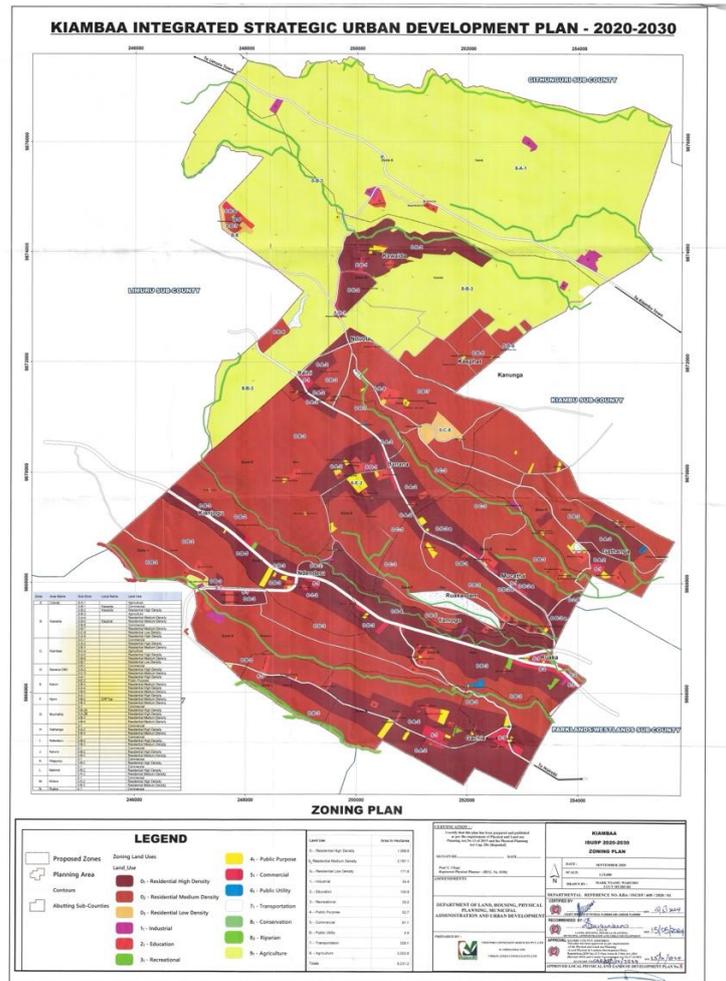
## **1.1 Overview of the Municipality**

Karuri Municipality is an urban administrative area located in Kiambu County, in central Kenya. The municipality lies within the Nairobi Metropolitan Region and forms part of the rapidly expanding urban corridor surrounding Nairobi City. Its strategic location has contributed to significant residential, commercial, and infrastructure development over the past two decades.

Karuri serves as an important residential and commercial hub for commuters working in Nairobi while also supporting local economic activities within Kiambu County. The municipality includes several fast-growing urban centres such as Ruaka, Ndenderu, Banana, and Karuri town, which have experienced rapid population growth driven by urban expansion, improved road connectivity, and increasing demand for housing within the Nairobi metropolitan area.

As urban development continues, the demand for essential municipal services such as solid waste management, water supply, sanitation, and urban infrastructure has increased significantly.

Figure 1 shows the administrative boundary of Karuri Municipality.



**Figure 1:** Karuri Municipality Administrative Boundary

Source: Kiambu County Department of Municipalities, Administration and Urban Development

## 1.2 Geographical Location

Karuri Municipality is located within the highland region of Kiambu County and is characterized by fertile soils and a favorable climate that historically supported agricultural activities. The municipality lies along key transportation corridors that connect Kiambu County to Nairobi City and other parts of the country.

Major roads serving the municipality include Limuru Road, the Northern Bypass, and Waiyaki Way, which facilitate movement of goods, services, and commuters between Karuri and Nairobi. The proximity of the municipality to major urban centres such as Westlands and Gigiri has accelerated real estate development and urban expansion.

The municipality occupies a strategic location within the Nairobi Metropolitan Region, making it an attractive area for residential development, commercial activities, and service-based enterprises.

### 1.3 Population

According to the 2019 Kenya Population and Housing Census, the population within the wards that constitute Karuri Municipality is estimated at approximately 236,400 residents.

Rapid urbanization, residential development, and proximity to Nairobi have contributed to steady population growth within the municipality. The area continues to attract residents due to improved transport connectivity, expanding housing developments, and growing economic opportunities.

Population growth has also resulted in increased demand for municipal services, including solid waste management, which requires expanded infrastructure, improved service delivery systems, and sustainable waste management practices.

**Table 1:** *Population Distribution by Ward within Karuri Municipality*

<b>Ward</b>	<b>Population (2019)</b>	<b>Approx. Share of Municipal Population (%)</b>
Karuri Ward	41,879	17.7%
Kihara Ward	53,474	22.6%
Ndenderu Ward	67,071	28.4%
Muchatha Ward	53,168	22.5%
Cianda	20,808	8.8%
<b>Total</b>	<b>236,400</b>	<b>100%</b>

Source: *Kenya National Bureau of Statistics (2019 Kenya Population and Housing Census)*.

### 1.4 Economic Activities

The local economy of Karuri Municipality is diverse and continues to evolve as the area urbanizes. Traditionally, the fertile lands surrounding the municipality supported agricultural production, which remains an important economic activity in peri-urban areas.

Over time, however, the local economy has diversified significantly.

#### *Agriculture*

Small-scale crop farming and livestock rearing continue to take place in peri-urban areas of the

municipality. Agricultural produce is commonly sold in local markets such as Banana and Ndenderu markets.

#### *Commerce and services*

Karuri has developed into a vibrant commercial area with retail businesses, restaurants, hospitality establishments, supermarkets, and service providers serving the growing urban population.

#### *Real estate and construction*

The municipality has experienced rapid expansion of residential estates and mixed-use developments, particularly in areas such as Ruaka and Ndenderu. This growth has significantly increased demand for housing and supporting infrastructure.

#### *Transport and trade*

Proximity to Nairobi and location along major transport routes support trade, commuting, and movement of goods and services.

The growth of these economic activities has contributed to increased solid waste generation within the municipality, necessitating improved waste management systems to maintain environmental health and urban cleanliness.

### **1.5 Purpose of the Solid Waste Management Plan**

The Karuri Municipality Solid Waste Management Plan aims to provide a comprehensive framework for improving the management of solid waste within the municipality through sustainable, inclusive, and efficient waste management practices.

The plan seeks to address current challenges in waste collection, transportation, recycling, and disposal while promoting waste reduction and resource recovery. It also aligns municipal waste management practices with national environmental policies, county regulations, and the objectives of the Kenya Urban Support Programme Phase II (KUSP II).

Implementation of this plan will support the development of an environmentally sustainable and financially viable waste management system that protects public health, reduces pollution, and enhances the overall quality of the urban environment.

## **1.6 Key Objectives of the Solid Waste Management Plan**

The main objectives of the Solid Waste Management Plan are to:

- Ensure timely and efficient collection, transportation, and disposal of solid waste within the municipality.
- Improve public-private-people partnerships in waste collection, segregation, and recycling activities.
- Promote public education, participation, and awareness on responsible waste management practices.
- Reduce environmental pollution by improving waste disposal systems and pollution control measures.
- Promote resource recovery and circular economy approaches in waste management.
- Ensure financial sustainability of the municipal solid waste management system.

## **2. Waste Generation and Composition Assessment**

### **2.1 Current Waste Generation**

Karuri Municipality generates municipal solid waste primarily from residential, commercial, institutional, and market activities. Additional waste streams originate from construction activities, hospitality establishments, and small-scale industrial operations within the municipality.

Based on urban waste generation trends in Kenyan municipalities, the average waste generation rate is estimated at approximately 0.6 kg per person per day.

Using this estimate and the population of 236,400 within the municipality, Karuri Municipality is estimated to generate approximately 141,840kg (156.35 tons) per day.

For planning purposes, waste quantities presented in this plan consider both household waste generation and additional waste generated by commercial activities, markets, institutions, and informal sector enterprises.

Planning assumption note: Waste generation estimates presented in this plan are based on per capita estimates and sectoral activities. These figures should be refined through a detailed waste characterization study during the implementation phase.

Table 2 presents the estimated daily waste generation by source within Karuri Municipality.

**Table 2:** *Estimated Daily Waste Generation by Source*

<b>Waste Generator</b>	<b>Estimated Daily Quantity (tons)</b>	<b>Share (%)</b>
Residential	114.14	76.0
Commercial	18.76	12.5
Institutional	10.94	7.3
Industrial	6.25	4.2
<b>Total</b>	<b>150.09</b>	<b>100</b>

## 2.2 Waste Composition

The solid waste stream within Karuri Municipality is dominated by organic waste generated from households, markets, restaurants, and food-related commercial activities.

Recyclable materials such as plastics, paper, metals, and glass constitute the second largest portion of the waste stream. Smaller quantities of hazardous and special waste are generated from healthcare facilities, automotive service stations, and small industries.

### *Household waste*

This consists of waste generated from household activities such as food preparation, cleaning, gardening, and disposal of packaging materials, clothing, and other household items.

### *Commercial waste*

This category includes waste generated from shops, retail stores, restaurants, hotels, offices, entertainment establishments, and service businesses. The waste typically includes packaging materials, food waste, plastics, glass, metals, paper, and electronic waste.

### *Municipal waste*

Municipal waste includes waste collected from public spaces such as streets, markets, and open areas. Street sweepings may contain dust, leaves, paper, plastic waste, and mixed refuse.

### *Institutional waste*

Institutional waste originates from schools, churches, offices, hospitals, and government facilities. Waste from these institutions commonly includes paper, plastics, food waste, and packaging materials. Healthcare facilities may also generate hazardous medical waste that is treated within the facility through incineration or other approved methods.

### *Agricultural waste*

In peri-urban areas, agricultural activities generate organic waste such as crop residues and animal manure. These materials are often biodegradable and can be reused through composting or agricultural applications.

Table 3 summarizes the main waste categories and their sources within Karuri Municipality.

**Table 3:** *Waste Categories, Sources, and Typical Waste Types in Kikuyu Municipality*

<b>Category</b>	<b>Main Sources</b>	<b>Typical Waste Types</b>
Organic	Households, markets, hotels	Food waste, vegetable matter, garden waste
Recyclables	Households, institutions, retail and wholesale outlets	Plastics, paper, glass, metals, wood
Non-recyclables	Construction sites, petrol stations, commercial premises	Rubber, mixed residues, low-value composite materials
Hazardous	Health facilities, industries	Medical waste, used oil, batteries, chemicals

## 2.3 Waste Generation Trends

Waste generation in Karuri Municipality is expected to increase steadily due to population growth, urban expansion, and rising consumption patterns.

The continued development of residential estates, commercial centres, and hospitality establishments is likely to increase both the quantity and diversity of waste generated within the municipality.

Assuming an average annual waste growth rate of approximately 2–3 percent, total daily waste generation within the municipality is projected to increase significantly over the next decade.

Table 4 presents projected waste generation trends for Karuri Municipality.

**Table 4:** *Projected Waste Generation 2025–2035*

<b>Year</b>	<b>Population (2-3% growth)</b>	<b>Estimated Daily Waste (tons/day)</b>
<b>2025</b>	266,000 – 282,200	159.6 – 169.3
<b>2030</b>	293,800 – 327,000	176.3 – 196.2
<b>2035</b>	324,400 – 379,300	194.6 – 227.6

These projections highlight the importance of investing in improved waste collection systems, recycling initiatives, composting facilities, and sustainable disposal infrastructure to manage the increasing waste volumes effectively.

## 3. Existing Solid Waste Management System

This section outlines the current solid waste management practices in Karuri Municipality, covering waste collection, transportation, treatment, disposal, recycling, institutional arrangements, and financing.

### 3.1 Waste Collection Systems

Waste collection in Karuri Municipality is carried out through a combination of municipal services and private sector operators. The County Government provides waste collection in selected areas using municipal trucks and personnel. However, due to limited resources, coverage remains incomplete, particularly in peri-urban zones, informal settlements, and newly developed residential estates.

Collection coverage is currently estimated at approximately 70–75% of total waste generated. Gaps in service contribute to illegal dumping and open burning, especially along road reserves and in market areas.

Private waste collectors supplement municipal services, especially for businesses, institutions, and high-income residential estates. These collectors operate under licensing agreements with the County Government.

Waste collection follows a zonal approach based on population density and waste generation:

- **Red zones:** High-density residential areas, markets, and commercial centres requiring daily or near-daily collection.
- **Orange zones:** Medium-density residential and mixed-use areas requiring 2–3 collections per week.
- **Green zones:** Low-density and peri-urban areas requiring weekly or on-demand collection.

### 3.2 Waste Transportation

Collected waste is transported to the Kangoki dumpsite in Thika Municipality. Municipal and private vehicles transport waste from households, commercial premises, institutions, and public spaces.

Challenges affecting transportation include:

- Limited number of operational vehicles
- High vehicle maintenance costs
- Poor road conditions in some areas
- Long haul distances to disposal sites

The municipality does not currently have a local waste transfer station, increasing transport distances and operational costs. Establishing a Material Recovery Facility (MRF) or transfer station will improve logistics efficiency and allow preliminary waste sorting and recovery.

### 3.3 Waste Treatment and Disposal

Final disposal takes place at the Kangoki dumpsite. Current disposal relies mostly on open dumping with minimal treatment, posing risks such as:

- Land and water pollution
- Odors and uncontrolled emissions
- Risks to nearby communities
- Increased greenhouse gas emissions

Future improvements will focus on:

- Waste reduction at source
- Recycling and composting
- Better landfill management

### 3.4 Recycling and Resource Recovery

Recycling and resource recovery in Karuri are mainly informal and driven by private operators and waste pickers. Materials recovered include plastics, paper, glass, and metals from markets, commercial premises, and mixed waste streams.

Opportunities to strengthen recycling include:

- Waste segregation at source
- Formal recognition of waste pickers
- Partnerships with recycling companies
- Establishment of MRFs

### 3.5 Institutional Framework

Solid waste management is coordinated by the County Government of Kiambu and Karuri Municipality. Key roles include:

- **Municipal Authority:** Oversight of waste collection, licensing private collectors, and community awareness.
- **County Government:** Policy guidance, budget allocation, and access to disposal infrastructure.

- **National Government (NEMA):** Regulatory oversight and standards enforcement.
- **Waste Generators:** Households, businesses, institutions responsible for proper storage and segregation
- **Private Collectors:** Licensed waste collection and transportation services.

**Table 5:** *Licensed Private Waste Service Providers in Karuri Municipality*

Service Provider	Areas Served	Type of Service
Kiambaa Garbage Solution	Karura/ Ndenderu	Household
KEEP Society	Gathanga, Muchatha, Ruaka	Household
Easy Breeze Cleaning Solutions	Ruaka	Household
Trash Handlers	Gachie, Muchatha	Household
Sirneat	Gachie, Karura, Ndenderu, Ruaka	Household
Ruaka Sanitary	Ruaka, Ndenderu, Cianda, Karuri	Household
Stephen Ndung'u Mungai	Ruaka, Gachie, Karura	Household
Takataka Solution	Cianda ward	Commercial

### 3.6 Financial Management

Funding for solid waste management in Karuri Municipality comes from multiple sources to support operations, infrastructure, public awareness, and capacity development:

- **Municipal Fees**

Waste management charges are integrated into business permits issued to commercial establishments. These fees support routine waste collection services and environmental management activities.

- **Private Collector Fees**

Licensed private waste collectors contribute through:

- **Licensing fees** – Annual fees paid for authorization to operate within the municipality.
- **Tipping (Gate) fees** – Charges levied when disposing waste at designated disposal sites.

- **Development Partners**

Grants, technical assistance, and capacity-building support may be provided by institutions such as the World Bank, African Development Bank (AfDB), United Nations Development Programme (UNDP), GIZ, USAID, and JICA. These

contributions typically support infrastructure development, pilot projects, and training initiatives.

- **Potential for Public–Private–People Partnerships (PPPPs)**

Karuri Municipality may leverage partnerships with private sector actors and community groups to improve efficiency, reduce operational costs, and support innovative waste recovery and recycling initiatives.

**Table 6: Potential Financing Sources for Solid Waste Management in Karuri Municipality**

<b>Financing Source</b>	<b>Type of Support</b>	<b>Key Activities Supported</b>
<b>Municipal Fees</b>	Local revenue	Routine waste collection, operational costs, environmental management
<b>Private Collector Fees</b>	Licensing & tipping fees	Regulation of private collectors, waste transport, disposal operations
<b>Development Partners</b>	Grants & technical assistance	Infrastructure development, capacity building, pilot projects
<b>Public–Private–People Partnerships (PPPPs)</b>	Collaborative investments	Recycling initiatives, waste recovery, operational efficiency

## 4. Waste Management Goals and Objectives

The Karuri Municipality SWM Plan establishes clear short-term (1–3 years) and long-term (5–10 years) goals to improve service delivery and promote sustainable waste management.

### 4.1 Short-Term Goals (1–3 Years)

- Improve collection coverage and operational efficiency
- Promote waste segregation at source among households, institutions, and businesses
- Establish a Material Recovery Facility (MRF)
- Develop composting facilities for organic waste
- Conduct public awareness campaigns

**Table 7: Short-term goals that will guide the SWM Plan in Karuri Municipality**

<b>Goal Area</b>	<b>Objective</b>	<b>Key Indicator(s)</b>	<b>Target (1–3 Years)</b>	<b>Responsible Entity</b>
<b>Waste collection</b>	Improve solid waste collection coverage and	Collection coverage rate	Increase from ~75% to at least 90%	Municipality / Licensed Private Collectors

	operational efficiency across the municipality			
<b>Waste Segregation</b>	Increase segregation of waste at source at household, institutional, and business levels	% of waste generators practicing segregation	At least 50% of waste generators	Municipality / Communities, Private Collectors
<b>Infrastructure</b>	Establish a waste transfer station / Material Recovery Facility (MRF)	Facility established and operational	At least one MRF operational	County Government / Municipality
<b>Organic Waste Management</b>	Develop a composting facility for green and organic waste	Composting facility operational	Facility established and processing organic waste	Municipality / PPPPs
<b>Public awareness</b>	Strengthen public awareness and participation in waste management	Number of sensitization campaigns conducted	At least two campaigns per year	Municipality / Community Groups

## 4.2 Long-Term Goals (5–10 Years)

- Reduce waste volumes sent to disposal through recycling and composting
- Improve disposal facilities to meet environmental standards
- Implement a zero-waste programme and circular economy initiatives
- Increase recovery of recyclable and compostable materials

**Table 8:** Long-term goals that will guide the SWM Plan in Karuri Municipality

Goal Area	Objective	Key Indicator(s)	Target (5–10 Years)	Responsible Entity
<b>Waste diversion</b>	Reduce the volume of waste disposed at dumpsites through recovery, recycling, and composting	% of waste diverted from disposal	40–60% diversion rate	Municipality / Private Sector
<b>Disposal Standards</b>	Improve waste disposal facilities to meet environmental and public health standards	Compliance with environmental standards	Fully compliant disposal arrangements	County Government
<b>Circular Economy</b>	Implement a zero-waste or circular economy approach	Circular economy initiatives implemented	Zero-waste programme operational	Municipality / PPPPs

<b>Recycling</b>	Increase recovery of recyclable and compostable materials	Quantity of materials recovered (tons per year)	Year-on-year increase	Municipality / Informal and Private Sector
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## **5. Waste Management Strategies**

This section outlines the strategies that will be implemented to improve solid waste management in Karuri Municipality in line with the goals and objectives of this plan and the KUSP II Solid Waste Management Guidelines.

### **5.1 Waste Minimization**

Waste minimization efforts in Karuri Municipality will focus on reducing the amount of waste generated at source through behavior change, improved consumption practices, and collaboration with key stakeholders. Reducing waste at the point of generation helps lower collection and disposal costs while promoting more sustainable resource use.

#### **5.1.1 Education and Public Awareness Campaigns**

Public education and awareness campaigns will be implemented to inform residents, businesses, and institutions about proper waste management practices. The campaigns will promote waste separation, reduction of single-use plastics, reuse of materials, and composting of organic waste.

Awareness programs will be conducted through community forums, schools, public meetings, social media platforms, and collaboration with community groups. Environmental clean-up campaigns will also be organized periodically to reinforce public participation in maintaining a clean municipality.

#### **5.1.2 Partnerships with Businesses**

Karuri Municipality will engage businesses and commercial establishments to encourage adoption of sustainable packaging and waste reduction practices. Businesses will be encouraged to reduce single-use packaging materials and adopt reusable or recyclable alternatives.

The municipality will also promote voluntary waste reduction initiatives within hotels, restaurants, supermarkets, and retail establishments. Waste audits may be encouraged to help businesses identify opportunities for waste reduction and improved resource efficiency.

## **5.2 Waste Segregation at Source**

Waste segregation at the point of generation is a key strategy for improving recycling rates and reducing the amount of waste sent to disposal sites.

Karuri Municipality will promote the separation of waste into categories such as organic waste, recyclables, and residual waste at household, institutional, and commercial levels.

### **5.2.1 Key Interventions**

- Roll out waste segregation guidelines for households, institutions, and businesses.
- Promote the use of color-coded bins and bags consistent with national and county waste management regulations.
- Conduct targeted training and sensitization programs for large waste generators such as markets, restaurants, schools, and institutions.

## **5.3 Collection Systems**

Strengthening waste collection systems is critical to improving coverage, efficiency, and service reliability within Karuri Municipality.

### **5.3.1 Key Interventions**

- Expand and improve door-to-door waste collection services, particularly in high-density residential areas and commercial centers.
- Install additional public waste bins in markets, transport nodes, and public spaces.
- Review and optimize collection frequencies based on waste generation patterns.
- Implement collection zoning to prioritize service delivery and improve efficiency.

## **5.4 Transportation Infrastructure**

Efficient transportation systems are essential for ensuring that collected waste is transported safely and promptly to disposal or treatment facilities.

### **5.4.1 Key Interventions**

- Assess current fleet capacity and identify gaps in vehicles and equipment.
- Procure appropriate waste collection and transportation equipment, including trucks, compactors, skip loaders, and waste bins.
- Improve routing and scheduling of collection vehicles to reduce operational costs and improve efficiency.
- Establish a strategically located waste transfer station or Material Recovery Facility to reduce long haul distances.

## **5.5 Recycling and Resource Recovery**

Recycling and resource recovery will be strengthened to reduce the amount of waste disposed at dumpsites while promoting circular economy practices.

### **5.5.1 Key Interventions**

- Establish a Material Recovery Facility within the municipality to support sorting and recovery of recyclable materials.
- Support partnerships between the municipality and recycling companies.
- Integrate informal waste pickers into formal recycling systems through cooperatives or contractual arrangements.
- Promote markets for recyclable materials through partnerships with recycling industries.

## **5.6 Organic Waste Management (Composting)**

Organic waste constitutes the largest proportion of municipal waste in Karuri Municipality. Composting will therefore be prioritized as an important waste management intervention.

### 5.6.1 Key Interventions

- Establish centralized or community-based composting facilities to process organic waste from households, markets, and institutions.
- Promote composting initiatives in markets and large food establishments.
- Encourage the use of compost in agriculture, landscaping, and urban greening programs.

## 5.7 Waste Disposal

Waste disposal practices will focus on reducing environmental and public health risks while gradually transitioning toward more sustainable waste management systems.

### 5.7.1 Key Interventions

- Improve waste handling and operational practices at disposal facilities used by the municipality.
- Promote waste diversion through recycling and composting to reduce disposal volumes.
- Explore appropriate waste treatment technologies where feasible.

**Table 9:** *Summary of Solid Waste Management Strategy Actions for Karuri Municipality*

Strategy Area	Key Actions	Responsible Actors	Timeframe
<b>Waste Minimization</b>	Public awareness campaigns; business engagement	Municipality; Businesses	Short term
<b>Waste Segregation</b>	Roll-out of color-coded segregation systems	Municipality; Private Collectors	Short term
<b>Waste Collection</b>	Expansion of door-to-door collection services	Municipality; Private Collectors	Short–medium term
<b>Transportation</b>	Fleet assessment and procurement of equipment	Municipality; County Government	Medium term
<b>Recycling</b>	Establishment of MRF; support to recyclers	Municipality; Private Sector	Medium term
<b>Composting</b>	Development of composting facilities	Municipality; PPPPs	Medium term
<b>Disposal</b>	Improvement of disposal practices	County Government	Long term

## 6. Institutional Capacity and Regulatory Framework

Effective solid waste management requires strong institutional arrangements, clear roles and responsibilities, and an enabling regulatory framework.

### 6.1 Institutional Roles and Responsibilities

Solid waste management in Karuri Municipality involves several actors including the County Government of Kiambu, the Municipal Board, private waste collectors, recycling enterprises, community organizations, and residents.

The County Government provides policy direction, regulatory oversight, and budgetary support for waste management services. The Municipality coordinates local service delivery and implementation of waste management programs.

Private sector actors provide waste collection services and recycling activities, while communities contribute through proper waste segregation and responsible waste disposal.

**Table 10:** *Institutional Roles in Solid Waste Management*

<b>Institution</b>	<b>Key Responsibilities</b>
<b>County Government</b>	Policy formulation, regulation, licensing, oversight
<b>Karuri Municipality</b>	Coordination of SWM services and implementation of SWM Plan
<b>Private Waste Collectors</b>	Waste collection and transportation
<b>Recycling Companies</b>	Processing and recovery of recyclable materials
<b>Community Organizations</b>	Public awareness and community mobilization

### 6.2 Institutional Coordination

Effective coordination among institutions is necessary for efficient delivery of waste management services. Karuri Municipality will strengthen coordination through:

- Regular coordination meetings between environment, public health, planning, and enforcement departments.
- Engagement forums with private waste collectors and recycling enterprises.
- Collaboration with national institutions responsible for environmental regulation.

- Partnerships with community organizations and local leaders to promote participation in waste management programs.

### **6.3 Regulatory and Policy Framework**

Solid waste management in Karuri Municipality is guided by national legislation and county regulations aimed at promoting sustainable waste management practices.

Key regulatory instruments include:

- Sustainable Waste Management Act, 2022
- Environmental Management and Coordination Act
- National Environment Management Authority regulations
- County environmental management regulations

The municipality will strengthen enforcement of these regulations to promote compliance and improve environmental performance.

### **6.4 Capacity Development**

Effective implementation of the Solid Waste Management Plan requires strengthening institutional capacity at the municipal level.

Priority areas include:

- Training municipal staff on waste management planning and monitoring.
- Improving waste data collection and reporting systems.
- Enhancing technical capacity for waste infrastructure planning.
- Providing adequate operational equipment and logistical support.

### **6.5 Institutional Capacity Needs**

Despite the current institutional framework, several challenges affect effective service delivery. These include:

- Limited financial resources

- Inadequate waste collection infrastructure
- Limited technical capacity for advanced waste management practices

Addressing these capacity gaps will be essential for successful implementation of this plan.

## **7. Public Awareness, Education and Stakeholder Engagement**

Public participation is a key component of effective waste management. Active involvement of residents, businesses, institutions, and community organizations is necessary to promote responsible waste handling and environmental stewardship.

Karuri Municipality will implement a comprehensive public awareness and stakeholder engagement program to support sustainable waste management practices.

### **7.1 Public Awareness and Education**

Public education initiatives will focus on increasing awareness about the importance of proper waste management and encouraging behavior change among residents and businesses.

Key messages will include:

- Waste segregation at source
- Proper waste storage and disposal
- Environmental and health impacts of improper waste management
- Recycling and composting opportunities

Awareness campaigns will be delivered through:

- Community meetings and public barazas
- Schools and educational institutions
- Social media platforms
- Local radio stations
- Environmental clean-up campaigns

Schools will also be engaged through environmental clubs and educational programs to promote environmental responsibility among young people.

## 7.2 Stakeholder Engagement

Successful implementation of the SWM Plan will require collaboration among various stakeholders including government agencies, private sector actors, community organizations, and development partners.

Key stakeholders include:

- County government departments
- Private waste collection companies
- Recycling enterprises
- Community-based organizations
- Youth and women groups
- Educational institutions
- Residents and business associations
- Development partners and civil society organizations

Regular consultations and partnerships will help ensure shared responsibility in waste management.

## 7.3 Community Participation

Community participation will be encouraged through initiatives such as:

- Community clean-up campaigns
- Neighborhood waste segregation programs
- Recycling and composting initiatives
- Environmental awareness events

Community-based waste management initiatives will also be supported to improve localized waste collection and recycling activities.

**Table 11:** *Stakeholder Engagement Framework*

<b>Stakeholder Group</b>	<b>Role in Waste Management</b>	<b>Engagement Mechanism</b>	<b>Frequency</b>
<b>Residents and Households</b>	Waste segregation and proper disposal	Community meetings, awareness campaigns	Quarterly

<b>Businesses and Institutions</b>	Waste reduction and compliance	Business forums, inspections	Biannually
<b>Private Waste Collectors</b>	Waste collection and transportation	Coordination meetings	Quarterly
<b>Community Groups / CBOs</b>	Community mobilization	Partnership programs and clean-ups	Ongoing
<b>Schools and Institutions</b>	Environmental education	School programs and clubs	Annually
<b>Development Partners</b>	Technical and financial support	Project coordination meetings	As required

## 8. Financial Strategy

Sustainable financing is essential for the effective implementation and long-term operation of the Solid Waste Management Plan in Karuri Municipality. This section outlines the key funding sources, cost recovery mechanisms, and financial planning approaches required to support waste management services and infrastructure investments.

### 8.1 Revenue Sources

The implementation of the Solid Waste Management Plan will rely on a combination of public funding, service fees, and partnerships with private sector actors.

The main sources of revenue will include:

- **County Government Budget Allocations** – Annual allocations from the County Government of Kiambu to support municipal waste management operations and infrastructure development.

**Municipal Budget Contributions** – Operational budgets for waste collection, monitoring, and enforcement activities.

- **User Fees and Service Charges** – Fees collected from households, businesses, and institutions for waste collection services.

- **Private Sector Investments** – Investments by private waste collectors, recycling enterprises, and waste management service providers.

- **Development Partner Support** – Grants and technical assistance from national programs and development partners supporting urban environmental management.

## **8.2 Cost Recovery Mechanisms**

To ensure long-term sustainability of waste management services, Karuri Municipality will strengthen cost recovery mechanisms. These will include:

- Reviewing existing waste collection fees to ensure they reflect the cost of service delivery.
- Expanding the number of households and businesses paying for waste collection services.
- Improving billing and revenue collection systems.
- Encouraging private sector participation in waste collection and recycling services.

Improved cost recovery will enable the municipality to maintain and expand waste management services while reducing dependence on public funding.

## **8.3 Public-Private-People Partnerships (PPPPs)**

Public-Private-People Partnerships will play an important role in financing and implementing key waste management initiatives.

Potential PPPP opportunities include:

- Development and operation of Material Recovery Facilities (MRFs)
- Composting facilities for organic waste
- Recycling enterprises
- Waste collection services in designated zones

These partnerships will help leverage private sector expertise, investment, and innovation in waste management.

## **8.4 Investment Needs**

Implementation of this plan will require investments in infrastructure, equipment, and institutional capacity.

## Key investment areas include:

- Waste collection vehicles and equipment
- Waste bins and storage infrastructure
- Transfer stations and Material Recovery Facilities
- Composting facilities
- Waste data management systems
- Public awareness programs
- Capacity building for municipal staff

## 9. Monitoring and Evaluation

Monitoring and evaluation (M&E) will be essential to track progress in the implementation of the Solid Waste Management Plan and ensure that planned interventions achieve the intended outcomes.

The Municipality will establish clear indicators and monitoring systems to assess performance and guide decision-making.

### 9.1 Key Performance Indicators

The following indicators will be used to monitor progress in solid waste management within Karuri Municipality.

**Table 12:** *Solid Waste Management Monitoring Indicators*

Objective	Indicator	Baseline	Target	Means of Verification
Improve waste collection services	Percentage of municipality covered by waste collection	~75%	90% coverage	Municipal records
Increase waste segregation at source	Percentage of households practicing segregation	Low (~10-15%)	50%	Field surveys
Reduce waste disposed at dumpsites	Percentage of waste diverted to recycling/composting	<10%	40-60%	Waste facility records
Strengthen regulatory compliance	Number of licensed private waste collectors	Existing licensed operators	Increase annually	County licensing records
Increase public participation	Number of awareness campaigns conducted	Limited (~1 per year)	At least 2 per year	Municipal reports

Improve operational capacity	Equipment availability	60-60% of required fleet and bins operational	90-100% operational	Municipal inventory
Improve collection efficiency	Percentage of waste collected per day	75% of total daily waste generaed	90% of total daily waste generated	Municipal records / Private collectors

## 9.2 Monitoring Mechanisms

Monitoring will be conducted through:

- Routine municipal waste collection reporting
- Field inspections of waste management services
- Waste audits and facility performance reviews
- Periodic stakeholder consultations

Municipal departments responsible for environment, public health, and infrastructure will collaborate in monitoring implementation of the SWM Plan.

## 9.3 Reporting

Progress reports will be prepared periodically to track implementation progress and identify areas requiring improvement.

- Quarterly operational reports
- Annual performance reviews
- Mid-term review of the SWM Plan

These reports will inform planning, budgeting, and policy adjustments.

## 9.4 Periodic Plan Review

This Solid Waste Management Plan will be reviewed periodically to reflect changing conditions such as population growth, urban expansion, technological developments, and evolving waste management practices.

A major review of the plan will be conducted every five years to ensure its continued relevance and effectiveness.

## **10. Implementation Timeline**

Implementation of the Solid Waste Management Plan will be phased over time to allow progressive improvement of waste management systems and infrastructure.

### **Phase 1: Short Term (0–3 Years)**

Focus areas will include:

- Expansion and improvement of waste collection services
- Public awareness campaigns on waste segregation
- Procurement of waste collection equipment
- Establishment of waste collection zones
- Planning and development of a Material Recovery Facility
- Development of composting initiatives for organic waste

### **Phase 2: Medium Term (3–5 Years)**

Focus areas will include:

- Operationalization of recycling and composting facilities
- Expansion of waste segregation programs
- Strengthening partnerships with recycling enterprises
- Improvement of waste disposal site management

### **Phase 3: Long Term (5+ Years)**

Focus areas will include:

- Expansion of waste diversion and recycling initiatives
- Integration of circular economy approaches
- Exploration of advanced waste treatment technologies where feasible
- Continuous improvement of waste management infrastructure and services

**Table 13: Implementation Timeline**

<b>Intervention</b>	<b>Phase 1 (0–3 yrs)</b>	<b>Phase 2 (3–5 yrs)</b>	<b>Phase 3 (5+ yrs)</b>
<b>Public awareness campaigns</b>	✓	✓	✓
<b>Waste segregation programs</b>	✓	✓	✓
<b>Expansion of collection services</b>	✓	✓	
<b>Procurement of equipment</b>	✓		
<b>Material Recovery Facility</b>	Planning	Construction	Operational
<b>Composting facility</b>	Planning	Operational	Expansion
<b>Recycling programs</b>		✓	✓
<b>Advanced waste treatment</b>			Feasibility

## **11. Conclusion**

The Karuri Municipality Solid Waste Management Plan provides a comprehensive framework for improving waste management services and promoting sustainable environmental practices within the municipality.

The plan outlines strategies to strengthen waste collection, promote waste segregation, enhance recycling and composting, and improve waste disposal systems. It also emphasizes the importance of institutional coordination, community participation, and financial sustainability in achieving effective waste management.

Successful implementation of the plan will require collaboration among the County Government, the Municipality, private sector actors, community organizations, and residents.

Through the implementation of this plan, Karuri Municipality aims to create a cleaner, healthier, and more sustainable urban environment while contributing to broader national and global goals on environmental protection and sustainable development.

## References

County Government of Kiambu. (2018–2022). *Kiambu County Integrated Development Plan (CIDP)*. Kiambu: County Government of Kiambu.

County Government of Kiambu. (2023–2027). *Kiambu County Integrated Development Plan (CIDP)*. Kiambu: County Government of Kiambu.

Government of Kenya. (1999). *Environmental Management and Coordination Act (EMCA)*. Nairobi: Government Printer.

Government of Kenya. (2022). *Sustainable Waste Management Act*. Nairobi: Government Printer.

Government of Kenya. (2010). *The Constitution of Kenya*. Nairobi: Government Printer.

Government of Kenya. (2015). *National Solid Waste Management Strategy*. Nairobi: Ministry of Environment and Forestry.

Karuri Municipal Development Plan / MADP

Ministry of Environment and Forestry. (2019). *National Sustainable Waste Management Policy*. Nairobi: Government of Kenya.

National Environment Management Authority (NEMA). (2021). *Environmental Management and Coordination (Waste Management) Regulations*. Nairobi: NEMA.

World Bank. (2020). *Kenya Urban Support Program (KUSP) Program Appraisal Document*. Washington, DC: World Bank.

World Bank. (2022). *Kenya Urban Support Program Phase II (KUSP II) Program Implementation Manual*. Washington, DC: World Bank.

United Nations Environment Programme (UNEP). (2015). *Global Waste Management Outlook*. Nairobi: UNEP.