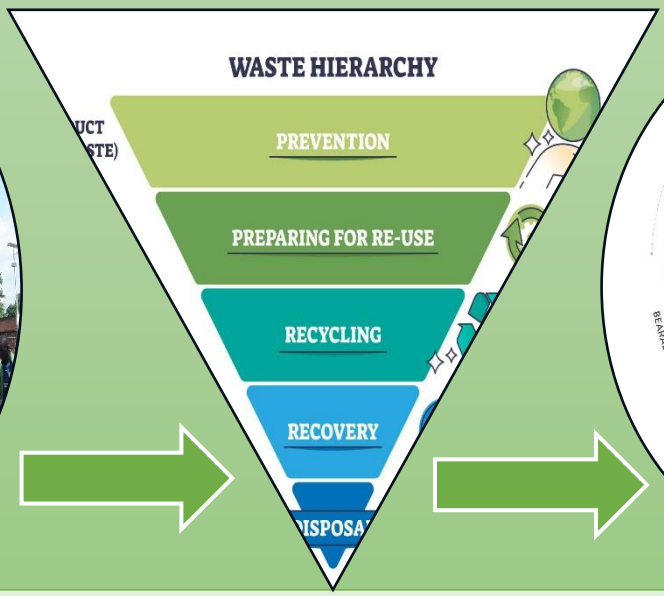
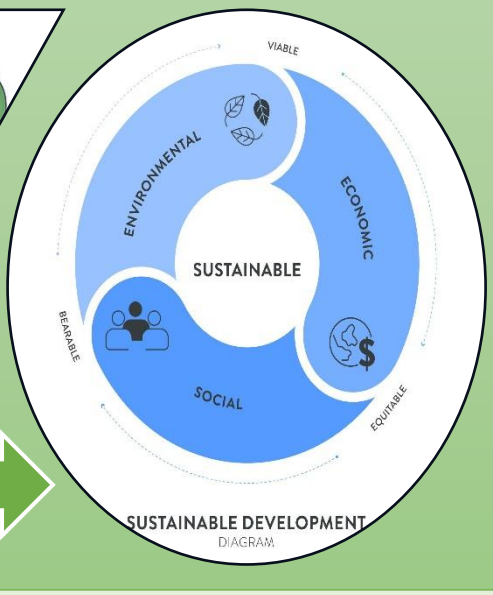
BUNGOMA COUNTY

KIMILILI MUNICIPALITY-SOLID WASTE MANAGEMENT PLAN





July, 2024

All enquiries about this Plan
Should be directed to:
The Municipality Manager

KENYA VISION 2030
Towards a Globally Competitive and Prosperous Kenya

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Kimilili.
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This document is also available at www.bungoma.go.ke

Motto:

"Our Heritage, Our Wealth"

Vision:

"Center of excellence in sustainable urban development, innovation, environmental safety and social inclusion"

Mission:

"To provide citizens and business community effective municipal services while maintaining community values"

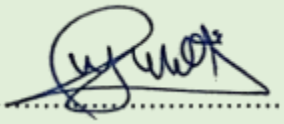
SERVICE COMMITMENT STATEMENT

We, the undersigned, being the top management and decision makers of Kimilili Municipality, do make a commitment on behalf of the people, businesses, investors and visitors of the aforesaid area, that;

We shall

Support inclusive economic growth, whilst maintaining an attractive, connected and well managed Municipality for residents, businesses, investors and visitors.

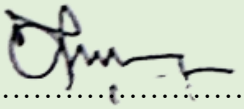
Signed



11/08/2022

CPA Martin Mabonga Dated

MUNICIPALMANAGER, KIMILILI



11.08.22

Mr. Wanyonyi Buteyo Dated

CHAIRMAN,

KIMILILIMUNICIPALITY BOARD

ACKNOWLEDGEMENT

Kimilili Municipality wishes to acknowledge the valuable contributions and support received from various institutions and individuals in the preparation of this Solid Waste Management Plan.

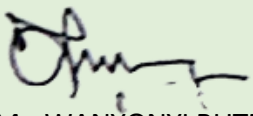
Special appreciation is extended to the **Bungoma County Government** for policy guidance, technical support, and commitment to strengthening sustainable urban service delivery. The Municipality also recognizes the central role played by the **Department of Environment and Public Health** in providing technical leadership, data, and operational insights that informed the development of this plan.

The Municipality is grateful to the **National Environment Management Authority (NEMA)** for regulatory guidance and environmental management expertise. Appreciation is also extended to municipal staff, technical officers, and stakeholders who participated in consultations and provided critical information throughout the planning process.

We acknowledge the contributions of **community-based organizations, private waste service providers, youth and women groups, and residents of Kimilili Municipality**, whose participation, perspectives, and local knowledge helped shape the plan to reflect real community needs and priorities.

Finally, the Municipality appreciates the support of development partners and all individuals who contributed time, expertise, and resources towards the successful preparation of this Solid Waste Management Plan.

Thank you and May God bless you all.



Mr. WANYONYI BUTEYO

Chairperson – Kimilili Municipality Board

County Government of Bungoma.

EXECUTIVE SUMMARY

Overview of Kimilili Municipality

Kimilili Municipality is located in the northern region of Bungoma County in Western Kenya and covers an area of approximately **181.2 square kilometres**. The municipality comprises four administrative wards—**Kimilili, Kibingei, Maeni, and Kamukuywa**. It lies between latitudes **0.7130°N and 0.8520°N** and around longitude **34.7740°E**, at an average elevation of approximately **1,570 metres above sea level**.

The municipality borders **Mt. Elgon Sub-County to the northwest, Tongaren to the east, Kabuchai and Webuye to the south, and Sirisia to the west**. Its proximity to the fertile slopes of Mt. Elgon provides a favorable-ecological environment that supports agricultural production and settlement. The area is served by an extensive river network including **Kuywa, Kimilili, Sosio, Kamusinga, Kibingei, and Kibisi rivers**, which provide water for domestic use, irrigation, and small-scale agro-industrial activities. However, these water resources are increasingly under pressure from siltation, encroachment, and pollution associated with expanding settlement and farming activities.

The municipality is characterized by **undulating to hilly terrain**, with steeper slopes in areas closer to Mt. Elgon that are prone to soil erosion and localized landslides. Kimilili experiences a **bimodal rainfall pattern**, with long rains occurring between March and June and short rains between August and November, averaging **1,400 to 1,700 mm annually**. Mean temperatures range between **15°C and 27°C**, creating favorable conditions for mixed farming and urban development. However, rainfall variability, land degradation, and changing hydrological patterns are increasingly affecting agricultural productivity, drainage systems, and urban environmental management.

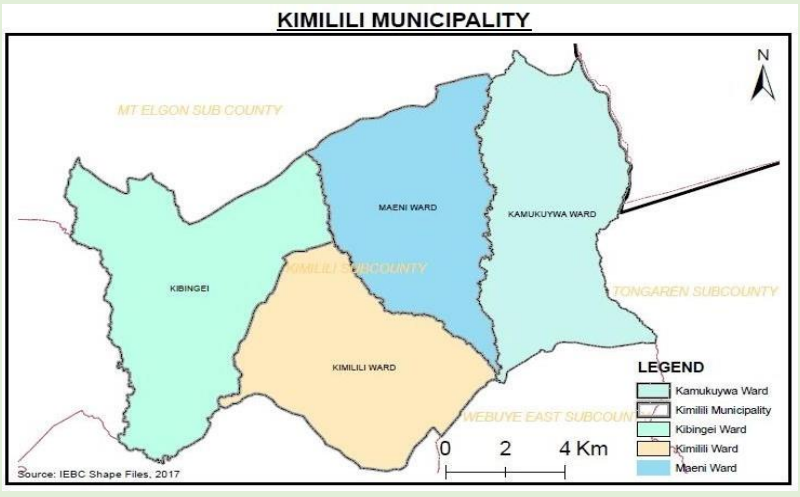


Figure 1 Map showing kimilili Municipality boundaries

Economic Context

Kimilili Municipality's economy is primarily driven by agriculture, trade, education, and transport services, reflecting its role as a regional market hub within Bungoma County. Fertile soils and favourable rainfall support smallholder farming of maize, beans, bananas, sugarcane, coffee, and vegetables, alongside dairy and poultry production. Agricultural produce from surrounding rural areas is traded through Kimilili Town, supporting vibrant commercial activity. The informal sector dominates employment, particularly in retail trade, transport services, and small enterprises, while formal employment is concentrated in education, health services, and public administration.

Purpose of the Solid Waste Management Plan

This Solid Waste Management Plan provides a comprehensive framework to guide the development and implementation of sustainable waste management systems in Kimilili Municipality. The plan aims to address existing service gaps while supporting long-term environmental protection, public health, and urban resilience.

It aligns with the Kenya Urban Support Programme (KUSP II), national and county policies, environmental regulations, and climate-responsive urban management principles. The plan promotes integrated waste management approaches that emphasize waste reduction, segregation at source, resource recovery, efficient service delivery, and environmentally safe disposal.

Key Objectives of the Plan

- Ensure timely, efficient, and reliable collection, transportation, treatment, and disposal of solid waste across the municipality.
- Strengthen public–private–people partnerships to improve waste collection, segregation, recycling, and resource recovery.
- Promote environmental education, public awareness, and community participation in sustainable waste management practices.
- Reduce environmental pollution and public health risks through improved waste treatment and disposal systems.
- Enhance financial sustainability of the solid waste management system through improved cost recovery and efficient resource utilization.

Strategic Direction

The plan adopts an integrated and climate-responsive waste management approach that prioritizes waste minimization, improved operational efficiency, strengthened institutional coordination, and enhanced community participation. By implementing these measures, Kimilili Municipality aims to establish a resilient, inclusive, and environmentally sustainable solid waste management system that supports urban growth while safeguarding public health and environmental quality.

Structure of the Solid Waste Management Plan

This Solid Waste Management Plan is organized into thematic chapters that collectively provide the policy, technical, institutional, and operational framework for sustainable waste management in Kimilili Municipality.

Chapter 1: Introduction
Provides background information on solid waste management challenges, policy context, and the rationale for developing the plan. It outlines the purpose, scope, and guiding principles of the Solid Waste Management Plan.

Chapter 2: Waste Generation and Composition Analysis
Presents an assessment of waste generation trends, sources of waste, and waste composition within the municipality. The chapter provides projections of future waste quantities to support infrastructure planning and resource recovery strategies.

Chapter 3: Current Solid Waste Management System
Describes existing waste management practices including collection, transportation, recycling, treatment, and disposal. It presents baseline performance indicators, institutional arrangements, operational capacity, and key challenges affecting service delivery.

Chapter 4: Goals and Objectives
Defines the overall goal and measurable objectives of the Solid Waste Management Plan, providing clear targets for improving service coverage, resource recovery, environmental protection, and institutional performance.

Chapter 5: Solid Waste Management Strategies
Outlines strategic interventions to improve waste minimization, segregation at source, collection efficiency, transportation systems, recycling, composting, and environmentally sound disposal.

Chapter 6: Institutional and Legal Framework
Describes the governance structure, roles and responsibilities of institutions, regulatory requirements, and enforcement mechanisms supporting solid waste management in the municipality.

Chapter 7: Stakeholder Engagement and Participation
Identifies key stakeholders involved in waste management and outlines mechanisms for coordination, community participation, public awareness, and partnership development.

Chapter 8: Financial Strategy
Presents financing approaches for waste management service delivery, including funding sources, cost recovery mechanisms, and investment priorities.

Chapter 9: Monitoring and Evaluation Framework
Defines performance indicators, monitoring procedures, and reporting mechanisms for tracking implementation progress and ensuring accountability.

Chapter 10: Implementation Framework and Timeline
Provides the implementation roadmap, including priority actions, responsible institutions, and phased timelines for executing the plan. Implementation of the Solid Waste Management Plan is estimated to require capital investment ranging from KES 430 million to KES 740 million over the infrastructure development horizon.

Chapter 11: Conclusion and Way Forward
Summarizes the strategic direction of the plan and outlines the municipality's commitment to implementing sustainable and climate-resilient waste management systems.

TABLE OF CONTENTS

Contents

Motto: i

Vision: i

Mission: i

SERVICECOMMITMENTSTATEMENT ii

ACKNOWLEDGEMENT iii

Thank you and May God bless you all. iii

EXECUTIVE SUMMARY iv

TABLE OF CONTENTS viii

LIST OF ACRYONMS xvi

DEFINITION OF KEY TERMS xvii

LIST OF FIGURES xix

LIST OF TABLES xix

CHAPTER 1 2

Introduction 2

1.1 PURPOSE OF THE PLAN 2

1.2 SCOPE OF THE STRATEGY 3

1.3 VISION AND MISSION OF THE SOLID WASTE MANAGEMENT STRATEGY IN KIMILILI MUNICIPALITY 3

CHAPTER 2 4

Waste Generation and Composition Assessment 4

2.1 Current Waste Generation 4

2.2 Waste Composition 5

2.2.1 Food, Kitchen, and Garden Waste 5

2.2.2 Agricultural Residues 6

2.2.3 Paper and Cardboard 6

2.2.4 Plastics and Polythene Materials 6

2.2.5 Glass 6

2.2.6 Scrap Metals 7
2.2.7 Electronic Waste (E-Waste) 7
2.2.8 Construction and Demolition Debris 7
2.2.9 Medical and Pharmaceutical Waste 7
2.2.10 Batteries and Expired Chemicals 8
2.3 Waste Generation Trends 8
CHAPTER 3 10
Existing Solid Waste Management System 10
3.1 Collection Systems 10
3.2 Baseline Performance of the Current Solid Waste Management System 11
3.3Waste Transportation 12
3.4 Waste Treatment and Disposal 13
3.5 Recycling and Resource Recovery 15
3.6 Institutional Framework 15
3.7 Financial Management 16
3.8 Key Operational Challenges in the Current Waste Management System 17
CHAPTER 4 18
Waste Management Goals and Objectives 18
4.1 Overall Goal 18
4.2 Measurable Objectives of the Solid Waste Management Plan 18
4.3 Short-Term Goals (1–3 Years) 19
4.3.1 Improve Waste Collection and Coverage 19
4.3.2 Promote Waste Segregation at Source 19
4.3.3 Strengthen Public Awareness and Participation 19
4.3.4 Develop Basic Waste Management Infrastructure 19
4.3.5 Improve Institutional and Human Capacity 19
4.4 Long-Term Goals (5–10 Years) 20
4.4.1 Increase Waste Diversion and Resource Recovery 20
4.4.2 Improve Waste Treatment and Disposal Facilities 20

4.4.3 Implement Circular Economy and Zero-Waste Approaches 20
4.4.4 Strengthen Financial Sustainability 20
4.4.5 Enhance Governance and Regulatory Compliance 20
4.5 Expected Outcomes 21
CHAPTER 5 22
Waste management strategies 22
5.1 Guiding principles 22
5.1.1 Waste Hierarchy Principle 22
5.1.2 Polluter Pays Principle 22
5.1.3 Circular Economy Principle 23
5.1.4 Public-Private-People Partnerships (PPPPs) 23
5.1.5 Environmental Protection and Public Health Principle 23
5.1.6 Inclusivity and Social Equity Principle 23
5.1.7 Climate-Sensitive Waste Management Principle 23
5.2 Waste Management Hierarchy 23
5.3 Waste Minimization 24
5.3.1 Public Education and Awareness on Waste Reduction 25
5.3.2 Promotion of Sustainable Consumption and Production Practices 25
5.3.3 Partnerships with Businesses and Institutions for Waste Reduction 26
5.4 Waste Segregation 26
5.4.1 Institutionalization of Waste Segregation at Source 27
5.4.2 Provision of Segregation Infrastructure and Facilities 28
5.4.3 Capacity Building and Public Training on Waste Segregation 28
5.4.4 Integration of Segregation into Collection and Transportation Systems 29
5.4.6 Enforcement, Monitoring, and Incentives for Segregation Compliance 29
5.4.7 Special Arrangements for Hazardous and Special Wastes 30
5.5 Waste Collection Systems 30
5.5.2 Development of Communal and Transfer Collection Facilities 31
5.5.3 Optimization of Collection Routes, Schedules, and Zoning 32

5.5.4 Integration of Private Sector and Community-Based Service Providers 32
5.5.5 Occupational Health, Safety, and Welfare of Collection Workers 33
5.5.6 Community Participation and Accountability in Collection Services 33
5.6 Waste Transportation Infrastructure 34
5.6.1 Assessment, Planning, and Optimization of Transportation Needs 35
5.6.2 Development and Management of Waste Transportation Fleet 35
5.6.3 Maintenance, Repair, and Asset Management Systems 35
5.6.4 Occupational Health, Safety, and Environmental Protection in Transportation 36
5.6.5 Integration of Transfer Stations and Intermediate Facilities 36
5.6.6 Use of Information and Communication Technology in Transportation Management 37
5.7 Recycling and Resource Recovery 37
5.7.1 Development of Material Recovery Facilities (MRFs) 38
5.7.2 Strengthening Informal Sector Recycling 38
5.7.3 Promotion of Recycling Enterprises and Green Jobs 38
5.7.4 Market Development for Recyclable Materials 39
5.8 Composting and Organic Waste Management 39
5.8.1 Establishment of Municipal and Community Composting Programs 39
5.8.2 Promotion of Household and Institutional Composting 40
5.8.3 Integration of Organic Waste Segregation with Composting Systems 40
5.8.4 Promotion of Organic Waste Value Addition 40
5.9 Waste Disposal and Final Treatment 40
5.9.1 Improvement of Existing Disposal Sites 41
5.9.2 Development of Sanitary Landfill Infrastructure 41
5.9.3 Leachate and Landfill Gas Management 42
5.9.4 Advanced Waste Treatment Technologies (Long-Term Option) 42
5.9.5 Regional and Inter-County Disposal Collaboration 43
5.9.6 Closure and Rehabilitation of Old Dumpsites 43
CHAPTER 6 44
Institutional Capacity and Regulatory Framework 44

6.1 Governance and Institutional Structure 44
6.2 Institutional Roles and Functional Responsibilities 44
6.3 Legal and Policy Framework 45
6.3.1 Constitution of Kenya, 2010 45
6.3.2 Environmental Management and Coordination Act (EMCA) 46
6.3.3 Sustainable Waste Management Act, 2022 46
6.3.4 Environmental Management and Coordination (Waste Management) Regulations of 2006 46
6.3.5 Public Health Act 47
6.3.6 Urban Areas and Cities Act 48
6.3.7 County Government Act and County Policies 48
6.4 Regulatory Enforcement and Compliance Systems 49
6.4.1 Regulatory Enforcement Institutional Roles 49
6.4.2 Regulatory Compliance Monitoring Process 50
6.4.3 Waste Service Provider Licensing and Regulation 51
6.4.5 Penalties and Corrective Enforcement Measures 51
CHAPTER 7 53
Public Education, Awareness and Stakeholder Engagement 53
7.1 Introduction 53
7.2 Key Stakeholders in Solid Waste Management 53
7.3 Stakeholder Roles and Responsibilities 54
7.4 Stakeholder Engagement Mechanisms 55
7.5 Community Participation and Public Awareness 56
7.6 Institutional Coordination 56
CHAPTER 8 57
Financial Strategy 57
8.1 Program-Based Budget Framework 58
8.1.1 Program Descriptions 59
8.1.2 Program-Based Budget Allocation Structure 60
8.1.3 Program-Based Financial Planning Cycle 61

8.1.3 Program-Based Financial Reporting 61
8.1.4 Outcome of the Program-Based Budget Framework 61
8.2 Capital Investment Requirements and Infrastructure Development Plan 62
8.2.1 Capital Investment Planning 63
8.2.2 Capital Investment Implementation Approach 64
8.3 Operational Expenditure and Service Delivery Cost Framework 64
8.3.1 Major Components of Operational Expenditure 65
8.3.2 Operational Cost Management Strategy 66
8.3.3 Operational Financial Sustainability 66
8.4 Financing Strategy and Funding Sources 67
8.4.1 Financing Objectives 67
8.4.2 Financing Structure 67
8.4.3 Financing Coordination and Resource Mobilization 69
8.5 Revenue and Cost Recovery Model 70
8.5.1 Cost Recovery Principles 70
8.5.2 Revenue Sources 70
8.5.3 Revenue Collection Mechanisms 71
8.5.4 Resource Recovery Revenue 71
8.5.5 Cost Recovery Performance 71
8.5.6 Affordability and Social Equity Considerations 72
8.5.7 Revenue Improvement Strategy 72
8.5.8 Long-Term Financial Sustainability 72
8.6 Public–Private–People Partnerships and Development Partner Investment Framework 72
8.6.1 Objectives of PPPP and Development Partner Engagement 73
8.6.2 Priority Investment Areas for PPPP Participation 73
8.6.3 PPPP Implementation Models 73
8.6.4 Development Partner Financing 74
8.6.5 Project Preparation and Investment Mobilization 74
8.6.6 Partnership Governance and Accountability 74

8.6.7 Expected Outcomes of PPPP and Development Partner Engagement 75
8.7 Financial Risk Management and Mitigation Framework 75
8.7.1 Financial Risk Management Objectives 75
8.7.2 Major Financial Risk Categories 75
8.7 3 Financial Risk Mitigation Measures 76
8.7.4 Asset Management and Lifecycle Cost Control 76
8.7.8 Financial Monitoring and Early Warning Systems 76
8.7.9 Financial Governance and Accountability 77
8.7.10 Outcome of Financial Risk Management Framework 77
8.8 Financial Governance and Accountability Framework 77
8.8.1 Financial Governance Objectives 77
8.8.2 Institutional Roles and Responsibilities 77
8.8.3 Budgeting and Financial Planning 78
8.8.4 Financial Control and Expenditure Management 78
8.8.5 Financial Reporting and Disclosure 78
8.8.6 Audit and Compliance Mechanisms 79
8.8.7 Financial Transparency and Public Accountability 79
8.8.8 Anti-Corruption and Integrity Measures 79
8.8.9 Outcome of Financial Governance Framework 79
8.9 Financial Projections and Investment Planning Framework 79
8.9.1 Financial Planning Time Horizons 80
8.9.2 Operational Expenditure Projections 80
8.9.3 Revenue Projections 80
8.9.4 Investment Planning and Resource Mobilization 81
8.9.5 Financial Monitoring and Review 81
8.9.6 Outcome of Financial Projection Framework 81
CHAPTER 9 82
Monitoring and Evaluation 82
9.1 Monitoring Framework 82

9.2 Key Performance Indicators (KPIs) 83
9.3 Data Collection and Reporting Mechanisms 83
9.4 Institutional Responsibilities for Monitoring 83
9.5 Performance Review and Evaluation 83
9.6 Periodic Review and Updating of SWM Plan 84
9.7 Community-Based Monitoring 84
9.8 Digital Monitoring Systems (Long-Term) 84
9.9 Solid Waste Management Results Framework 85
CHAPTER 10 86
Implementation Timeline 86
10.1 Phased Implementation Approach 86
10.2 Phase 1: Short-Term Implementation Actions (0–3 Years) 87
10.3 Phase 2: Medium-Term Implementation Actions (3–5 Years) 87
10.4 Phase 3: Long-Term Implementation Actions (5–10 Years) 87
10.5 Implementation Coordination and Oversight 88
10.6 Implementation Risk Management 88
10.7 Implementation Monitoring 88
10.8 Solid Waste Management Implementation Matrix 88
Chapter 11: Conclusion and Way Forward 91

LIST OF ACRYONMS

Acronym	Meaning
CBOs	Community-Based Organizations
CIDP	County Integrated Development Plan
EMCA	Environmental Management and Coordination Act
GIS	Geographic Information System
ISWM	Integrated Solid Waste Management
KUSP II	Kenya Urban Support Programme Phase II
MRF	Material Recovery Facility
MSW	Municipal Solid Waste
NEMA	National Environment Management Authority
NGOs	Non-Governmental Organizations
OHS	Occupational Health and Safety
PPP	Public–Private Partnership
PPPP	Public–Private–People Partnership
SWM	Solid Waste Management
SWMP	Solid Waste Management Plan
WEEE	Waste Electrical and Electronic Equipment

DEFINITION OF KEY TERMS

Biodegradable Waste
Organic waste that can be decomposed naturally by microorganisms, such as food waste, garden waste, and agricultural residues.

Circular Economy
An economic system that promotes reuse, recycling, and recovery of materials to minimize waste generation and resource consumption.

Composting
A biological process that converts organic waste into nutrient-rich material through controlled decomposition.

Controlled Disposal Site
A waste disposal facility where waste placement and management practices are regulated to reduce environmental and public health risks.

Hazardous Waste
Waste that poses potential risks to human health or the environment due to its toxic, corrosive, flammable, or reactive characteristics.

Integrated Solid Waste Management (ISWM)
A comprehensive approach to waste management that combines waste reduction, segregation, collection, recycling, treatment, and safe disposal.

Material Recovery Facility (MRF)
A facility where mixed waste is sorted and separated into recyclable materials for processing and reuse.

Municipal Solid Waste (MSW)
Waste generated from households, commercial establishments, institutions, and public spaces within a municipality.

Open Dumping
Uncontrolled disposal of waste in undesignated areas without environmental protection measures.

Public–Private–People Partnership (PPPP)
A collaborative arrangement between government, private sector, and community stakeholders in service delivery and resource management.

Recycling
The process of converting waste materials into new products to reduce resource consumption and environmental pollution.

Resource Recovery
Extraction of useful materials or energy from waste through recycling, composting, or other treatment processes.

Sanitary Landfill
An engineered waste disposal facility designed to isolate waste from the environment through lining, leachate control, and monitoring systems.

Segregation at Source
Separation of waste into different categories (e.g., organic, recyclable, hazardous) at the point where it is generated.

Solid Waste Management (SWM)
The systematic control of waste generation, storage, collection, transportation, treatment, and disposal.

Waste Collection Coverage
The proportion of waste generated that is collected through formal waste management services.

Waste Diversion
Reduction of waste sent to disposal sites through recycling, composting, or reuse.

Waste Generation Rate
The quantity of waste produced per person or per area over a specific period.

Waste Transfer Station
An intermediate facility where waste is temporarily stored before being transported to treatment or disposal sites.

LIST OF FIGURES

Figure 1 Map showing kimilili Municipality boundaries iv
Figure 2; poorly maintained waste bins **Figure 3; overflowing bins and poorly maintained waste collection points** 11
Figure 4 current waste transportation vehicle 13
Figure 5 open dumping site 14
Figure 6 waste management hierarchy 24
Figure 7 waste segregated bins 27
Figure 8 well designed vehicle for solid waste transportation in Denmark 34
Figure 9 stakeholders of waste management within the municipality 55
Figure 10; Waste Management Monitoring Framework Flow 82

LIST OF TABLES

Table 1 solid waste characterization 8
Table 2 Projected Daily Solid Waste Generation (2.2% Growth Scenario) 9
Table 3 Projected Annual Solid Waste Generation 9
Table 4 Baseline Solid Waste Management Performance Indicators 12
Table 5 Application of Waste Hierarchy in Kimilili Municipality 24
Table 6 Comparison of Disposal Systems 42
Table 7 Advanced Treatment Technology Options 43
Table 8 Institutional Roles and Responsibilities 45
Table 9 **EMCA Compliance Requirements for Waste Management** 46
Table 10 **Sustainable Waste Management Act — Municipal Obligations** 46
Table 11 legal framework application summary 49
Table 12 **Detailed Enforcement Mandate Allocation** 50
Table 13 **Compliance Monitoring Cycle** 51
Table 14 **Waste Service Provider Licensing Requirements** 51
Table 15 **Enforcement Escalation Framework** 52
Table 16 Stakeholder Roles in Solid Waste Management 54
Table 17 solid waste Management Program Structure 59
Table 18 indicative program budget allocation 60
Table 19 Indicative Capital Investment Requirements 63
Table 20 Capital Investment Summary by Category 64
Table 21 Capital Investment Phasing Plan 64
Table 22 Annual Operational Cost Structure 66
Table 23 Capital Investment Financing Sources 69

Table 24 Operational Expenditure Financing Sources 69
Table 25 **Blended Financing Model by Program** 69
Table 26 Proposed Waste Service Tariff Structure 71
Table 27 Indicative Annual Revenue Potential 71
Table 28 Indicative Operational Cost Recovery Outlook 71
Table 29 Priority PPP Investment Areas 73
Table 30 PPP Implementation Models 74
Table 31 Key Financial Risks in Municipal Solid Waste Management 75
Table 32 **Financial Risk Mitigation Measures** 76
Table 33 **Financial Performance Monitoring Indicators** 76
Table 34 **Institutional Responsibilities for Financial Governance** 78
Table 35 **Financial Reporting Requirements** 78
Table 36 Capital Investment Projection by Implementation Phase 80
Table 37 Indicative Operational Expenditure Projection 80
Table 38 **Indicative Revenue Projection** 80
Table 39 **Solid Waste Management Key Performance Indicators** 83
Table 40 **Monitoring Responsibilities Matrix** 83
Table 41 Monitoring and Evaluation Results Framework 85
Table 42 Phased Implementation Plan 86
Table 43 Short-Term Implementation Actions 87
Table 44 **Medium-Term Implementation Actions** 87
Table 45 **Long-Term Implementation Actions** 87

CHAPTER 1

Introduction

Solid waste management remains one of the major development challenges globally, nationally, and at the county level. The promulgation of the Constitution of Kenya, 2010, devolved environmental management functions, including solid waste management, to County Governments. In line with this constitutional mandate, Bungoma County Government is responsible for the management of solid waste within its jurisdiction.

Kimilili Municipality, located in Bungoma County, was established in 2019 pursuant to the Urban Areas and Cities Act. Following its establishment, solid waste management functions within the municipality fall under the oversight of the Municipal Board, working in coordination with the County Department responsible for Environment, Water, and Natural Resources.

All human activities generate waste that must be properly managed to safeguard human health, protect the environment, and enhance urban aesthetics. This challenge is particularly significant in urban centres such as Kimilili, where population growth, expanding commercial activities, markets, institutions, and changing consumption patterns contribute to increasing volumes and complexity of solid waste. Inadequate waste management leads to blocked drainage systems, environmental pollution, public health risks, and degradation of urban spaces.

Kenya Vision 2030 recognizes the need for efficient, sustainable, and integrated waste management systems as the country advances toward industrialization and sustainable urban development. Guided by the Environmental Management and Coordination Act (EMCA), the Sustainable Waste Management Act, 2022, relevant regulations, and other applicable national and county policy frameworks, this Solid Waste Management Plan provides a comprehensive framework for managing solid waste within Kimilili Municipality.

The Plan aims to guide all stakeholders in delivering effective, inclusive, environmentally sound, and financially sustainable solid waste management services, while promoting resource recovery and advancing a circular economy approach within the municipality.

1.1 PURPOSE OF THE PLAN

Solid Waste Management Plan has been formulated to guide **Kimilili Municipality** on sustainable solid waste management by ensuring a healthy, safe and secure environment for all. The plan is a deliberate and visionary commitment for the municipal board in the management of solid waste.

The guiding principle of this plan is to address the following:

- The Current situation (Where are we now?)
- The Preferred state (Where do we want to go?) and

- Implementation of the Strategy (How do we get there?)

1.2 SCOPE OF THE STRATEGY

Solid waste management remains a major challenge in the county. Over the years, the defunct local authorities did not establish proper waste management systems and hence the County Government inherited this state of affairs. This has led to the current poor waste management situation across the county.

It is proposed that this Strategy will cover a period of five (5) years with a midterm review after every three (3) years. With the full implementation of the Strategy, it is expected that the municipality will have embraced environmentally sound waste management technologies and best practices. While the implementation period of this Solid Waste Management Plan is five (5) years, infrastructure investment planning and financial projections extend over a ten (10) year horizon to accommodate long-term capital development requirements, particularly sanitary landfill development and system expansion.

1.3 VISION AND MISSION OF THE SOLID WASTE MANAGEMENT STRATEGY IN KIMILILI MUNICIPALITY

Vision

"A center of excellence in sustainable urban development, innovation, environmental safety and social inclusion"

Mission

"To provide citizens and business community effective municipal services while maintaining community values"

CHAPTER 2

Waste Generation and Composition Assessment

2.1 Current Waste Generation

Kimilili Municipality generates solid waste mainly from its four wards, namely **Kimilili Town, Kibingei, Kamkuywa, and Maeni**. Waste generation is highest in Kimilili Town due to high population density, commercial activities, markets, and institutional presence. The other wards contribute significantly through agricultural, residential, and small-scale commercial activities.

Major sources of solid waste within the municipality include:

- Retail and agricultural markets
- Hotels, restaurants, and food kiosks
- Wholesale and retail shops
- Small-scale industries and workshops
- Educational and financial institutions
- Offices and service centers
- Construction and demolition activities
- Health facilities

Waste generation in Kimilili Municipality is mainly influenced by population growth, urbanization, and expanding economic activities. Most waste generated is collected in mixed form, with limited segregation at source.

In peri-urban and rural areas, especially in Kibingei, Kamkuywa, and Maeni wards, a portion of organic waste is reused for composting and agricultural purposes. However, in urban centers, most waste is disposed of without prior sorting.

The municipality generates both household and commercial waste, with increasing volumes observed in market centers and residential estates.

Kimilili Municipality had a baseline population of approximately **162,038 persons in 2019**, with projections showing steady growth that could reach between **318,123 and 417,480 persons by 2050** depending on growth scenarios

Using a conservative urban waste generation rate of approximately **0.5 kg per person per day**, Kimilili Municipality is currently estimated to generate approximately:

- **81 tonnes of solid waste per day** (based on 2019 population baseline)

With projected population growth, daily waste generation is expected to increase significantly. By 2050, waste generation could range between:

- **159 tonnes per day** (under moderate population growth scenario)
- **208 tonnes per day** (under higher population growth scenario)

These projections demonstrate that waste generation in Kimilili Municipality will continue to increase due to population growth, urban expansion, increased commercial activities, and changing consumption patterns. Without improved waste minimization, segregation, recycling, and recovery systems, pressure on collection, transportation, and disposal infrastructure will continue to increase.

2.2 Waste Composition

Solid waste generated in Kimilili Municipality consists of organic and inorganic materials. Organic waste forms the largest proportion, mainly originating from households, markets, hotels, and agricultural activities.

The main waste streams include:

- Food, kitchen, and garden waste
- Agricultural residues
- Paper and cardboard
- Plastics and polythene materials
- Glass
- Scrap metals
- Electronic waste
- Construction and demolition debris
- Medical and pharmaceutical waste
- Batteries and expired chemicals

2.2.1 Food, Kitchen, and Garden Waste

This stream consists of biodegradable organic waste generated from households, markets, hotels, restaurants, and landscaping activities. It includes food leftovers, fruit and vegetable peels, spoiled food, grass cuttings, and plant trimmings.

This waste stream forms the largest proportion of municipal solid waste and presents significant opportunities for composting and organic resource recovery. If not properly managed, organic waste decomposes and produces methane gas and foul odors and attracts disease vectors such as flies and rodents.

The municipality shall prioritize composting and organic waste recovery programs to divert organic waste from disposal sites.

2.2.2 Agricultural Residues

Agricultural residues include crop remains such as maize stalks, husks, banana leaves, sugarcane residues, and other farm organic waste generated from farming activities and agro-processing.

These wastes are largely biodegradable and can be reused for composting, mulching, livestock feed, or bioenergy production. Poor disposal of agricultural residues through open burning contributes to air pollution and greenhouse gas emissions.

The municipality shall promote sustainable reuse and composting of agricultural waste.

2.2.3 Paper and Cardboard

This stream includes newspapers, office paper, packaging materials, cartons, and cardboard boxes generated from households, shops, offices, and markets.

Paper and cardboard are recyclable materials and have high resource recovery value. However, when mixed with organic waste, their recycling potential reduces significantly.

The municipality shall promote segregation and recycling partnerships to recover paper and cardboard waste.

2.2.4 Plastics and Polythene Materials

This stream includes plastic bottles, packaging materials, carrier bags, plastic containers, and single-use plastics generated from households, markets, and commercial activities.

Plastic waste is non-biodegradable and contributes significantly to environmental pollution, drainage blockage, and soil contamination. However, plastics have high recycling potential when properly segregated.

The municipality shall promote plastic recycling programs, plastic reduction campaigns, and enforcement of plastic waste management regulations.

2.2.5 Glass

Glass waste includes bottles, broken glass, jars, and other glass packaging materials generated from households, bars, restaurants, and commercial establishments.

Glass is fully recyclable and can be reused multiple times. However, broken glass poses safety risks to waste handlers if not properly segregated.

The municipality shall promote glass recovery and safe handling practices.

2.2.6 Scrap Metals

Scrap metals include iron, steel, aluminum cans, and other metallic waste generated from households, garages, workshops, and construction activities.

Scrap metals have high economic value and are commonly recovered through informal recycling systems. Proper recovery reduces environmental pollution and supports circular economy development.

The municipality shall support metal recycling value chains and safe recovery practices.

2.2.7 Electronic Waste (E-Waste)

Electronic waste includes discarded electrical and electronic equipment such as phones, computers, televisions, and household appliances.

E-waste contains hazardous components such as heavy metals and toxic chemicals that can contaminate soil and water if improperly disposed. E-waste requires specialized handling, storage, and recycling.

The municipality shall promote safe e-waste collection systems and partnerships with licensed e-waste recyclers.

2.2.8 Construction and Demolition Debris

This stream includes concrete waste, bricks, stones, timber, tiles, and excavation materials generated from building construction and demolition activities.

Construction waste is bulky and can overwhelm disposal sites if not properly managed. Some materials can be reused in construction or road works.

The municipality shall promote construction waste reuse and designated disposal systems.

2.2.9 Medical and Pharmaceutical Waste

This stream includes waste generated from hospitals, clinics, pharmacies, and laboratories such as sharps, contaminated materials, expired drugs, and pathological waste.

Medical waste poses serious public health and environmental risks if not properly treated. It requires specialized handling, treatment, and disposal according to national health and environmental regulations.

The municipality shall coordinate with health facilities and regulatory agencies to ensure safe medical waste management.

2.2.10 Batteries and Expired Chemicals

This stream includes used batteries, laboratory chemicals, agrochemicals, and household hazardous chemicals. These wastes contain toxic substances that can contaminate soil, groundwater, and surface water if improperly disposed. They require specialized collection, storage, and disposal systems. The municipality shall promote safe collection points and compliance with hazardous waste handling regulations.

Based on available assessments and observations, the estimated waste composition in Kimilili Municipality is as follows:

Table 1 solid waste characterization

Type of Waste	Percentage (%)
Organic Waste	51%
Plastics	11%
Paper and Paper Products	9%
Glass	5%
Metals	2%
Inert Materials (sand, rubble, dirt)	4%
Mixed Waste	18%
Total	**100%**

This composition shows strong potential for composting and recycling, particularly for organic waste, plastics, paper, and glass, which can support circular economy initiatives within the municipality.

The waste composition profile indicates that biodegradable waste constitutes the largest proportion of municipal waste, highlighting strong potential for composting and organic waste recovery programs. The significant presence of recyclable materials such as plastics, paper, and glass also demonstrates the viability of developing structured recycling systems within the municipality.

2.3 Waste Generation Trends

Waste Generation Trends

Waste generation trends in Kimilili Municipality are strongly influenced by population growth, urban expansion, economic activities, and changing consumption patterns. According to the 2019 Kenya Population and Housing Census, Kimilili Municipality had an estimated population of approximately **162,038 persons**

Population projections based on the national average growth rate of **2.2% per annum** indicate that the population is expected to increase to approximately **192,852 persons by 2027**, **229,526 persons by 2035**, and **318,123 persons by 2050**

Using an average urban waste generation rate of **0.5 kg per person per day**, the projected solid waste generation trends for Kimilili Municipality are presented below.

Table 2 Projected Daily Solid Waste Generation (2.2% Growth Scenario)

Year	Population	Waste Generation (Tonnes/Day)
2019	162,038	81
2027	192,852	96
2035	229,526	115
2050	318,123	159

Table 3 Projected Annual Solid Waste Generation

Year	Waste Generation (Tonnes/Year)
2019	29,565
2027	35,040
2035	41,975
2050	58,035

The projections show that solid waste generation in Kimilili Municipality is expected to nearly double between 2019 and 2050. This increase will be driven by population growth, expansion of residential areas, growth of market and commercial activities, increased use of packaged goods, and changing urban consumption patterns.

Without improvements in waste minimization, segregation, recycling, and recovery systems, the volume of waste requiring collection, transportation, treatment, and disposal will continue to increase, placing additional pressure on municipal infrastructure and environmental systems.

These trends highlight the urgent need for integrated solid waste management planning that supports waste reduction, promotes circular economy practices, and ensures environmentally sustainable disposal systems.

CHAPTER 3

Existing Solid Waste Management System

3.1 Collection Systems

Solid waste collection in Kimilili Municipality is carried out through a combination of municipal services, private service providers, and community-based initiatives. Waste collection methods vary across the four wards Kimilili Town, Kibingei, Kamkuywa, and Maeni depending on population density, accessibility, and availability of infrastructure.

a) Door-to-Door Collection

In Kimilili Town and selected residential estates, door-to-door waste collection is practiced on a limited scale. This service is mainly provided by the municipality and a few licensed private operators. However, coverage remains inadequate due to limited equipment, personnel, and financial resources.

Most households and business premises are not fully integrated into regular door-to-door collection schedules, leading to irregular collection and waste accumulation in some areas.

b) Communal Collection Points and Skip Bins

In peri-urban and rural areas such as Kibingei, and Maeni wards, waste is mainly collected through communal collection points and informal dumping areas. These include:

- Open waste collection grounds
- Roadside dumping points
- Temporary holding areas
- Market waste collection zones

Some markets and trading centers have designated waste bins, though many are insufficient in number, poorly maintained, or lack segregation facilities.

Overflowing bins and poorly managed collection points often result in littering, illegal dumping, and environmental pollution.

Figure 2; poorly maintained waste bins

Figure 3; overflowing bins and poorly maintained waste collection points

c) Collection Frequency

Waste collection frequency varies across the municipality:

- Kimilili Town: Collected 2–3 times per week in major commercial and market areas
- Residential estates: Once or twice per week
- Peri-urban and rural areas: Irregular and on-demand

Inconsistencies in collection schedules are mainly caused by vehicle breakdowns, and limited manpower.

d) Collection Zoning

The municipality has not fully implemented formal waste collection zoning. Existing collection routes are informal and not optimally planned, leading to:

- Duplication of services in some areas
- Neglect of remote settlements
- Inefficient use of vehicles and personnel

This affects service coverage and increases operational costs.

3.2 Baseline Performance of the Current Solid Waste Management System

The current solid waste management system in Kimilili Municipality can be assessed using key performance indicators that describe waste generation, collection efficiency, transportation

capacity, recovery levels, and disposal practices. These indicators provide a baseline for planning improvements and monitoring progress in service delivery.

Table 4 Baseline Solid Waste Management Performance Indicators

Indicator	Current Status	Remarks
Estimated waste generated	Approximately 81 tonnes per day	Based on population and per capita generation
Waste collection coverage	Approximately 55–65% of generated waste	Coverage varies across wards
Waste segregation at source	Minimal	Most waste collected in mixed form
Recycling and resource recovery	Limited (<10%)	Mainly informal sector recovery
Organic waste recovery	Very limited	Composting not institutionalized
Waste transportation system	Mixed use of open and closed trucks	Risk of waste spillage and odor
Waste transfer infrastructure	Limited	Direct hauling to disposal sites common
Main disposal method	Open or controlled dumping	No engineered sanitary landfill
Environmental monitoring	Limited	No structured monitoring system
Waste data management	Inadequate	Limited tracking of waste quantities

The baseline assessment indicates that the current solid waste management system in Kimilili Municipality is characterized by moderate collection coverage, limited waste segregation at source, and low levels of recycling and resource recovery. A significant proportion of waste is disposed through open or controlled dumping due to limited treatment and recovery infrastructure.

The assessment further highlights operational constraints in waste transportation capacity, limited transfer infrastructure, and inadequate environmental monitoring systems. These gaps demonstrate the need for systematic improvements across the waste management value chain, including strengthened collection systems, expanded recovery infrastructure, improved disposal practices, and enhanced regulatory enforcement.

3.3Waste Transportation

Waste transportation forms a critical component of the solid waste management chain as it links waste collection points to transfer stations, treatment facilities, and disposal sites. Efficient waste transportation systems are necessary to prevent waste spillage, reduce environmental pollution, and ensure timely waste handling.

Currently, waste transportation within Kimilili Municipality is undertaken through a combination of municipal arrangements and private sector waste collection service providers. Waste is

transported from collection points, markets, institutions, and commercial areas to designated disposal sites using available waste transportation vehicles.

However, the existing waste transportation system faces several operational challenges including limited number of waste transportation vehicles, use of open or non-standardized trucks, irregular maintenance of vehicles, and lack of waste tracking systems. In some cases, waste is transported without proper covering, leading to waste spillage, odor nuisance, and environmental pollution along transportation routes.

Figure 4 current waste transportation vehicle

3.4 Waste Treatment and Disposal

a) Waste Treatment Practices

Currently, Kimilili Municipality has limited waste treatment facilities. Most waste collected is not subjected to formal treatment before disposal.

Existing treatment practices include:

- Informal composting at household and farm level
- Small-scale waste sorting by informal recyclers
- Limited recovery of reusable materials

No fully developed composting plant, material recovery facility, or waste treatment center exists within the municipality.

b) Waste Disposal Methods

Waste disposal remains one of the major challenges in Kimilili Municipality. The municipality lacks a properly engineered sanitary landfill that meets environmental standards.

Current disposal practices include:

- Open dumping at designated and undesignated sites
- Use of temporary disposal grounds
- Transportation to external dumping sites

Figure 5 open dumping site

These disposal sites lack:

- Leachate control systems
- Methane gas management systems
- Proper fencing and security
- Environmental monitoring mechanisms

As a result, open dumping leads to:

- Soil and water contamination
- Air pollution from open burning
- Breeding of disease vectors
- Public health risks

3.5 Recycling and Resource Recovery

Recycling and resource recovery in Kimilili Municipality is largely informal and underdeveloped.

a) Informal Recycling Activities

Informal waste pickers, youth groups, and small-scale traders recover recyclable materials such as:

- Plastics
- Scrap metals
- Paper and cardboard
- Glass bottles

These materials are sold to middlemen or recycling companies outside the municipality.

b) Community-Based Initiatives

Some community and youth groups engage in:

- Composting of organic waste
- Collection of plastic waste
- Production of briquettes from organic residues

However, these initiatives are limited in scale and lack adequate technical and financial support.

c) Challenges in Recycling

Key challenges affecting recycling include:

- Lack of segregation at source
- Contamination of recyclable materials
- Absence of a Material Recovery Facility (MRF)
- Limited market access for recycled products
- Low public awareness

These challenges reduce the effectiveness and profitability of recycling activities.

3.6 Institutional Framework

a) Governance Structure

Solid waste management in Kimilili Municipality is primarily under the responsibility of the kimilili municipality, working through the relevant departments.

Key institutions involved include:

- County Department responsible for Environment and Sanitation
- Environment and Public Health Department
- National Environment Management Authority (NEMA)
- Private waste service providers
- Community-Based Organizations (CBOs)
- Youth and women groups

b) Roles and Responsibilities

- Municipality: Planning, coordination, supervision, and service delivery
- NEMA: Regulation, licensing, and environmental compliance
- Private Sector: Waste collection, transportation, and recycling
- Community Groups: Awareness creation and small-scale recovery

Coordination among stakeholders remains weak, leading to duplication of roles and inefficiencies.

3.7 Financial Management

a) Funding Sources

Waste management activities in Kimilili Municipality are financed mainly through:

- County government budget allocations
- Business permit fees
- User charges
- Limited private sector investment

Funding remains insufficient to meet operational and development needs.

b) Revenue Collection

Revenue from waste services is not well structured. Many households do not pay regular waste collection fees, while collection from businesses is inconsistently enforced.

This results in:

- Low-cost recovery
- Dependence on county subsidies
- Delayed maintenance of equipment
- Limited-service expansion

c) Financial Challenges

Major financial challenges include:

- Inadequate budget allocation
- Poor revenue collection mechanisms
- High operational costs
- Limited access to donor and PPP funding

These constraints affect service quality and sustainability.

3.8 Key Operational Challenges in the Current Waste Management System

The current waste management system faces several operational and institutional challenges that affect service efficiency and environmental protection. These include limited waste collection coverage, inadequate transportation capacity, and lack of waste segregation at source, limited recycling infrastructure, and reliance on uncontrolled disposal practices.

Additional challenges include weak enforcement of waste management regulations, limited financial resources for infrastructure development, insufficient public awareness on waste segregation, and lack of structured data collection and monitoring systems.

These challenges increase environmental risks, reduce recovery efficiency, and place pressure on existing waste disposal sites.

The identified operational, institutional, and infrastructure gaps highlight the need for a structured transition towards a more efficient, sustainable, and integrated solid waste management system in Kimilili Municipality. Addressing these challenges requires improved waste segregation, enhanced collection and transportation systems, expanded recycling and resource recovery infrastructure, and environmentally sound disposal practices. The following chapter outlines the desired future state of solid waste management and the strategic pathway for achieving this transition.

CHAPTER 4

Waste Management Goals and Objectives

This section outlines the short-term and long-term goals and objectives of the Solid Waste Management Plan for Kimilili Municipality. The goals are designed to guide the municipality towards establishing a sustainable, inclusive, efficient, and environmentally sound waste management system that supports public health, economic development, and environmental protection.

The goals and objectives are aligned with national policies, county development plans, KUSP2 objectives, and international best practices in solid waste management.

4.1 Overall Goal

The overall goal of this Solid Waste Management Plan is to establish an integrated, efficient, financially sustainable, and environmentally responsible solid waste management system in Kimilili Municipality that promotes waste minimization, resource recovery, and safe disposal while enhancing public health and environmental quality.

4.2 Measurable Objectives of the Solid Waste Management Plan

To achieve sustainable and efficient solid waste management in Kimilili Municipality, the following measurable objectives shall guide implementation of this plan:

- Increase municipal solid waste collection coverage from the current estimated 55–65% to 90% by 2030.
- Achieve 70% household participation in waste segregation at source by 2030.
- Increase recycling and resource recovery to at least 40% of total waste generated by 2030.
- Divert 50% of organic waste from disposal sites through composting and recovery by 2030.
- Replace all open waste transportation vehicles with fully enclosed and licensed waste transport trucks by 2028.
- Upgrade existing disposal facilities and ensure environmentally compliant waste disposal systems by 2030.
- Establish a digital waste data tracking and monitoring system by 2028.
- Conduct regular public awareness programs to reach at least 90% of the municipal population by 2030.

These objectives provide measurable targets to guide implementation, monitoring, and continuous improvement of solid waste management services in the municipality.

4.3 Short-Term Goals (1–3 Years)

In the short term, Kimilili Municipality will focus on improving service delivery, strengthening institutions, and laying the foundation for sustainable waste management.

The short-term goals include:

4.3.1 Improve Waste Collection and Coverage

- Expand door-to-door collection services in Kimilili Town and major trading centers.
- Increase the number of communal collection points in underserved areas.
- Improve collection schedules and route planning.
- Procure additional waste collection equipment and vehicles.

4.3.2 Promote Waste Segregation at Source

- Introduce color-coded bins and bags for waste separation.
- Conduct sensitization campaigns on segregation practices.
- Pilot source segregation programs in selected estates, schools, and markets.
- Develop guidelines for households and businesses on waste separation.

4.3.3 Strengthen Public Awareness and Participation

- Implement continuous public education programs.
- Engage community leaders, youth, and women groups in awareness creation.
- Organize community clean-up activities and environmental days.
- Integrate waste management education in schools.

4.3.4 Develop Basic Waste Management Infrastructure

- Establish temporary waste transfer stations in strategic locations.
- Upgrade existing collection points.
- Identify and secure land for future waste treatment facilities.
- Improve storage facilities for collected waste.

4.3.5 Improve Institutional and Human Capacity

- Train municipal staff on modern waste management practices.
- Enhance coordination among departments and stakeholders.
- Develop standard operating procedures for waste management.
- Strengthen enforcement of existing regulations.

4.4 Long-Term Goals (5–10 Years)

In the long term, Kimilili Municipality aims to establish a fully integrated and sustainable waste management system supported by modern infrastructure and strong partnerships.

The long-term goals include:

4.4.1 Increase Waste Diversion and Resource Recovery

- Achieve significant reduction in waste sent to disposal sites.
- Establish functional recycling and composting facilities.
- Develop a Material Recovery Facility (MRF).
- Promote market development for recycled products.

4.4.2 Improve Waste Treatment and Disposal Facilities

- Develop a sanitary landfill that meets environmental standards.
- Introduce leachate and gas management systems.
- Establish centralized composting plants for organic waste.
- Explore waste-to-energy and biogas technologies where feasible.

4.4.3 Implement Circular Economy and Zero-Waste Approaches

- Promote extended producer responsibility (EPR).
- Support reuse, repair, and refurbishment initiatives.
- Encourage eco-design and sustainable packaging.
- Integrate circular economy principles in municipal planning.

4.4.4 Strengthen Financial Sustainability

- Establish efficient user fee systems.
- Improve billing and revenue collection mechanisms.
- Attract private investment through PPPPs.
- Access donor and climate finance for waste projects.

4.4.5 Enhance Governance and Regulatory Compliance

- Strengthen monitoring and enforcement mechanisms.
- Ensure full compliance with NEMA and national standards.
- Update local waste management bylaws.
- Improve transparency and accountability in service delivery.

4.5 Expected Outcomes

Successful implementation of these goals and objectives is expected to result in:

- Improved cleanliness and environmental quality.
- Reduced incidence of waste-related diseases.
- Increased employment opportunities in recycling and waste recovery.
- Enhanced community ownership of waste management initiatives.
- Reduced environmental pollution.
- Improved municipal revenue from waste services.
- Progress towards a sustainable and resilient urban environment.

CHAPTER 5

Waste management strategies

This chapter presents the strategic framework for improving solid waste management in Kimilili Municipality during the plan period. The strategies outlined in this chapter are informed by the situational analysis presented which identified key challenges such as inadequate collection coverage, low levels of waste segregation, limited recycling and recovery infrastructure, weak enforcement mechanisms, and reliance on open dumping practices.

Rapid population growth, urbanization, expansion of commercial activities, and changing consumption patterns have contributed to increased waste generation within the municipality. These developments have placed significant pressure on existing waste management systems, resulting in environmental pollution, public health risks, and increased operational costs.

In response to these challenges, Kimilili Municipality adopts an integrated and sustainable approach to solid waste management. The strategies are designed to strengthen service delivery, enhance environmental protection, promote resource recovery, improve institutional coordination, and ensure financial sustainability. The municipality recognizes that effective waste management requires coordinated interventions across the entire waste management chain, from waste generation to final disposal.

5.1 Guiding principles

The Solid Waste Management Plan for Kimilili Municipality shall be guided by the following principles to ensure sustainability, efficiency, inclusiveness, and compliance with national and international best practices.

5.1.1 Waste Hierarchy Principle

The municipality shall prioritize waste prevention, reduction, reuse, recycling, recovery, and safe disposal as the last option. This approach will minimize environmental impacts and optimize resource utilization.

5.1.2 Polluter Pays Principle

Waste generators, including households, businesses, and institutions, shall take responsibility for the waste they produce. Appropriate user charges and penalties for illegal dumping shall be enforced to promote accountability.

5.1.3 Circular Economy Principle

Solid waste shall be recognized as a resource that can support economic development through recycling, composting, material recovery, and value addition. The municipality shall promote investments in recycling enterprises and green jobs.

5.1.4 Public-Private-People Partnerships (PPPPs)

The municipality shall promote collaboration between government, private sector, communities, youth groups, and development partners to enhance service delivery, innovation, and financial sustainability.

5.1.5 Environmental Protection and Public Health Principle

All waste management activities shall prioritize protection of human health, ecosystems, water resources, soil quality, and air quality through environmentally sound practices.

5.1.6 Inclusivity and Social Equity Principle

Waste management services shall be accessible to all residents, including informal settlements, vulnerable groups, youth, women, and persons with disabilities.

5.1.7 Climate-Sensitive Waste Management Principle

Waste management infrastructure and operations shall consider increasing climate risks such as flooding, extreme rainfall, and temperature rise, which are projected to increase risks to solid waste systems over time

5.2 Waste Management Hierarchy

The waste management hierarchy is a guiding principle for sustainable solid waste management. It prioritizes waste management options based on environmental sustainability, resource efficiency, and cost effectiveness. The hierarchy promotes waste prevention and resource recovery while minimizing reliance on disposal.

Kimilili Municipality shall apply the waste management hierarchy to guide planning, investment, and implementation of waste management programs. The municipality shall prioritize waste reduction, reuse, recycling, and recovery before considering final disposal.

Figure 6 waste management hierarchy

Table 5 Application of Waste Hierarchy in Kimilili Municipality

Hierarchy Level	Application in Kimilili
Prevention	Public awareness, waste minimization programs
Reuse	Promotion of reusable packaging
Recycling	Support recycling enterprises and MRF
Recovery	Composting and organic waste processing
Disposal	Controlled disposal and future sanitary landfill

5.3 Waste Minimization

Waste minimization is a fundamental component of sustainable solid waste management in Kimilili Municipality. It focuses on reducing the quantity and harmful nature of waste generated at the source before it enters the collection and disposal system. Effective waste minimization reduces pressure on collection services, lowers transportation and disposal costs, conserves natural resources, and minimizes environmental pollution.

Currently, a significant proportion of waste generated within Kimilili Municipality consists of avoidable materials such as single-use plastics, excessive packaging, food waste, and discarded reusable items. These wastes increase operational costs and contribute to environmental

degradation when improperly managed. Addressing waste generation at the source is therefore critical to improving the overall efficiency and sustainability of the waste management system.

Waste minimization in Kimilili Municipality will be promoted through behavior change, sustainable consumption practices, business engagement, and supportive policy frameworks. The municipality recognizes that long-term success in waste reduction depends on public awareness, institutional commitment, and private sector participation.

5.3.1 Public Education and Awareness on Waste Reduction

Public awareness and behavioral change are essential for reducing waste generation at household, institutional, and commercial levels. Many residents and businesses are not fully aware of the environmental, health, and economic impacts of excessive waste generation. As a result, waste is often produced and discarded without consideration of reuse or reduction opportunities.

To address this challenge, the municipality shall implement continuous and structured education programs aimed at fostering a culture of responsible waste management.

Key actions shall include:

- Development and distribution of educational materials in local languages.
- Use of community meetings, churches, schools, radio programs, and social media platforms for sensitization.
- Integration of waste reduction messages into school environmental clubs and curricula.
- Organization of annual environmental awareness campaigns and clean-up exercises.
- Promotion of zero-waste events and environmentally friendly public functions.
- Engagement of community leaders, youth groups, and women groups as change agents.

These initiatives will aim to promote practices such as carrying reusable bags, avoiding disposable packaging, reducing food wastage, and repairing or repurposing household items.

5.3.2 Promotion of Sustainable Consumption and Production Practices

Sustainable consumption and production practices are essential for reducing waste generation along the entire value chain, from production to final consumption. Businesses, institutions, and households play a key role in determining the type and volume of waste produced within the municipality.

Kimilili Municipality shall encourage the adoption of environmentally responsible practices that minimize waste generation and promote efficient use of resources.

This shall be achieved through:

- Promotion of reusable and refillable containers in shops and markets.

- Encouragement of bulk purchasing and minimal packaging.
- Support for eco-friendly packaging alternatives.
- Introduction of green procurement policies within municipal departments.
- Recognition and certification of environmentally responsible businesses and institutions.
- Collaboration with suppliers to reduce unnecessary packaging.

These measures will help reduce packaging waste, promote reuse, and support environmentally conscious business practices.

5.3.3 Partnerships with Businesses and Institutions for Waste Reduction

The private sector and public institutions generate a significant portion of municipal waste, particularly from commercial activities, hospitality services, agro-processing, and construction. Engaging these stakeholders is therefore critical for effective waste minimization.

Kimilili Municipality shall establish formal partnerships with businesses and institutions to promote waste reduction initiatives and compliance with sustainable waste management standards.

These partnerships shall focus on:

- Adoption of waste minimization policies by businesses and institutions.
- Implementation of internal waste audits to identify reduction opportunities.
- Introduction of take-back schemes for packaging and electronic waste.
- Promotion of extended producer responsibility (EPR) programs.
- Improvement of waste storage and handling practices.
- Support for corporate social responsibility initiatives in waste management.

Through these partnerships, businesses and institutions will be encouraged to take greater responsibility for the waste they generate and contribute actively to environmental protection.

5.4 Waste Segregation

Waste segregation is a critical component of effective and sustainable solid waste management in Kimilili Municipality. It involves the separation of different types of waste at the point of generation in order to facilitate efficient collection, recycling, treatment, and safe disposal. Proper segregation improves the quality of recyclable materials, enhances composting processes, reduces contamination, lowers treatment costs, and minimizes the volume of waste sent to disposal sites.

The situational analysis indicates that waste generated within Kimilili Municipality is largely mixed at the source, with organic waste, plastics, paper, metals, and hazardous materials often disposed of together. This practice limits opportunities for recycling and recovery, increases handling and treatment costs, and exposes waste workers and the public to health and

environmental risks. Mixed waste also reduces the economic value of recyclable materials and contributes to rapid filling of disposal sites.

Effective waste segregation requires a combination of public awareness, supportive infrastructure, clear regulatory frameworks, and consistent enforcement. Kimilili Municipality therefore recognizes source segregation as a foundational requirement for achieving integrated solid waste management and promoting a circular economy.

Kimilili Municipality shall implement a standardized color-coded waste segregation system to support separation of waste at source. The use of clearly labelled bins improves recycling efficiency, reduces contamination of recyclable materials, and supports safe waste handling.

The municipality shall promote segregation of waste into at least three main categories: biodegradable (organic) waste, recyclable waste, and residual or hazardous waste. This system shall be gradually strengthened and expanded as capacity and infrastructure improve.

Figure 7 waste segregated bins

5.4.1 Institutionalization of Waste Segregation at Source

Institutionalizing waste segregation at source is essential for ensuring consistent and long-term compliance among households, businesses, and institutions. Voluntary segregation alone is often insufficient without clear guidelines, regulations, and monitoring mechanisms.

Kimilili Municipality shall therefore establish a formal framework for source segregation through policy, legal, and administrative measures.

Key interventions shall include:

- Development and adoption of municipal guidelines on waste segregation.
- Enactment and enforcement of bylaws requiring segregation at household, commercial, and institutional levels.
- Integration of segregation requirements into waste collection service agreements.
- Gradual introduction of compliance standards supported by sensitization programs.
- Establishment of reporting and monitoring mechanisms to assess compliance.
- Provision of incentives for compliant households and businesses.

These measures shall ensure that segregation becomes a standard practice rather than an optional activity.

5.4.2 Provision of Segregation Infrastructure and Facilities

Adequate infrastructure is necessary to support effective waste segregation. Without appropriate containers, storage systems, and collection facilities, households and businesses are unable to practice segregation even when they are willing to do so.

Kimilili Municipality shall therefore invest in the provision and improvement of segregation infrastructure at household, community, and institutional levels.

This shall include:

- Procurement and distribution of color-coded bins and bags in accordance with national standards.
- Installation of segregated waste containers in markets, bus parks, schools, health facilities, and public spaces.
- Construction of designated sorting and storage areas in markets and commercial centers.
- Establishment of neighborhood-level collection and sorting points where necessary.
- Promotion of affordable household-level waste storage systems.
- Provision of specialized containers for hazardous and special wastes.

These facilities shall be designed to be user-friendly, durable, and easily accessible.

5.4.3 Capacity Building and Public Training on Waste Segregation

Effective waste segregation depends on knowledge, skills, and sustained behavioral change among waste generators and service providers. Many residents and businesses lack adequate information on how to segregate waste correctly and why it is important.

The municipality shall therefore implement comprehensive capacity-building and training programs on waste segregation.

Key activities shall include:

- Training of community leaders, ward administrators, and enforcement officers.

- Organization of household-level demonstrations and sensitization sessions.
- Development of training manuals, posters, and instructional materials.
- Establishment of ward-level waste management champions.
- Support for peer learning and community-led initiatives.
- Continuous refresher training for waste collection staff.

These initiatives shall promote correct segregation practices and improve overall compliance.

5.4.4 Integration of Segregation into Collection and Transportation Systems

Waste segregation can only be effective if collection and transportation systems are designed to maintain separation of waste streams. Mixing segregated waste during collection undermines public confidence and discourages participation.

Kimilili Municipality shall therefore align its collection and transportation systems with segregation requirements.

This shall be achieved through:

- Introduction of separate collection schedules for different waste streams.
- Deployment of specialized or compartmentalized collection vehicles.
- Designation of specific collection days for recyclables and hazardous waste.
- Training of collection crews on handling segregated waste.
- Monitoring of collection practices to prevent re-mixing.
- Development of operational guidelines for segregated waste handling.

These measures shall ensure that segregation efforts at source are preserved throughout the waste management chain.

5.4.6 Enforcement, Monitoring, and Incentives for Segregation Compliance

Sustained compliance with waste segregation requirements requires consistent monitoring, enforcement, and motivation. Weak enforcement and lack of accountability often lead to low compliance levels.

Kimilili Municipality shall therefore strengthen its regulatory and incentive mechanisms to support segregation.

Key measures shall include:

- Regular inspections of households, businesses, and institutions.
- Issuance of warnings and penalties for non-compliance.
- Introduction of recognition and reward schemes for compliant entities.
- Public disclosure of good practices and model neighborhoods.
- Establishment of community reporting and feedback mechanisms.

- Integration of segregation performance into service provider evaluations.

These measures shall promote accountability and encourage widespread adoption of segregation practices.

5.4.7 Special Arrangements for Hazardous and Special Wastes

Certain waste streams, such as medical waste, electronic waste, batteries, chemicals, and sanitary waste, require special handling due to their potential health and environmental risks. Mixing such waste with general municipal waste poses serious hazards.

Kimilili Municipality shall therefore establish specialized systems for managing hazardous and special wastes.

This shall include:

- Development of specific guidelines for hazardous and special waste handling.
- Designation of licensed collection and treatment service providers.
- Provision of specialized containers and storage facilities.
- Training of generators and handlers on safe management practices.
- Collaboration with relevant regulatory agencies.
- Public awareness on proper disposal of special wastes.

These arrangements shall ensure safe and environmentally sound management of high-risk waste streams.

5.5 Waste Collection Systems

Efficient and reliable waste collection systems are essential for maintaining public health, environmental quality, and urban cleanliness in Kimilili Municipality. Waste collection represents the most visible component of the solid waste management system and has a direct influence on public perception, community participation, and overall system effectiveness.

The situational analysis indicates that waste collection services in Kimilili Municipality are characterized by limited coverage, inadequate equipment, irregular collection schedules, and insufficient coordination between municipal and private service providers. In some areas, particularly high-density residential zones and informal settlements, waste collection services are inadequate or absent, leading to illegal dumping, open burning, and environmental pollution.

Inadequate collection systems also undermine efforts in waste segregation and recycling, as uncollected or poorly handled waste often becomes mixed and contaminated. Strengthening waste collection systems is therefore a priority intervention for improving the overall performance of the municipal waste management system.

Kimilili Municipality shall establish an integrated, efficient, inclusive, and customer-oriented waste collection system that ensures equitable service delivery across all wards and promotes compliance with waste management standards.

5.5.1 Expansion and Improvement of Door-to-Door Collection Services

Door-to-door waste collection provides the most convenient and hygienic method of waste removal, particularly in residential and commercial areas. It reduces littering, minimizes illegal dumping, and encourages households and businesses to participate in segregation and recycling programs.

The municipality shall gradually expand and improve door-to-door collection services in all residential and commercial areas, with particular focus on high-density settlements and market centers.

Key interventions shall include:

- Mapping of residential and commercial areas to identify service gaps.
- Development of standardized service delivery guidelines.
- Licensing and regulation of private and community-based collectors.
- Establishment of service contracts with clear performance targets.
- Introduction of complaint-handling and customer feedback mechanisms.
- Promotion of affordable and equitable service fees.

These measures shall improve coverage, reliability, and accountability in service provision.

5.5.2 Development of Communal and Transfer Collection Facilities

In areas where door-to-door collection is not technically or economically feasible, communal collection systems provide an important alternative. Such systems are particularly relevant in densely populated neighborhoods, informal settlements, and peri-urban areas.

Kimilili Municipality shall therefore develop and upgrade communal waste collection and transfer facilities.

This shall include:

- Construction of permanent and well-designed waste collection bays.
- Installation of covered, secured, and clearly labeled skip containers.
- Provision of lighting, fencing, and drainage systems at collection sites.
- Assignment of caretakers and supervisors for major collection points.
- Regular cleaning, disinfection, and maintenance of facilities.
- Development of small-scale transfer stations where necessary.

These facilities shall be strategically located to ensure accessibility, safety, and environmental protection.

5.5.3 Optimization of Collection Routes, Schedules, and Zoning

Efficient routing and scheduling of collection vehicles are essential for reducing operational costs, minimizing fuel consumption, and improving service reliability. Poorly planned routes and irregular schedules lead to service delays, equipment wear, and increased expenses.

Kimilili Municipality shall optimize its collection operations through systematic planning and use of appropriate management tools.

Key measures shall include:

- Division of the municipality into defined collection zones.
- Development of ward-specific collection schedules.
- Conducting route optimization studies.
- Introduction of digital route planning and monitoring systems.
- Public dissemination of collection calendars.
- Periodic review and adjustment of routes and schedules.

These measures shall enhance efficiency, transparency, and service predictability.

5.5.4 Integration of Private Sector and Community-Based Service Providers

Private operators, youth groups, women groups, and community-based organizations play an important role in supplementing municipal waste collection services. Their involvement enhances coverage, creates employment opportunities, and promotes community ownership.

Kimilili Municipality shall strengthen partnerships with non-municipal service providers through clear regulatory and support frameworks.

This shall be achieved through:

- Registration and licensing of service providers.
- Development of standard operating procedures.
- Provision of technical and managerial training.
- Facilitation of access to equipment and financing.
- Establishment of performance monitoring systems.
- Promotion of cooperative and franchising models.

These arrangements shall promote professionalism, accountability, and sustainability among service providers.

5.5.5 Occupational Health, Safety, and Welfare of Collection Workers

Waste collection workers are exposed to various occupational hazards, including sharp objects, hazardous substances, disease-causing organisms, and traffic risks. Protecting their health and safety is essential for ensuring reliable service delivery and compliance with labor standards.

Kimilili Municipality shall prioritize the welfare and safety of waste collection personnel.

Key interventions shall include:

- Provision of personal protective equipment (PPE) such as gloves, boots, masks, and reflective clothing.
- Regular medical examinations and vaccinations.
- Training on safe handling of waste and emergency procedures.
- Enforcement of occupational safety standards.
- Provision of insurance and social protection schemes.
- Establishment of grievance and support mechanisms.

These measures shall improve working conditions and staff morale.

5.5.6 Community Participation and Accountability in Collection Services

Active community participation is essential for the success of waste collection systems. Communities play a critical role in proper waste storage, timely presentation of waste for collection, and monitoring of service quality.

Kimilili Municipality shall promote community involvement and accountability in waste collection.

This shall include:

- Establishment of ward-level waste management committees.
- Promotion of community monitoring and reporting systems.
- Regular public forums and stakeholder consultations.
- Dissemination of service information and performance reports.
- Engagement of community leaders in enforcement and sensitization.
- Support for neighborhood cleanliness initiatives.

These measures shall strengthen trust, cooperation, and service effectiveness.

5.6 Waste Transportation Infrastructure

Efficient and reliable waste transportation infrastructure is a critical link between waste collection, treatment, and final disposal in Kimilili Municipality. Transportation systems ensure that collected waste is safely and promptly transferred from collection points and transfer stations to recycling facilities, treatment plants, and disposal sites. Poorly developed transportation systems lead to waste accumulation, environmental pollution, increased operational costs, and reduced public confidence in waste management services.

The situational analysis indicates that waste transportation in Kimilili Municipality is constrained by limited availability of appropriate vehicles, frequent equipment breakdowns, inadequate maintenance systems, and insufficient logistical planning. In some cases, waste is transported using open or poorly sealed vehicles, resulting in littering, leachate leakage, unpleasant odors, and public health risks along transportation routes. As an initial priority intervention, the municipality shall develop one municipal waste transfer station to improve transport efficiency and reduce long-distance haulage costs.

Inefficient transportation systems also undermine efforts in waste segregation and recycling, as mixed transportation often leads to contamination of separated waste streams. Strengthening transportation infrastructure is therefore essential for improving service reliability, protecting the environment, and supporting integrated solid waste management.

Kimilili Municipality shall develop a modern, well-managed, and environmentally sound waste transportation system that supports segregated waste handling, minimizes environmental impacts, and enhances operational efficiency.

Figure 8 well designed vehicle for solid waste transportation in Denmark

5.6.1 Assessment, Planning, and Optimization of Transportation Needs

Effective waste transportation requires systematic planning based on accurate data on waste generation, collection coverage, distances to treatment and disposal sites, and available resources.

The municipality shall therefore conduct regular assessments to determine transportation requirements and optimize operations.

Key interventions shall include:

- Periodic evaluation of waste volumes and transport demand.
- Assessment of existing vehicle capacity and utilization rates.
- Analysis of travel distances and travel times.
- Identification of infrastructure gaps and priority investment areas.
- Development of medium- and long-term transportation plans.
- Integration of transportation planning with collection and disposal strategies.

These measures shall ensure that transportation systems are responsive to changing needs.

5.6.2 Development and Management of Waste Transportation Fleet

A reliable and well-maintained fleet is essential for effective waste transportation. Inadequate or poorly maintained vehicles result in service interruptions, high maintenance costs, and safety risks.

Kimilili Municipality shall strengthen its waste transportation fleet through planned investments and improved management practices.

This shall include:

- Procurement of modern, closed-body and leak-proof waste transport vehicles.
- Introduction of compartmentalized or specialized vehicles for segregated waste.
- Gradual replacement of obsolete and inefficient equipment.
- Establishment of centralized fleet management systems.
- Implementation of preventive maintenance schedules.
- Development of vehicle replacement and upgrading plans.

These measures shall improve reliability and reduce operational downtime.

5.6.3 Maintenance, Repair, and Asset Management Systems

Sustainable transportation systems require effective maintenance and asset management to extend the lifespan of equipment and minimize costs.

Kimilili Municipality shall establish structured maintenance and asset management systems for waste transportation infrastructure.

Key interventions shall include:

- Establishment or strengthening of municipal workshops.
- Training of technical staff on vehicle maintenance and repair.
- Development of maintenance manuals and schedules.
- Use of computerized maintenance management systems where feasible.
- Maintenance of spare parts inventories.
- Regular inspection and condition assessment of vehicles.

These systems shall enhance equipment performance and reduce long-term costs.

5.6.4 Occupational Health, Safety, and Environmental Protection in Transportation

Waste transportation activities expose workers and the public to various risks, including traffic accidents, exposure to hazardous waste, and environmental pollution. Ensuring safety and environmental protection is therefore a key priority.

The municipality shall implement comprehensive safety and environmental management measures in transportation operations.

This shall include:

- Provision of appropriate personal protective equipment to drivers and loaders.
- Training on defensive driving and safe waste handling.
- Enforcement of speed limits and traffic regulations.
- Prevention of overloading and spillage.
- Regular cleaning and disinfection of vehicles.
- Emergency response procedures for accidents and spills.

These measures shall minimize health, safety, and environmental risks.

5.6.5 Integration of Transfer Stations and Intermediate Facilities

Transfer stations and intermediate facilities play an important role in reducing transportation costs and improving operational efficiency, particularly where disposal sites are located far from waste generation areas.

Kimilili Municipality shall assess the feasibility of establishing transfer stations and related infrastructure.

Key actions shall include:

- Identification of suitable locations for transfer facilities.
- Design and construction of environmentally sound transfer stations.
- Provision of compactors and loading equipment.
- Development of operational guidelines.
- Integration of transfer stations into routing plans.
- Monitoring of environmental and social impacts.

These facilities shall enhance system efficiency and reduce vehicle travel distances.

5.6.6 Use of Information and Communication Technology in Transportation Management

Modern waste transportation systems benefit from the use of digital tools and information systems for monitoring, coordination, and performance management.

Kimilili Municipality shall gradually introduce information and communication technology in transportation management.

This shall include:

- Installation of vehicle tracking systems.
- Use of digital logbooks and reporting tools.
- Monitoring of fuel consumption and vehicle utilization.
- Integration of transportation data with municipal management systems.
- Development of performance dashboards.
- Training of staff on data management.

These tools shall enhance transparency, accountability, and decision-making.

5.7 Recycling and Resource Recovery

Recycling and resource recovery form a key component of sustainable solid waste management in Kimilili Municipality. Resource recovery reduces the volume of waste sent to disposal sites, conserves natural resources, creates employment opportunities, and supports the transition towards a circular economy.

Currently, recycling activities within Kimilili Municipality are largely informal and small-scale, mainly undertaken by waste pickers, youth groups, and small traders who recover materials such as plastics, scrap metals, paper, and glass. These materials are typically sold to middlemen or transported to recycling facilities outside the municipality. Despite these efforts, recycling levels remain low due to lack of segregation at source, limited infrastructure, and weak market linkages.

Kimilili Municipality shall strengthen recycling and resource recovery systems through development of infrastructure, institutional support, and promotion of private sector

participation. The Material Recovery Facility and composting infrastructure shall be designed for modular expansion to accommodate increasing waste volumes and support achievement of long-term recycling and diversion targets.

5.7.1 Development of Material Recovery Facilities (MRFs)

The municipality shall promote establishment of Material Recovery Facilities to support sorting, storage, and processing of recyclable materials.

Key actions shall include:

- Identification and acquisition of land for MRF development
- Construction of basic sorting and storage infrastructure
- Provision of sorting equipment and protective gear
- Integration of informal waste pickers into formal recycling systems
- Establishment of partnerships with recycling companies

These facilities shall improve recovery rates, reduce contamination of recyclable materials, and improve efficiency in waste processing.

5.7.2 Strengthening Informal Sector Recycling

The informal sector plays a critical role in waste recovery within the municipality. The municipality shall support integration of informal waste collectors into formal waste management systems.

Key interventions shall include:

- Registration and organization of waste picker groups
- Provision of training on safe waste handling and sorting
- Provision of PPE and basic equipment
- Development of cooperative business models
- Facilitation of market linkages for recovered materials

5.7.3 Promotion of Recycling Enterprises and Green Jobs

The municipality shall promote development of recycling enterprises to support local economic growth and job creation.

This shall include:

- Promotion of plastic recycling enterprises
- Support for briquette production from organic residues
- Promotion of glass and metal recovery businesses
- Facilitation of access to financing for recycling entrepreneurs

- Promotion of youth and women participation in recycling value chains

5.7.4 Market Development for Recyclable Materials

Sustainable recycling requires stable markets for recovered materials. The municipality shall support development of local and regional recycling markets.

This shall be achieved through:

- Partnerships with recycling companies
- Promotion of recycled products in municipal procurement
- Support for waste-based product innovation
- Collaboration with county and national recycling programs

5.8 Composting and Organic Waste Management

Organic waste constitutes the largest proportion of solid waste generated in Kimilili Municipality, mainly originating from households, fresh produce markets, hotels, food kiosks, and agricultural activities. Effective management of organic waste is therefore critical for reducing the volume of waste sent to disposal sites, minimizing greenhouse gas emissions, and promoting sustainable agriculture.

Currently, organic waste management within the municipality is largely informal, with some households and farmers practicing small-scale composting. However, most organic waste is mixed with other waste streams and disposed of at dumping sites, leading to odor generation, vector breeding, and methane emissions.

Kimilili Municipality shall promote structured organic waste management systems through composting programs, infrastructure development, and community-based initiatives.

5.8.1 Establishment of Municipal and Community Composting Programs

The municipality shall promote establishment of composting facilities at municipal, market, and community levels to support processing of organic waste.

Key actions shall include:

- Identification and allocation of land for composting facilities
- Establishment of market-based composting sites
- Promotion of community and institutional composting initiatives
- Development of compost quality standards and guidelines
- Promotion of compost use in agriculture and landscaping

These initiatives shall reduce waste volumes at disposal sites and support soil fertility improvement in agricultural areas.

5.8.2 Promotion of Household and Institutional Composting

Households, schools, markets, and institutions generate significant quantities of organic waste that can be composted at source.

The municipality shall promote decentralized composting through:

- Public education and training on composting methods
- Promotion of low-cost composting technologies
- Demonstration projects in schools and public institutions
- Integration of composting in urban agriculture programs

5.8.3 Integration of Organic Waste Segregation with Composting Systems

Effective composting requires clean organic waste streams. The municipality shall strengthen segregation of biodegradable waste at source to support composting programs.

This shall include:

- Provision of color-coded bins for organic waste
- Separate collection schedules for organic waste
- Training of waste handlers on organic waste management
- Monitoring of organic waste quality

5.8.4 Promotion of Organic Waste Value Addition

Organic waste presents opportunities for value addition and green enterprise development. The municipality shall promote investment in organic waste value chains.

This shall include:

- Production of compost for agriculture and landscaping
- Promotion of briquette production from organic residues
- Exploration of biogas production for energy generation (where feasible)
- Support for youth and women groups in organic waste enterprises

5.9 Waste Disposal and Final Treatment

Waste disposal represents the final stage of the solid waste management chain and is critical for protecting public health, environmental quality, and long-term sustainability. In Kimilili Municipality, waste disposal remains a major challenge due to the absence of an engineered sanitary landfill and reliance on open dumping practices.

Currently, a significant proportion of waste generated within the municipality is disposed of at uncontrolled dumping sites or temporary disposal grounds. These disposal methods lack environmental safeguards such as leachate collection systems, landfill gas control systems, environmental monitoring mechanisms, and proper site management infrastructure. As a result, these practices contribute to groundwater contamination, air pollution, greenhouse gas emissions, and public health risks.

Kimilili Municipality shall progressively transition from open dumping to environmentally sound disposal systems that comply with national environmental standards and international best practices.

5.9.1 Improvement of Existing Disposal Sites

In the short term, the municipality shall improve management of existing disposal sites to minimize environmental and public health risks.

Key interventions shall include:

- Site fencing and controlled access
- Waste compaction and controlled tipping
- Regular soil cover application
- Stormwater drainage control around disposal sites
- Fire prevention and control measures
- Environmental monitoring of surrounding areas

5.9.2 Development of Sanitary Landfill Infrastructure

In the medium to long term, Kimilili Municipality shall develop or access a sanitary landfill facility that meets environmental and regulatory standards.

Key design components shall include:

- Engineered liner systems to prevent groundwater contamination
- Leachate collection and treatment systems
- Landfill gas (methane) collection and control systems
- Stormwater diversion systems
- Environmental monitoring boreholes
- Weighbridge and waste recording systems
- Security fencing and controlled entry points

Table 6 Comparison of Disposal Systems

Parameter	Open Dumping	Controlled Dumpsite	Sanitary Landfill
Environmental Protection	Very Low	Moderate	High
Leachate Control	None	Limited	Full System
Gas Management	None	Minimal	Engineered Gas Collection
Public Health Protection	Low	Moderate	High
Regulatory Compliance	Non-Compliant	Partial	Fully Compliant

5.9.3 Leachate and Landfill Gas Management

Effective management of leachate and landfill gas is critical for preventing environmental pollution and climate impacts.

The municipality shall promote:

- Installation of leachate collection pipes and storage ponds
- Treatment of leachate before discharge
- Methane gas venting or capture systems
- Exploration of landfill gas-to-energy opportunities (long-term)

5.9.4 Advanced Waste Treatment Technologies (Long-Term Option)

Subject to feasibility and financial viability, the municipality may explore advanced waste treatment technologies.

Potential options include:

- Waste-to-Energy (WtE) plants for residual waste
- Anaerobic digestion for organic waste
- Refuse Derived Fuel (RDF) production

Table 7 Advanced Treatment Technology Options

Technology	Suitable Waste Type	Key Benefit	Limitation
Waste-to-Energy	Mixed residual waste	Energy generation	High capital cost
Anaerobic Digestion	Organic waste	Biogas + fertilizer	Requires clean organic waste
RDF Production	Dry combustible waste	Fuel alternative	Requires segregation

5.9.5 Regional and Inter-County Disposal Collaboration

Where development of a standalone sanitary landfill is not immediately feasible, the municipality shall explore regional waste disposal partnerships with neighboring municipalities or county government facilities.

5.9.6 Closure and Rehabilitation of Old Dumpsites

The municipality shall progressively rehabilitate and close uncontrolled dumping sites.

Key actions shall include:

- Site stabilization and reshaping
- Soil cover and vegetation restoration
- Surface water drainage improvement
- Long-term environmental monitoring

CHAPTER 6

Institutional Capacity and Regulatory Framework

Effective solid waste management in Kimilili Municipality depends on strong institutional arrangements, clear governance structures, adequate technical and human resource capacity, and strict adherence to environmental and public health regulatory requirements. Solid waste management is a cross-sectoral function that intersects with environmental protection, public health management, urban planning, infrastructure development, and socio-economic development.

With increasing population growth, urban expansion, and changing consumption patterns, the demand for waste management services in Kimilili Municipality is expected to increase significantly. Without strong institutional coordination and enforcement mechanisms, waste management challenges may result in environmental degradation, increased public health risks, and reduced service efficiency.

Kimilili Municipality shall therefore strengthen institutional coordination, enhance technical capacity, improve regulatory enforcement, and establish effective monitoring and reporting systems to support sustainable solid waste management.

6.1 Governance and Institutional Structure

Solid waste management governance in Kimilili Municipality operates within Kenya's devolved governance framework established under the Constitution of Kenya, 2010. Waste management functions are assigned to County Governments but operationalized at municipal level.

At the national level, environmental policy, environmental standards, and regulatory oversight are provided by national institutions, particularly the National Environment Management Authority (NEMA). At the county level, Bungoma County Government provides policy direction, financial resources, technical oversight, and infrastructure development support.

At the municipal level, the Kimilili Municipality is responsible for planning, coordination, supervision, and monitoring of waste management services. Operational service delivery is supported through collaboration with private service providers, community organizations, and development partners.

6.2 Institutional Roles and Functional Responsibilities

Effective waste management requires clearly defined institutional roles supported by operational procedures and accountability mechanisms.

Table 8 Institutional Roles and Responsibilities

Institution	Strategic Role	Operational Role	Accountability Role
Bungoma County Government	Policy, budgeting, infrastructure investment	Technical oversight	Performance oversight
Kimilili Municipality	Planning and coordination	Service supervision	Reporting to County
Environment Department	Technical implementation	Monitoring and reporting	Compliance tracking
Public Health Department	Public health regulation	Sanitation inspections	Health compliance enforcement
NEMA	Environmental regulation	Licensing and audits	Environmental compliance
Private Sector	Service delivery	Waste collection and recycling	Contract compliance
Community Groups	Community mobilization	Waste recovery and awareness	Community monitoring

6.3 Legal and Policy Framework

Solid waste management in Kimilili Municipality shall be implemented in accordance with national constitutional provisions, environmental legislation, waste management laws, public health legislation, urban governance statutes, and county policy frameworks.

The legal framework provides authority for waste management implementation, defines regulatory standards, and establishes enforcement mechanisms.

6.3.1 Constitution of Kenya, 2010

The Constitution provides the supreme legal foundation for environmental protection and waste management service delivery.

Article 42 guarantees every person the right to a clean and healthy environment. This creates a legal obligation for government institutions, including municipalities, to ensure waste management practices protect environmental quality and public health.

Article 69 requires sustainable management of environmental resources and elimination of environmentally harmful practices such as uncontrolled waste dumping and open burning.

The Fourth Schedule assigns waste management functions to County Governments, providing the legal basis for Bungoma County and Kimilili Municipality to implement waste management services.

6.3.2 Environmental Management and Coordination Act (EMCA)

EMCA provides the principal legal framework for environmental management in Kenya and establishes NEMA as the national environmental regulatory authority.

Under EMCA:

- Waste facilities must undergo Environmental Impact Assessment before development
- Waste facilities must undergo Environmental Audits during operation
- Waste transportation must meet environmental safety standards
- Hazardous waste must be managed through licensed systems

Table 9 ***EMCA Compliance Requirements for Waste Management***

Compliance Area	Requirement	Responsible Institution
New Waste Facilities	Environmental Impact Assessment	Municipality / NEMA
Existing Facilities	Environmental Audit	Municipality / NEMA
Waste Transport	Licensing and compliance	Service Providers / NEMA
Hazardous Waste	Special licensing and handling	Municipality / NEMA

6.3.3 Sustainable Waste Management Act, 2022

The Sustainable Waste Management Act provides a comprehensive legal framework for integrated waste management in Kenya. The Act promotes waste minimization, waste segregation at source, recycling, resource recovery, and environmentally sound disposal.

The Act also promotes extended producer responsibility, private sector participation, and public participation in waste management. Kimilili Municipality shall align its waste management systems with the provisions of this Act.

Table 10 ***Sustainable Waste Management Act — Municipal Obligations***

Legal Requirement	Municipal Action
Waste Segregation	Introduce source segregation programs
Waste Reduction	Promote reuse and waste minimization
Recycling Promotion	Support recycling enterprises
Circular Economy	Promote resource recovery systems

6.3.4 Environmental Management and Coordination (Waste Management) Regulations of 2006

This regulation defines "waste" includes any matter prescribed to waste and any matter whether liquid, solid, gaseous or radioactive, which is discharged, emitted or deposited in the

environment in such volume composition or manner likely to cause an alteration of the environment.

Part IV - The Environmental Impact Assessment Study Report, 18. (1)A proponent shall submit to the Authority, an environmental content of impact assessment study report incorporating but not limited to the environmental following information - (f) the products, byproducts and waste generated project;

Part V - Environmental Audit and Monitoring 36, (2) an environmental audit report compiled under these Regulations shall contain - (b) an indication of the various materials, including non-manufactured materials, the final products, and by products, and waste generated.

6.3.5 Public Health Act

The Public Health Act Revised Edition 2012, Part 126. Rules under Part, The Minister, on the advice of the board, may make rules and may confer powers and impose duties in connation with the carrying out and enforcement thereof on local authorities, magistrates, owners and others as to—(d) the drainage of land, streets or premises, the disposal of offensive liquids and the removal and disposal of rubbish, refuse, manure and waste matters.

Section 118 - What constitutes nuisance-1. The following shall be deemed to be nuisances liable to be dealt with in the manner provided in this;

Part—(c) any street, road or any part thereof, any stream, pool, ditch, gutter, watercourse, sink, water-tank, cistern, water-closet, earth-closet, privy, urinal, cesspool, soak-away pit, septic tank, cesspit, soil-pipe, waste-pipe, drain, sewer, garbage receptacle, dust-bin, dungpit, refuse- pit, slop-tank, ash-pit or manure heap so foul or in such a state or so situated or constructed as in the opinion of the medical officer of health to be offensive or to be injurious or dangerous to health.

Part (e) states that any noxious matter, or waste water, flowing or discharged from any premises, wherever situated, into any public street, or into the gutter or side channel of any street, or into any or watercourse, irrigation channel or bed thereof not approved for the reception of such discharge constitutes to be a nuisance.

Section 126 - Rules under Part, The Minister, on the advice of the board, may make rules and may confer powers and impose duties in connection with the carrying out and enforcement thereof on local authorities, magistrates, owners and others as to—**part (d)** the drainage of land, streets or premises, the disposal of offensive liquids and the removal and disposal of rubbish, refuse, manure and waste matter

6.3.6 Urban Areas and Cities Act

The Urban Areas and Cities Act provide the legal framework for governance, management, and service delivery within urban areas in Kenya, including municipalities such as Kimilili. The Act establishes Municipal Boards and assigns responsibility for planning, coordination, and delivery of municipal services, including solid waste management.

Under the Act, municipalities are required to ensure efficient delivery of urban services, including environmental sanitation, waste management, drainage maintenance, and environmental protection. The Act also emphasizes public participation, accountability, financial sustainability, and performance-based service delivery.

For Kimilili Municipality, the Act provides the legal authority for the Municipal Board to coordinate and supervise solid waste management planning and service delivery within the municipality.

Operational Implications for Kimilili Municipality

The Urban Areas and Cities Act require the municipality to:

- Develop municipal solid waste management plans
- Ensure service delivery standards are met
- Supervise waste service providers
- Ensure public participation in service planning
- Monitor service performance and report to the County Government
- Ensure financial accountability in service delivery

6.3.7 County Government Act and County Policies

The County Government Act provides the legal framework for governance, planning, service delivery, and public administration at the county level. The Act defines how counties plan development, allocate resources, coordinate service delivery, and implement sectoral programs such as waste management.

The Act requires counties to prepare development plans such as the County Integrated Development Plan (CIDP), which guides infrastructure development, environmental management, and service delivery investments.

For Kimilili Municipality, the County Government Act provides the legal framework for funding, planning alignment, inter-department coordination, and oversight of waste management services.

Operational Implications for Kimilili Municipality

The County Government Act requires:

- Integration of municipal SWM plans into county development plans
- County budget allocation for waste infrastructure and services
- Inter-departmental coordination in waste management
- Public participation in service planning and budgeting
- Performance monitoring of municipal services

Table 11 legal framework application summary

Law	Key Focus	Application in Kimilili SWM
Constitution	Environmental rights	Waste service provision
EMCA	Environmental protection	Facility licensing and monitoring
SWM Act 2022	Integrated waste management	Segregation, recycling programs
Public Health Act	Sanitation	Waste storage and handling enforcement
Urban Areas Act	Municipal governance	Service delivery coordination

6.4 Regulatory Enforcement and Compliance Systems

Effective enforcement of solid waste management laws and regulations is critical for protecting public health, preventing environmental pollution, and ensuring compliance with national and county waste management standards. Regulatory enforcement ensures that all waste generators, service providers, and waste facility operators comply with legal and environmental requirements.

In Kimilili Municipality, regulatory enforcement is implemented through coordinated action between the Municipal Board, County Environment Department, Public Health Department, and National Environment Management Authority (NEMA).

Weak enforcement of waste regulations may lead to illegal dumping, environmental contamination, public health risks, and increased operational costs for the municipality. The municipality shall therefore strengthen inspection systems, enforcement procedures, compliance monitoring, and legal action mechanisms.

6.4.1 Regulatory Enforcement Institutional Roles

Regulatory enforcement of solid waste management in Kimilili Municipality is implemented through a multi-agency approach involving municipal authorities, county technical departments, and national environmental regulators. Effective enforcement requires clear definition of mandates, coordination mechanisms, and operational communication channels between these institutions.

The Municipal Board is responsible for overall enforcement coordination within the municipality. This includes ensuring that waste management bylaws are implemented, coordinating inspection programs, and supervising enforcement officers.

The Municipal Environment Department is responsible for day-to-day regulatory enforcement activities including routine inspection of waste facilities, monitoring waste service providers, investigating illegal dumping cases, and maintaining enforcement records.

The Public Health Department plays a critical role in enforcing sanitation standards and preventing public health risks associated with poor waste management. Public Health Officers are legally empowered to inspect premises, issue compliance notices, and enforce sanitation requirements under the Public Health Act.

The National Environment Management Authority (NEMA) provides national-level environmental regulatory oversight. NEMA is responsible for licensing waste facilities, conducting environmental audits, and enforcing environmental compliance requirements under EMCA.

The County Government provides policy oversight, resource allocation, and enforcement support, particularly for large-scale violations and environmental compliance matters requiring multi-agency coordination.

Table 12 ***Detailed Enforcement Mandate Allocation***

Institution	Legal Authority	Operational Enforcement Role	Enforcement Tools
Municipality	Municipal By-laws	Inspections, enforcement notices	Fines, service restrictions
Public Health	Public Health Act	Sanitation enforcement	Closure notices, sanitation orders
NEMA	EMCA	Environmental compliance	Licenses, environmental penalties
County Government	County Laws	Oversight and support	Policy enforcement directives

6.4.2 Regulatory Compliance Monitoring Process

The regulatory compliance monitoring process is designed to ensure that all waste management activities within Kimilili Municipality comply with environmental, public health, and municipal regulatory requirements.

Compliance monitoring shall be conducted through planned inspections, complaint-based investigations, environmental monitoring, and compliance reporting. The municipality shall adopt a risk-based inspection approach where high-risk waste generators and facilities are inspected more frequently.

Inspection activities shall include verification of waste storage standards, waste segregation practices, waste transportation compliance, facility environmental compliance, and occupational health and safety standards.

All inspection activities shall be documented through standardized inspection checklists and digital record systems where available. Non-compliance cases shall be recorded and tracked until corrective actions are completed.

Table 13 ***Compliance Monitoring Cycle***

Stage	Activity	Output
Planning	Identify high-risk waste generators	Inspection schedule
Inspection	Conduct site inspections	Inspection reports
Compliance Review	Assess compliance status	Compliance rating
Enforcement	Issue corrective notices	Compliance directives
Follow-Up	Verify corrective actions	Compliance clearance

6.4.3 Waste Service Provider Licensing and Regulation

Licensing and regulation of waste service providers is essential for ensuring service quality, environmental protection, and public health safety. All waste collection companies, recyclers, waste transporters, and waste treatment operators must comply with licensing and operational standards before operating within the municipality.

Service providers must obtain necessary environmental licenses from NEMA and operational approvals from the municipality. Licensing requirements shall include proof of technical capacity, environmental compliance, staff training, vehicle compliance, and occupational safety measures.

The municipality shall maintain an updated register of licensed waste service providers and conduct regular compliance audits to ensure adherence to license conditions.

Table 14 ***Waste Service Provider Licensing Requirements***

Requirement	Verification Method
NEMA Environmental License	License certificate verification
Vehicle Compliance	Physical vehicle inspection
Staff Training	Training certification review
PPE Availability	Field inspection
Service Contract Compliance	Contract performance review

6.4.5 Penalties and Corrective Enforcement Measures

Penalties and corrective enforcement measures are necessary to deter non-compliance and ensure adherence to waste management standards. Enforcement actions shall be proportional to the severity and frequency of violations.

Minor violations shall be addressed through compliance notices and corrective orders. Repeated violations may attract financial penalties, service suspension, or legal prosecution. Serious environmental violations may trigger enforcement action by NEMA including facility closure or environmental restoration orders.

The municipality shall adopt progressive enforcement where education and compliance support are provided before penalties are applied, except in cases of serious environmental or public health risk.

Table 15 ***Enforcement Escalation Framework***

Violation Level	**Enforcement Action**
Minor	Warning and compliance notice
Moderate	Financial penalty and compliance timeline
Major	Service suspension or prosecution
Severe Environmental Risk	NEMA enforcement and legal action

CHAPTER 7

Public Education, Awareness and Stakeholder Engagement

7.1 Introduction

Effective solid waste management in Kimilili Municipality requires coordinated participation of multiple stakeholders involved in waste generation, collection, transportation, recycling, regulation, and environmental health protection. Sustainable waste management cannot be achieved by a single institution and therefore requires collaboration between government departments, private sector actors, community groups, and the public.

Within Kimilili Municipality, the **Department of Environment and Public Health** plays a central operational role in planning, regulating, supervising, and monitoring waste management activities. The department works in collaboration with county institutions, national regulatory agencies, private waste service providers, and the community to ensure safe and environmentally sound waste management practices.

This chapter identifies key stakeholders and outlines their roles, responsibilities, and engagement mechanisms in implementation of the Solid Waste Management Plan.

7.2 Key Stakeholders in Solid Waste Management

Solid waste management in Kimilili Municipality involves stakeholders across the entire waste management value chain including waste generation, service delivery, regulation, environmental protection, and community participation.

Key stakeholders include:

- Bungoma County Government
- Kimilili Municipal Board
- Department of Environment and Public Health (Kimilili Municipality)
- National Environment Management Authority (NEMA)
- Private waste collection and transport service providers
- Recycling and waste recovery enterprises
- Community-based organizations (CBOs)
- Youth and women groups
- Households and residents
- Markets and commercial establishments
- Institutions such as schools, health facilities, and offices
- Development partners and non-governmental organizations

7.3 Stakeholder Roles and Responsibilities

Table 16 Stakeholder Roles in Solid Waste Management

Stakeholder	Key Roles and Responsibilities
Bungoma County Government	Policy direction, funding allocation, infrastructure investment, oversight of municipal service delivery
Kimilili Municipal	Planning and coordination of municipal waste services, supervision of implementation, enforcement of municipal waste regulations
Department of Environment and Public Health	Operational management of waste services, environmental monitoring, sanitation enforcement, inspections, public health protection, awareness programs
National Environment Management Authority (NEMA)	Environmental regulation, licensing of waste facilities, compliance monitoring, environmental audits
Private Waste Service Providers	Waste collection, transportation, recycling, and service delivery under contractual arrangements
Recycling Enterprises	Material recovery, recycling, and resource recovery operations
Community-Based Organizations (CBOs)	Community mobilization, awareness creation, local waste management initiatives
Youth and Women Groups	Participation in waste collection, recycling activities, and public education
Households and Residents	Waste segregation at source, proper waste storage, compliance with municipal regulations
Markets and Commercial Establishments	Proper handling and segregation of commercial waste, participation in waste service programs
Institutions (Schools, Health Facilities, Offices)	Institutional waste management and compliance with sanitation standards
Development Partners / NGOs	Technical support, capacity building, financial and programmatic support

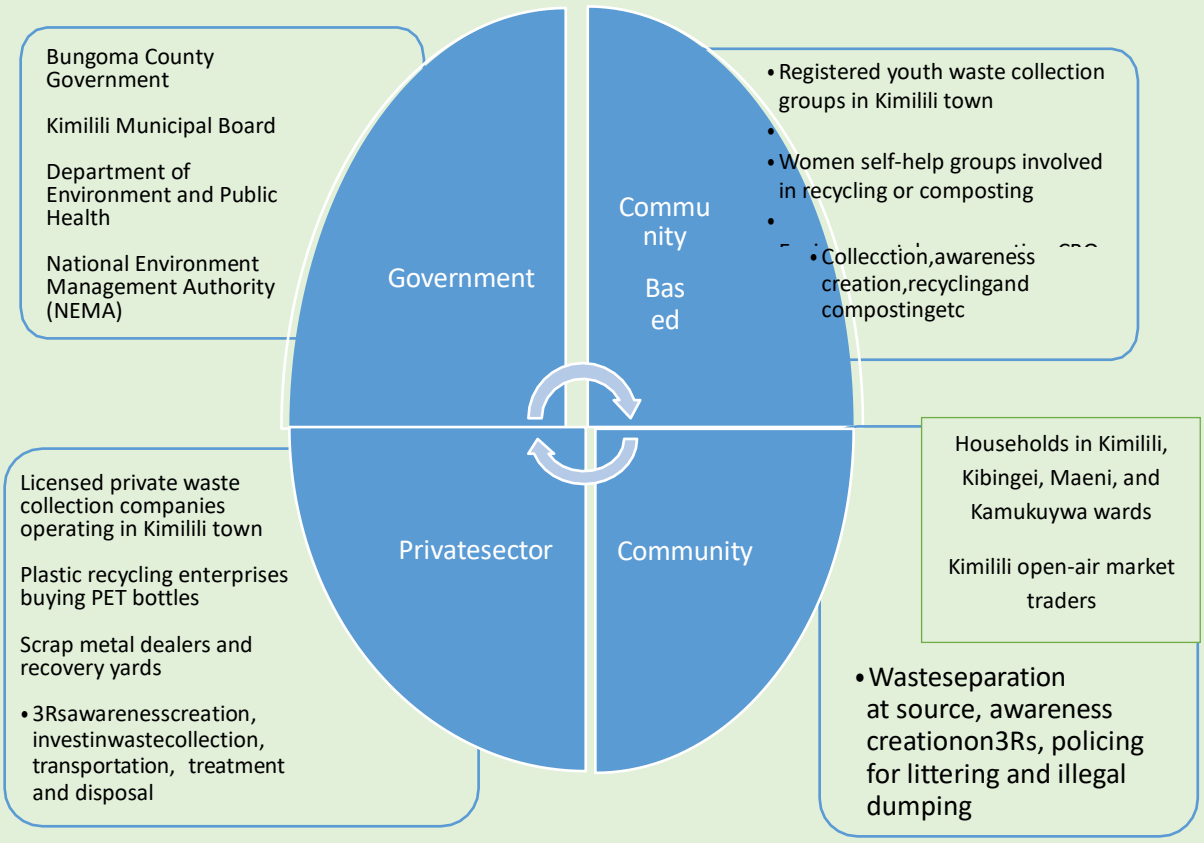


Figure 9 stakeholders of waste management within the municipality

7.4 Stakeholder Engagement Mechanisms

The municipality shall implement structured stakeholder engagement mechanisms to enhance coordination, participation, and accountability in waste management service delivery.

Key engagement mechanisms shall include:

- Public awareness and environmental education programs
- Community consultation and participation forums
- Stakeholder coordination meetings led by the Department of Environment and Public Health
- Public feedback and complaint reporting systems
- Public-private partnerships for service delivery
- Collaboration with community groups in recycling and waste recovery programs

These mechanisms will support transparency, improve service effectiveness, and strengthen shared responsibility for waste management.

7.5 Community Participation and Public Awareness

Community participation is essential for achieving effective waste segregation, reducing illegal dumping, and supporting recycling initiatives. The municipality shall promote active public involvement through environmental education campaigns, community outreach programs, and behavior change initiatives.

Residents shall be encouraged to adopt responsible waste management practices including waste minimization, segregation at source, and compliance with municipal waste regulations. The Department of Environment and Public Health shall coordinate continuous awareness programs to strengthen public participation in sustainable waste management.

7.6 Institutional Coordination

Effective implementation of the Solid Waste Management Plan requires coordination among municipal departments, county government institutions, national regulatory agencies, and service providers.

The Department of Environment and Public Health shall serve as the primary coordinating unit for operational waste management activities, working closely with the Municipal Board and relevant stakeholders to ensure integrated planning, monitoring, and enforcement.

CHAPTER 8

Financial Strategy

Financial sustainability is a fundamental requirement for the successful implementation, operation, and long-term performance of the Solid Waste Management Plan for Kimilili Municipality. This financial strategy operationalizes the infrastructure investments, service delivery systems, and institutional arrangements defined in the preceding chapters of the Solid Waste Management Plan.Effective solid waste management systems require sustained investment in infrastructure, operational resources, institutional capacity, environmental compliance, and continuous service delivery.

Kimilili Municipality is experiencing increasing waste generation driven by population growth, urban expansion, commercial development, and changing consumption patterns. These trends are placing growing pressure on waste collection, transportation, treatment, and disposal systems. Without adequate and predictable financial resources, the municipality will not be able to expand service coverage, invest in modern infrastructure, or meet environmental and public health standards.

This Financial Strategy establishes a structured and program-based financing framework to support implementation of the Solid Waste Management Plan over short-, medium-, and long-term time horizons. The strategy is designed to ensure financial viability, improve cost recovery, attract development financing, and support private sector participation in waste management service delivery.

The financial framework adopts the following guiding principles:

1. Financial sustainability and long-term service continuity.
2. Cost recovery and efficient resource utilization.
3. Program-based budgeting aligned with service delivery functions.
4. Investment prioritization and phased infrastructure development
5. Diversification of financing sources
6. Transparency, accountability, and financial governance
7. Private sector participation and partnership financing
8. Alignment with national policy, county planning, and development partner financing frameworks

The municipality shall adopt a diversified financing model that combines public sector funding, user-based cost recovery, development partner support, and private sector investment. This approach will reduce dependence on a single funding source while improving resilience of the municipal waste management system.

The financial strategy is structured around clearly defined waste management service programs. Each program represents a functional component of the municipal solid waste management system with defined investment needs, operational requirements, and financing arrangements. This program-based approach strengthens budget transparency, improves expenditure tracking, supports performance monitoring, and enhances eligibility for development partner financing.

The financial framework also integrates capital investment planning, operational expenditure management, revenue generation, financial risk management, and long-term investment sustainability. Financing arrangements are aligned with the phased implementation of infrastructure and service expansion to ensure efficient allocation of financial resources over time.

Through this structured approach, Kimilili Municipality aims to establish a financially sustainable, investment-ready, and donor-responsive solid waste management system capable of supporting inclusive urban development, environmental protection, and climate resilience.

8.1 Program-Based Budget Framework

Kimilili Municipality shall implement the Solid Waste Management Plan using a program-based budgeting approach. Program-based budgeting links financial resources directly to service delivery functions, infrastructure development, and operational performance. This approach strengthens financial planning, enhances accountability, improves expenditure tracking, and supports performance-based management of municipal waste services.

Under this framework, all solid waste management activities are organized into defined service programs representing the functional components of the integrated waste management system. Each program has clearly defined objectives, activities, investment requirements, operational costs, and expected outputs. Financial allocations shall be planned, approved, and monitored at program level.

The program-based budgeting system supports:

- transparent allocation of financial resources
- improved monitoring of service delivery performance
- alignment of expenditure with municipal waste management priorities
- structured investment planning and phased infrastructure development
- improved eligibility for development partner financing
- strengthened financial reporting and accountability

Annual municipal waste management budgets shall be prepared and implemented in accordance with the program structure defined below.

Table 17 solid waste Management Program Structure

Program No.	Program Name	Core Function	Key Outputs
Program 1	Waste Collection Services	Municipal waste collection and primary handling	Reliable door-to-door and communal collection coverage
Program 2	Waste Transfer and Transportation	Efficient movement of waste to treatment and disposal facilities	Reduced transport cost and improved logistics efficiency
Program 3	Recycling and Material Recovery	Sorting and recovery of recyclable materials	Increased recycling rates and reduced waste disposal volumes
Program 4	Organic Waste Management	Treatment of biodegradable waste through composting	Reduced organic waste disposal and compost production
Program 5	Final Disposal Infrastructure	Environmentally compliant waste disposal	Safe and regulated final waste disposal
Program 6	Public Education and Community Engagement	Behavior changes and stakeholder participation	Improved segregation and public compliance
Program 7	Institutional Strengthening and Regulation	Governance, enforcement, and monitoring	Improved system performance and compliance
Program 8	Financial Management and Revenue Administration	Billing, revenue collection, and financial reporting	Financial sustainability and cost recovery

8.1.1 Program Descriptions

- **Waste Collection Services**

This program supports municipal waste collection operations including door-to-door collection, communal collection systems, procurement and operation of collection vehicles, staffing, fuel, maintenance, and service supervision.

- **Waste Transfer and Transportation**

This program supports efficient transportation of waste through transfer stations, transport logistics, vehicle management systems, and operational coordination of waste flows to treatment and disposal facilities.

- **Recycling and Material Recovery**

This program supports development and operation of recycling infrastructure including a Material Recovery Facility, sorting systems, integration of informal waste pickers, and development of markets for recyclable materials.

- **Organic Waste Management**

This program supports processing of biodegradable waste through composting facilities, separate organic waste collection systems, and production and distribution of compost.

- **Final Disposal Infrastructure**

This program supports development and operation of a sanitary landfill, environmental monitoring systems, and rehabilitation and closure of uncontrolled dumping sites.

- **Public Education and Community Engagement**

This program supports public awareness campaigns, stakeholder participation, training programs, and behaviour change initiatives to promote responsible waste management practices.

- **Institutional Strengthening and Regulation**

This program supports staff training, enforcement of waste regulations, monitoring systems, data management, and development of operational procedures.

- **Financial Management and Revenue Administration**

This program supports billing systems, tariff administration, revenue collection, financial reporting, auditing, and resource mobilization.

8.1.2 Program-Based Budget Allocation Structure

Municipal financial resources shall be allocated across programs according to service delivery priorities, infrastructure investment requirements, and operational needs. Indicative budget distribution shall be structured as follows.

Table 18 indicative program budget allocation

Program	Budget Priority Level	Main Cost Type
Waste Collection Services	Very High	Operational and capital
Waste Transfer and Transportation	High	Capital and operational
Recycling and Material Recovery	High	Capital intensive
Organic Waste Management	Medium to High	Capital and operational

Final Disposal Infrastructure	Very High	Capital intensive
Public Education and Community Engagement	Medium	Operational
Institutional Strengthening and Regulation	Medium	Operational
Financial Management and Revenue Administration	Medium	Operational

8.1.3 Program-Based Financial Planning Cycle

The municipality shall implement the following financial planning cycle:

1. Program activity planning
2. Cost estimation by program
3. Budget allocation approval
4. Expenditure tracking by program
5. Performance monitoring
6. Financial reporting
7. Annual review and adjustment

This structured planning cycle ensures alignment between financial investment and waste management performance outcomes.

8.1.3 Program-Based Financial Reporting

Financial reporting shall be conducted at program level and shall include:

- capital expenditure by program
- operational expenditure by program
- revenue generated per program
- cost recovery performance
- funding gap analysis
- performance indicators linked to expenditure

Program-based reporting shall be submitted annually to the Municipal Board and County Government as part of financial accountability and performance monitoring requirements.

8.1.4 Outcome of the Program-Based Budget Framework

Implementation of program-based budgeting will enable Kimilili Municipality to:

- improve efficiency of financial resource allocation
- strengthen service delivery planning
- enhance investment prioritization
- improve financial sustainability
- attract development partner financing
- ensure accountability in waste management expenditure

This framework forms the financial management foundation for implementation of the Solid Waste Management Plan.

8.2 Capital Investment Requirements and Infrastructure Development Plan

Implementation of the Solid Waste Management Plan requires strategic capital investment in infrastructure, equipment, and operational systems to establish an integrated, efficient, and environmentally compliant municipal waste management system. Capital investment planning is aligned with the program-based budgeting framework and structured to support progressive expansion of service capacity, waste treatment infrastructure, and environmentally sound disposal systems.

Capital investments shall be implemented in phased stages to align infrastructure development with financing availability, operational readiness, and projected waste generation growth. Priority investments focus on strengthening collection systems, developing waste recovery infrastructure, improving transportation efficiency, and establishing a sanitary landfill facility that complies with national environmental standards.

Based on infrastructure requirements and projected service expansion, the following major capital investments have been identified.

1. **Waste Collection Infrastructure**

Expansion of municipal waste collection services requires procurement of four modern waste collection trucks to support full door-to-door coverage across all wards. Additional investment is required in waste storage bins, communal containers, and handling equipment to support segregated waste collection and safe handling. The planned procurement of four modern collection vehicles is based on projected service coverage requirements and replacement of existing limited and ageing transport capacity.

2. **Waste Transfer Infrastructure**

To improve operational efficiency and reduce direct transport distances, one municipal waste transfer station shall be constructed. The facility will serve as an intermediate waste consolidation point and will include reception areas, loading equipment, and environmental control systems.

3. **Material Recovery Facility**

One Material Recovery Facility shall be constructed to support sorting and recovery of recyclable materials including plastics, paper, metals, and glass. The facility will support formal recycling operations, integration of informal waste recovery actors, and reduction of waste requiring final disposal.

4. **Organic Waste Treatment Infrastructure**

Two composting facilities shall be established to process segregated organic waste from households, markets, and institutions. Compost production will support resource recovery, reduce landfill demand, and contribute to circular economy development.

5. **Sanitary Landfill Development**

A municipal sanitary landfill shall be developed to provide environmentally compliant final waste disposal. The landfill shall include engineered lining systems, leachate management infrastructure, gas control systems, and stormwater diversion systems, monitoring boreholes, and controlled access facilities.

6. **Dumpsite Rehabilitation**

Existing uncontrolled dumping areas shall be rehabilitated and progressively closed to reduce environmental and public health risks.

7. **Digital Monitoring and Operational Systems**

Digital systems shall be established to support waste data management, vehicle tracking, performance monitoring, and operational reporting.

8.2.1 Capital Investment Planning

Capital investments shall be implemented across short-, medium-, and long-term planning horizons to ensure efficient resource allocation and progressive system development.

Table 19 Indicative Capital Investment Requirements

Infrastructure Component	Program	Estimated Cost Range (KES)	Implementation Phase
Waste collection trucks (4 units)	Waste Collection Services	32,000,000 – 48,000,000	Short term (1–3 years)
Waste bins and storage equipment	Waste Collection Services	8,000,000 – 12,000,000	Short term (1–3 years)
Transfer station construction	Waste Transfer and Transportation	25,000,000 – 40,000,000	Short term (1–3 years)
Material Recovery Facility	Recycling and Material Recovery	60,000,000 – 90,000,000	Medium term (3–5 years)
Composting facilities (2 units)	Organic Waste Management	40,000,000 – 70,000,000	Medium term (3–5 years)
Sanitary landfill development	Final Disposal Infrastructure	250,000,000 – 450,000,000	Long term (5–10 years)
Dumpsite rehabilitation and closure	Environmental Protection	15,000,000 – 30,000,000	Medium term (3–5 years)
Digital monitoring and tracking systems	Institutional Strengthening	10,000,000 – 20,000,000	Medium term (3–5 years)
Public education infrastructure	Community Engagement	5,000,000 – 10,000,000	Continuous

Table 20 Capital Investment Summary by Category

Investment Category	Estimated Total Cost Range (KES)
Collection and handling infrastructure	40,000,000 – 60,000,000
Transfer and logistics infrastructure	25,000,000 – 40,000,000
Recycling and composting infrastructure	100,000,000 – 160,000,000
Final disposal infrastructure	250,000,000 – 450,000,000
Institutional and monitoring systems	15,000,000 – 30,000,000
Public engagement infrastructure	5,000,000 – 10,000,000
Total Estimated Capital Investment	**435,000,000 – 750,000,000**

Table 21 Capital Investment Phasing Plan

Phase	Timeframe	Key Investments
Short Term	1–3 years	Collection trucks, bins, transfer station, institutional systems
Medium Term	3–5 years	Material Recovery Facility, composting facilities, dumpsite rehabilitation
Long Term	5–10 years	Sanitary landfill development and advanced disposal systems

8.2.2 Capital Investment Implementation Approach

Capital investments shall be implemented in accordance with municipal procurement regulations, environmental compliance requirements, and technical design standards. Detailed feasibility studies, engineering design, environmental impact assessments, and financial structuring shall be undertaken prior to implementation of major infrastructure projects.

Investment prioritization shall be guided by service delivery needs, environmental risk reduction, financial feasibility, and availability of financing.

The capital investment plan provides the infrastructure foundation required to achieve full implementation of the Solid Waste Management Plan and transition to an integrated, resource-efficient, and environmentally sustainable municipal waste management system.

8.3 Operational Expenditure and Service Delivery Cost Framework

Operational expenditure represents the recurring financial resources required to operate, maintain, and manage the municipal solid waste management system on a continuous basis. While capital investments establish infrastructure and service capacity, operational expenditure ensures sustained service delivery, system functionality, regulatory compliance, and performance efficiency.

Kimilili Municipality shall maintain a structured operational budgeting framework aligned with the program-based budget structure. Annual operational budgets shall be prepared based on service coverage targets, infrastructure utilization levels, staffing requirements, performance standards, and regulatory obligations.

Operational expenditure shall cover all routine costs associated with waste collection, transportation, treatment, disposal, institutional administration, monitoring, and public engagement.

8.3.1 Major Components of Operational Expenditure

Operational costs of the municipal waste management system are structured across the following service functions:

- waste collection and handling
- waste transfer and transportation
- recycling and material recovery operations
- composting facility operations
- sanitary landfill operations
- public education and stakeholder engagement
- institutional administration and regulatory enforcement
- financial management and system monitoring

Waste Collection Operations

Waste collection operations represent the largest recurring expenditure component and include personnel salaries, fuel consumption, vehicle maintenance, operational supplies, safety equipment, and service supervision. Operational financing shall support municipality-wide door-to-door collection and management of communal collection points.

Waste Transfer and Transportation Operations

Operational costs include staffing of transfer facilities, vehicle operation, fuel consumption, maintenance of transport equipment, waste handling systems, and environmental control measures.

Recycling and Material Recovery Operations

Operational expenditure includes staffing of the Material Recovery Facility, sorting operations, equipment maintenance, utilities, protective equipment, and recyclable storage management.

Composting Facility Operations

Operational costs include organic waste processing, staffing, equipment maintenance, utilities, compost quality control, and distribution of compost products.

Sanitary Landfill Operations

Landfill operational expenditure includes site personnel, waste compaction and placement, environmental monitoring, leachate management, gas control systems, site security, and routine maintenance.

Public Education and Community Engagement

Continuous public awareness programs require operational financing for communication materials, outreach activities, stakeholder engagement forums, and training initiatives.

Institutional Administration and Regulatory Enforcement

Administrative costs include planning, monitoring, regulatory enforcement, data management, reporting systems, and staff training.

Financial Management and System Monitoring

Operational expenditure shall support billing systems, revenue collection, financial reporting, auditing, and digital monitoring platforms.

Table 22 Annual Operational Cost Structure

Operational Cost Component	Estimated Annual Cost Range (KES)
Waste collection personnel and operations	18,000,000 – 25,000,000
Transport fuel and vehicle maintenance	12,000,000 – 18,000,000
Facility operations (MRF, composting, landfill)	15,000,000 – 25,000,000
Institutional administration and monitoring	5,000,000 – 8,000,000
Public education and community engagement	2,000,000 – 4,000,000
Total Estimated Annual Operational Expenditure	**52,000,000 – 80,000,000**

8.3.2 Operational Cost Management Strategy

Kimilili Municipality shall implement cost control and efficiency measures to optimize operational expenditure. These measures shall include:

- route optimization and service planning
- preventive maintenance programs
- performance-based service contracts
- energy efficiency improvements
- digital monitoring of operational performance
- periodic cost reviews and financial audits

8.3.3 Operational Financial Sustainability

Operational expenditure shall be financed through a combination of municipal budget allocations, user-based cost recovery, resource recovery revenue, and supplementary external financing where necessary.

Annual operational budgets shall be reviewed and adjusted based on service demand, infrastructure utilization, cost escalation, and revenue performance.

Effective management of operational expenditure is essential to ensure continuity of waste management services, protection of public health, environmental compliance, and long-term financial sustainability of the municipal waste management system.

8.4 Financing Strategy and Funding Sources

Implementation of the Solid Waste Management Plan requires a diversified, reliable, and sustainable financing framework capable of supporting both capital investment and recurring operational expenditure. Given the scale of infrastructure development and ongoing service delivery costs, Kimilili Municipality shall adopt a blended financing approach that combines public sector funding, user-based cost recovery, development partner support, and private sector participation.

The financing strategy is designed to ensure long-term financial sustainability, reduce dependence on a single funding source, support phased infrastructure development, and enhance eligibility for development partner financing and investment partnerships.

8.4.1 Financing Objectives

The municipal financing strategy is guided by the following objectives:

- ensure adequate and predictable funding for infrastructure development and service delivery
- support progressive expansion of waste management services
- improve cost recovery and revenue collection efficiency
- mobilize external financing and investment partnerships
- promote private sector participation in service delivery
- strengthen financial resilience of the waste management system

8.4.2 Financing Structure

The municipality shall mobilize financial resources through the following major funding streams.

a) County Government Budget Allocations

County government funding shall provide the primary public financing base for solid waste management infrastructure and operational service delivery. Annual county budget allocations shall support capital investment, operational expenditure, institutional strengthening, and environmental compliance activities.

County funding shall also provide counterpart financing required for development partner projects and co-financing arrangements for major infrastructure investments.

b) Municipal Revenue and Cost Recovery

User-based cost recovery shall provide a sustainable financing stream for routine service delivery. Revenue shall be generated through household waste collection fees, commercial waste service charges, institutional service fees, and other approved waste management tariffs.

Tariff structures shall be progressively strengthened to improve cost recovery while maintaining affordability for households and businesses. Differentiated tariffs based on waste generation levels and service categories shall be applied to ensure equitable cost distribution.

Revenue collection systems shall be strengthened through improved billing, enforcement of service charges, and adoption of digital payment systems.

c) Development Partner Grants and Concessional Financing

Development partner financing shall play a central role in supporting major capital investments, technical assistance, and institutional capacity development. The municipality shall actively pursue grant financing and concessional funding from bilateral and multilateral development partners.

Priority investment areas for development partner financing include sanitary landfill development, recycling infrastructure, composting facilities, digital monitoring systems, and institutional strengthening programs.

d) Public–Private–People Partnerships (PPPP)

Private sector participation shall be mobilized to support infrastructure development, service delivery, and resource recovery operations. PPPP arrangements shall leverage private investment, technical expertise, and operational efficiency.

Priority areas for PPP investment include waste collection services, recycling operations, composting facilities, transfer station management, and selected treatment infrastructure.

e) Climate and Green Financing

The municipality shall pursue climate and environmentally focused financing opportunities to support low-emission and resource-efficient waste management systems. Eligible activities include organic waste diversion, methane emission reduction, recycling expansion, and circular economy initiatives.

f) Revenue from Resource Recovery

Income generated from sale of recyclable materials, compost products, and other recovered resources shall provide supplementary revenue to support operational sustainability.

Table 23 Capital Investment Financing Sources

Investment Area	Primary Financing Source	Supporting Financing
Waste collection vehicles and bins	County government	Development grants
Transfer station	Development partners	PPP investment
Material Recovery Facility	PPP investment	Development grants
Composting facilities	Climate or green financing	PPP investment
Sanitary landfill	County and national government	Development partners
Dumpsite rehabilitation	Development grants	Municipal budget
Digital monitoring systems	Development partners	Municipal budget
Public awareness infrastructure	Municipal budget	Development partners

Table 24 Operational Expenditure Financing Sources

Operational Cost Category	Main Financing Source
Waste collection operations	User fees and municipal budget
Transport and facility operations	Municipal budget and service revenue
Recycling and composting operations	Resource recovery revenue and municipal support
Public education programs	Municipal budget and development partners
Institutional administration	Municipal budget
Financial management systems	Municipal budget and technical assistance

*Table 25 **Blended Financing Model by Program***

Program	Public Funding	Cost Recovery	Donor Financing	PPP Investment
Waste Collection Services	High	High	Low	Medium
Waste Transfer and Transportation	Medium	Low	Medium	High
Recycling and Material Recovery	Low	Medium	Medium	High
Organic Waste Management	Medium	Medium	High	Medium
Final Disposal Infrastructure	High	Low	High	Medium
Public Education and Community Engagement	High	Low	Medium	Low
Institutional Strengthening and Regulation	High	Low	Medium	Low
Financial Management and Revenue Administration	High	Medium	Low	Low

8.4.3 Financing Coordination and Resource Mobilization

Kimilili Municipality shall establish structured resource mobilization mechanisms to coordinate financing from public budgets, development partners, and private sector investors. Financing proposals shall be prepared for priority infrastructure projects, and funding opportunities shall be actively pursued in collaboration with county and national government institutions.

All financing arrangements shall comply with public financial management regulations, procurement laws, environmental safeguards, and contractual accountability standards.

8.5 Revenue and Cost Recovery Model

Financial sustainability of the municipal solid waste management system depends on the municipality's ability to generate reliable revenue and progressively recover the cost-of-service delivery. Cost recovery reduces dependence on public subsidies, supports operational continuity, and ensures that waste management services remain financially viable over the long term.

Kimilili Municipality shall implement structured revenue and cost recovery framework designed to balance financial sustainability, service affordability, and equitable cost sharing among service users.

The revenue model shall be based on user-based service charges, commercial waste management fees, institutional service agreements, and income generated from resource recovery activities. These revenue streams shall be complemented by municipal budget support where full cost recovery is not immediately achievable. During early implementation phases, the municipality shall maintain targeted operational subsidies to support service expansion and ensure affordability while cost recovery mechanisms are progressively strengthened.

8.5.1 Cost Recovery Principles

The municipal cost recovery framework shall be guided by the following principles:

- progressive cost recovery based on service expansion
- affordability for households and small businesses
- equitable tariff structure based on waste generation levels
- transparency in tariff setting and billing
- enforcement of payment compliance
- efficiency in revenue collection systems

Cost recovery shall initially focus on covering operational expenditure, with gradual expansion towards partial recovery of capital investment costs over time.

8.5.2 Revenue Sources

The municipal waste management system shall generate revenue from the following sources:

- household waste collection service fees
- commercial and institutional waste service charges
- special waste handling fees where applicable
- sale of recyclable materials
- sale of compost products
- penalties and enforcement charges where applicable

These revenue streams shall provide financial support for operational expenditure and contribute to long-term financial sustainability.

Table 26 Proposed Waste Service Tariff Structure

Customer Category	Monthly Service Fee (KES)
Low-density residential areas	200 – 300
High-density residential areas	100 – 200
Small businesses	300 – 800
Medium businesses	800 – 2,000
Large commercial generators	Case-based charging

8.5.3 Revenue Collection Mechanisms

Revenue collection shall be strengthened through structured billing systems, enforcement of service charges, and integration of waste service fees with existing municipal revenue systems. Digital payment platforms shall be progressively introduced to improve collection efficiency, reduce revenue leakage, and enhance financial transparency.

8.5.4 Resource Recovery Revenue

Income generated from recycling and compost production shall provide supplementary revenue to support operational sustainability. Revenue potential will depend on material recovery rates, market demand for recyclable materials, and compost sales.

Table 27 Indicative Annual Revenue Potential

Revenue Source	Estimated Annual Revenue Range (KES)
Household waste collection fees	15,000,000 – 25,000,000
Commercial and institutional waste charges	10,000,000 – 18,000,000
Sale of recyclable materials	5,000,000 – 10,000,000
Compost product sales	3,000,000 – 6,000,000
Enforcement penalties and special service fees	1,000,000 – 3,000,000
Total Estimated Annual Revenue	**34,000,000 – 62,000,000**

8.5.5 Cost Recovery Performance

Based on projected operational expenditure and estimated revenue potential, municipal waste service revenue is expected to recover a significant proportion of annual operational costs. However, full cost recovery may not be achieved during early implementation phases due to infrastructure development costs, service expansion requirements, and affordability considerations.

Municipal budget support and external financing will therefore continue to play a critical role in sustaining service delivery.

Table 28 Indicative Operational Cost Recovery Outlook

Indicator	Estimated Range
Annual operational expenditure	52,000,000 – 80,000,000 KES

Annual service revenue	34,000,000 – 62,000,000 KES
Estimated cost recovery ratio	50% – 80%
Expected subsidy requirement	Moderate

8.5.6 Affordability and Social Equity Considerations

Tariff structures shall be periodically reviewed to ensure affordability for low-income households and small businesses. Where necessary, the municipality may apply targeted subsidies, cross-subsidization between user categories, or phased tariff adjustments to balance financial sustainability and social equity.

8.5.7 Revenue Improvement Strategy

To strengthen cost recovery and financial sustainability, the municipality shall implement the following measures:

- expand service coverage and billing base
- strengthen enforcement of waste service charges
- improve billing accuracy and revenue tracking
- promote waste segregation to increase recyclable value
- expand compost production and market access
- introduce digital revenue collection systems

8.5.8 Long-Term Financial Sustainability

Progressive improvement in revenue collection efficiency, expansion of service coverage, and development of resource recovery markets will enhance long-term financial sustainability. The municipality shall periodically review tariff structures, revenue performance, and cost recovery targets to ensure financial stability of the waste management system.

8.6 Public–Private–People Partnerships and Development Partner Investment Framework

Kimilili Municipality recognizes that large-scale infrastructure development and expansion of modern waste management systems require substantial financial resources, technical expertise, and operational capacity that cannot be provided solely through public sector funding. To accelerate system development and improve service efficiency, the municipality shall actively promote Public–Private–People Partnerships (PPPP) and development partner investment in solid waste management.

This framework establishes the institutional and financial arrangements through which private sector investors and development partners will participate in financing, constructing, and operating waste management infrastructure and services.

8.6.1 Objectives of PPPP and Development Partner Engagement

The municipality shall pursue partnership financing to achieve the following objectives:

- mobilize additional capital for infrastructure development
- improve operational efficiency and service delivery performance
- access technical expertise and innovation
- accelerate development of recycling and resource recovery systems
- reduce financial burden on public budgets
- enhance long-term sustainability of waste management services

8.6.2 Priority Investment Areas for PPPP Participation

Private sector participation shall be encouraged in infrastructure and service areas where operational efficiency, revenue generation potential, and technological expertise can be enhanced through partnership arrangements.

Table 29 Priority PPP Investment Areas

Investment Area	Potential PPP Role	Revenue Mechanism
Waste collection services	Service contracts, fleet operation	Service fees and municipal payments
Transfer station operation	Facility construction and operation	Tipping fees and service contracts
Material Recovery Facility	Design, build, operate	Sale of recyclable materials
Composting facilities	Facility development and operation	Compost sales and service fees
Waste treatment infrastructure	Technology investment and operation	Treatment fees
Landfill operation support	Operational management services	Tipping fees and service contracts

8.6.3 PPPP Implementation Models

The municipality may adopt different PPP models depending on project scale, investment requirements, and risk allocation. Partnership structures shall be selected based on financial feasibility, operational efficiency, and long-term sustainability.

Table 30 PPP Implementation Models

PPP Model	Description	Suitable Application
Service Contract	Private operator provides defined services for agreed fee	Waste collection operations
Lease Agreement	Private entity operates facility owned by municipality	Transfer stations or compost plants
Concession Agreement	Private entity finances, builds, and operates facility for defined period	MRF or treatment facilities
Build–Operate–Transfer (BOT)	Private investor builds and operates infrastructure before transfer to municipality	Large infrastructure projects such as landfill

8.6.4 Development Partner Financing

Development partners shall provide grant financing, concessional funding, and technical assistance to support infrastructure development, institutional strengthening, and climate-responsive waste management interventions.

Priority areas for development partner financing include:

- sanitary landfill development
- recycling infrastructure and MRF development
- composting facilities
- digital monitoring and data management systems
- institutional capacity building
- climate mitigation and emission reduction projects

Development partner funding shall be aligned with national development policy, county planning priorities, and international environmental and social safeguards.

8.6.5 Project Preparation and Investment Mobilization

To attract PPP and development partner financing, the municipality shall undertake structured project preparation including:

- feasibility studies
- environmental and social impact assessments
- financial modelling and investment analysis
- risk assessment and mitigation planning
- preparation of investment proposals and partnership agreements

8.6.6 Partnership Governance and Accountability

All partnership arrangements shall comply with public procurement regulations, financial management standards, and environmental safeguards. Performance monitoring, financial reporting, and contract compliance mechanisms shall be established for all partnership projects.

8.6.7 Expected Outcomes of PPPP and Development Partner Engagement

Implementation of structured partnership financing will enable the municipality to accelerate infrastructure development, improve service delivery efficiency, mobilize additional financial resources, and strengthen long-term sustainability of the municipal solid waste management system.

8.7 Financial Risk Management and Mitigation Framework

Effective financial risk management is essential to ensure the long-term sustainability, stability, and resilience of the municipal solid waste management system. Waste management systems are exposed to multiple financial risks arising from revenue uncertainty, operational cost fluctuations, infrastructure financing challenges, and institutional capacity constraints.

Kimilili Municipality shall implement a structured financial risk management framework to identify, monitor, and mitigate risks that may affect financial performance, service delivery continuity, and infrastructure investment.

8.7.1 Financial Risk Management Objectives

The financial risk management framework is designed to:

- protect financial sustainability of waste management services
- ensure continuity of service delivery despite funding variability
- reduce exposure to cost escalation and revenue instability
- strengthen financial planning and resource allocation
- improve resilience to economic and operational uncertainties

8.7.2 Major Financial Risk Categories

The municipal waste management system faces several potential financial risks associated with revenue generation, expenditure management, infrastructure financing, and institutional performance.

Table 31 Key Financial Risks in Municipal Solid Waste Management

Risk Category	Description
Low revenue collection rates	Non-payment or delayed payment of service charges
Delayed public funding	Late or reduced county budget disbursements
High operational costs	Rising fuel prices, labour costs, and maintenance expenses
Infrastructure financing gaps	Insufficient capital funding for planned investments
Cost overruns in infrastructure projects	Construction and procurement cost escalation
Market volatility for recyclables	Fluctuation in prices of recovered materials
Equipment breakdown and asset failure	Unexpected repair or replacement costs
Inflation and economic fluctuations	Increased cost of goods and services
Weak financial management systems	Inefficient billing, tracking, and reporting

8.7 3 Financial Risk Mitigation Measures

The municipality shall implement targeted risk mitigation measures to address each major risk category.

Table 32 ***Financial Risk Mitigation Measures***

Risk	Mitigation Strategy
Low revenue collection	Strengthen billing systems and enforcement mechanisms
Delayed public funding	Establish contingency reserves and phased implementation
High operational costs	Implement cost control measures and preventive maintenance
Infrastructure financing gaps	Diversify funding sources and mobilize external financing
Project cost overruns	Apply strict procurement controls and project monitoring
Market volatility for recyclables	Diversify material recovery streams and strengthen contracts
Equipment breakdown	Implement asset management and maintenance schedules
Inflation	Periodic tariff review and financial adjustment mechanisms
Weak financial systems	Introduce digital financial management and reporting systems

8.7.4 Asset Management and Lifecycle Cost Control

The municipality shall implement asset management systems to track infrastructure condition, maintenance schedules, and replacement planning. Lifecycle cost management will reduce unexpected capital expenditure and improve long-term financial planning.

8.7.8 Financial Monitoring and Early Warning Systems

Financial performance shall be monitored regularly through:

- revenue collection performance tracking
- expenditure monitoring and variance analysis
- infrastructure investment monitoring
- cost escalation assessment
- financial performance reporting

Early warning indicators shall be used to identify emerging financial risks and trigger corrective action.

Table 33 ***Financial Performance Monitoring Indicators***

Indicator	Monitoring Purpose
Revenue collection efficiency	Measure effectiveness of billing and payment
Operational cost variance	Monitor expenditure deviations from budget
Cost recovery ratio	Assess financial sustainability
Infrastructure investment progress	Track capital expenditure performance
Asset maintenance compliance	Monitor infrastructure reliability
Budget execution rate	Assess financial implementation performance

8.7.9 Financial Governance and Accountability

All financial risk management activities shall be integrated into municipal financial governance systems. Financial reporting, auditing, and performance reviews shall be conducted regularly to ensure accountability, transparency, and compliance with public financial management regulations.

8.7.10 Outcome of Financial Risk Management Framework

Implementation of structured financial risk management will enhance financial resilience, protect infrastructure investments, improve operational stability, and support long-term sustainability of municipal solid waste management services.

8.8 Financial Governance and Accountability Framework

Strong financial governance and accountability systems are essential to ensure transparency, efficiency, and integrity in the management of financial resources for solid waste management. Effective governance safeguards public funds, strengthens investor and donor confidence, and ensures that financial resources are used for their intended purposes in accordance with approved budgets and regulatory requirements.

Kimilili Municipality shall implement a structured financial governance framework aligned with national public financial management laws, county financial procedures, and applicable municipal regulations. The framework shall define institutional responsibilities, financial control systems, reporting requirements, and oversight mechanisms for all solid waste management financial activities.

8.8.1 Financial Governance Objectives

The financial governance framework is designed to:

- ensure transparent allocation and utilization of financial resources
- strengthen accountability in municipal waste management expenditure
- support effective financial planning and budgeting
- prevent financial mismanagement and revenue leakage
- enhance compliance with public financial management regulations
- improve donor and investor confidence

8.8.2 Institutional Roles and Responsibilities

Financial management responsibilities shall be clearly defined across municipal and county institutions involved in waste management service delivery and financing.

Table 34 ***Institutional Responsibilities for Financial Governance***

Institution	Financial Responsibility
Municipal Board	Budget approval, financial oversight, performance review
Municipal Finance Department	Budget preparation, revenue management, expenditure control
Environment Department	Technical planning and expenditure implementation
County Government Treasury	Budget allocation, financial supervision, compliance
Internal Audit Unit	Financial audit and compliance monitoring
Procurement Unit	Procurement management and contract compliance

8.8.3 Budgeting and Financial Planning

All waste management financial resources shall be planned through annual budgeting processes consistent with the program-based budgeting framework. Budget preparation shall include capital investment planning, operational expenditure estimation, revenue projections, and financing gap analysis.

Budget approval shall follow established municipal and county financial procedures.

8.8.4 Financial Control and Expenditure Management

Financial control systems shall be established to ensure that expenditures are authorized, documented, and aligned with approved budgets. Expenditure shall be tracked at program level to ensure accountability and performance monitoring.

Procurement processes shall comply with applicable public procurement regulations to ensure transparency, competitiveness, and value for money.

8.8.5 Financial Reporting and Disclosure

Regular financial reporting shall be conducted to provide accurate and timely information on revenue collection, expenditure performance, investment progress, and financial sustainability.

Table 35 ***Financial Reporting Requirements***

Report Type	Reporting Frequency	Responsible Unit
Revenue collection report	Monthly	Finance Department
Operational expenditure report	Monthly	Finance Department
Capital investment progress report	Quarterly	Environment Department
Program budget performance report	Quarterly	Municipal Board
Financial audit report	Annually	Internal Audit Unit

8.8.6 Audit and Compliance Mechanisms

Financial auditing shall be conducted regularly to ensure compliance with financial regulations and to verify proper use of financial resources. Both internal and external audits shall be conducted in accordance with statutory requirements.

Audit findings shall be reviewed by the Municipal Board and corrective actions shall be implemented where necessary.

8.8.7 Financial Transparency and Public Accountability

The municipality shall promote transparency through disclosure of financial performance information, stakeholder engagement, and public reporting of waste management service performance and financial outcomes.

8.8.8 Anti-Corruption and Integrity Measures

Financial management systems shall incorporate safeguards to prevent fraud, corruption, and misuse of funds. Procurement transparency, independent auditing, and performance monitoring shall form core components of financial integrity management.

8.8.9 Outcome of Financial Governance Framework

Implementation of strong financial governance and accountability systems will enhance financial discipline, improve resource management efficiency, strengthen stakeholder confidence, and support sustainable implementation of the Solid Waste Management Plan.

8.9 Financial Projections and Investment Planning Framework

Financial projections provide a forward-looking assessment of the financial requirements, expected revenues, and funding gaps associated with implementation of the Solid Waste Management Plan. Long-term financial planning is necessary to ensure that capital investments, operational expenditure, and financing arrangements are aligned with service expansion targets and infrastructure development timelines.

Kimilili Municipality shall implement a structured financial projection and investment planning framework covering short-, medium-, and long-term planning horizons. Financial projections shall guide budget preparation, investment prioritization, financing mobilization, and monitoring of financial sustainability.

Financial projections shall be periodically reviewed and updated to reflect changes in service coverage, infrastructure development progress, cost escalation, and revenue performance.

8.9.1 Financial Planning Time Horizons

Financial planning for solid waste management shall be structured across the following implementation periods:

- Short term: 1–3 years
- Medium term: 3–5 years
- Long term: 5–10 years

Each planning period reflects infrastructure development phases, operational scale-up, and financing mobilization requirements.

Table 36 Capital Investment Projection by Implementation Phase

Implementation Phase	Estimated Investment Range (KES)	Key Investments
Short term (1–3 years)	65,000,000 – 100,000,000	Collection trucks, bins, transfer station, institutional systems
Medium term (3–5 years)	115,000,000 – 190,000,000	Material Recovery Facility, composting facilities, dumpsite rehabilitation
Long term (5–10 years)	250,000,000 – 450,000,000	Sanitary landfill development and advanced disposal infrastructure
Total projected capital investment	**430,000,000 – 740,000,000**	Integrated waste management infrastructure

8.9.2 Operational Expenditure Projections

Operational expenditure is expected to increase progressively as service coverage expands and infrastructure becomes fully operational. Annual operational costs shall be adjusted based on staffing requirements, infrastructure utilization, inflation, and service performance targets.

Table 37 Indicative Operational Expenditure Projection

Year	Estimated Operational Expenditure (KES)
Year 1	52,000,000 – 60,000,000
Year 3	60,000,000 – 70,000,000
Year 5	70,000,000 – 80,000,000
Year 10	To be determined based on system expansion

8.9.3 Revenue Projections

Municipal revenue from waste services is expected to increase as service coverage expands, billing systems improve, and resource recovery activities scale up.

Table 38 Indicative Revenue Projection

Year	Estimated Annual Revenue (KES)
Year 1	34,000,000 – 40,000,000

Year 3	40,000,000 – 50,000,000
Year 5	50,000,000 – 62,000,000
Year 10	To be determined based on system performance

8.9.4 Investment Planning and Resource Mobilization

Investment planning shall be guided by infrastructure priorities, service expansion needs, financial feasibility, and availability of financing. The municipality shall prepare project investment proposals, mobilize development partner support, and structure PPP arrangements for major infrastructure projects.

8.9.5 Financial Monitoring and Review

Financial projections shall be reviewed periodically to reflect updated cost estimates, infrastructure development progress, and revenue performance. Adjustments to investment schedules and financing strategies shall be made as necessary to maintain financial sustainability.

8.9.6 Outcome of Financial Projection Framework

Structured financial projections provide a clear roadmap for investment planning, financing mobilization, and long-term financial sustainability of the municipal solid waste management system. The projection framework ensures that financial planning remains aligned with infrastructure development and service delivery goals.

CHAPTER 9

Monitoring and Evaluation

Monitoring and Evaluation (M&E) is essential for assessing the effectiveness, efficiency, sustainability, and impact of solid waste management interventions in Kimilili Municipality. A structured M&E framework enables the municipality to track progress, identify gaps, support evidence-based decision-making, and ensure accountability to stakeholders.

Kimilili Municipality shall establish a results-based monitoring and evaluation system aligned with national environmental reporting requirements, county development performance frameworks, and KUSP performance indicators.

The M&E system shall focus on service coverage, operational efficiency, environmental performance, financial sustainability, and stakeholder satisfaction.

9.1 Monitoring Framework

The monitoring framework shall track performance across the entire waste management value chain including waste generation, collection, transportation, treatment, recycling, and disposal.

Monitoring shall be conducted at municipal, ward, and facility levels.

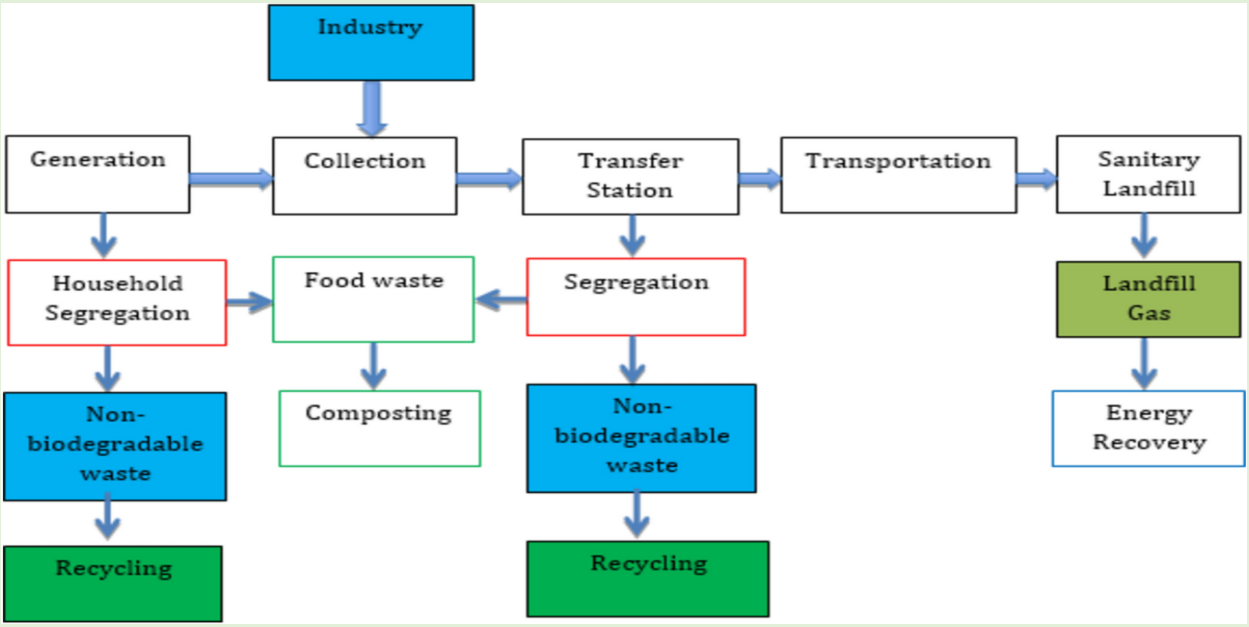


Figure 10; Waste Management Monitoring Framework Flow

9.2 Key Performance Indicators (KPIs)

The municipality shall track performance using measurable indicators covering operational, environmental, financial, and institutional performance.

Table 39 ***Solid Waste Management Key Performance Indicators***

Indicator	Unit	Frequency
Waste collected per day	Tonnes/day	Monthly
Waste collection coverage	% of population served	Quarterly
Waste diverted from disposal sites	%	Quarterly
Quantity of waste recycled	Tonnes/month	Monthly
Number of illegal dumping sites eliminated	Number	Quarterly
Collection frequency compliance	%	Monthly
Equipment availability rate	%	Monthly
Revenue collection efficiency	%	Quarterly
Public complaints resolved	%	Quarterly

9.3 Data Collection and Reporting Mechanisms

The municipality shall establish standardized data collection and reporting systems.

This shall include:

- Daily waste collection records
- Vehicle and equipment utilization records
- Recycling and recovery tracking records
- Financial performance reports
- Environmental compliance monitoring reports

9.4 Institutional Responsibilities for Monitoring

Table 40 ***Monitoring Responsibilities Matrix***

Institution	Responsibility
Municipal Environment Department	Data collection and reporting
Municipal Board	Oversight and performance review
County Environment Department	Technical supervision
NEMA	Environmental compliance monitoring
Service Providers	Operational data reporting

9.5 Performance Review and Evaluation

The municipality shall conduct:

- Monthly operational reviews
- Quarterly performance evaluations
- Annual waste management performance audits

Performance reports shall be submitted to the Municipal Board and County Government.

9.6 Periodic Review and Updating of SWM Plan

The Solid Waste Management Plan shall be reviewed periodically to reflect:

- Population growth and urban expansion
- Changes in waste generation trends
- Technological advancements
- Policy and regulatory changes
- Climate and environmental risks

The plan shall undergo:

- Mid-term review after 3 years
- Full review after 5 years

9.7 Community-Based Monitoring

The municipality shall promote community participation in monitoring waste services through:

- Ward waste management committees
- Community reporting platforms
- Public feedback forums

9.8 Digital Monitoring Systems (Long-Term)

The municipality shall progressively introduce digital tools for waste monitoring including:

- Digital waste data management systems
- GPS tracking of waste collection vehicles
- Mobile reporting applications
- Performance dashboards

9.9 Solid Waste Management Results Framework

Table 41 Monitoring and Evaluation Results Framework

Indicator	Baseline (2024)	Target (2030)	Monitoring Frequency	Responsible Institution
Waste collection coverage	55–65%	90%	Quarterly	Municipality
Waste segregation at source	Minimal	70% households	Quarterly	Municipality
Recycling and recovery rate	<10%	40%	Annual	Municipality / Private sector
Organic waste composted	Very low	50% organic waste	Annual	Municipality
Controlled disposal compliance	Limited	Fully compliant disposal site	Annual	Municipality / NEMA
Illegal dumping incidents	Frequent	Reduced by 80%	Quarterly	Municipality
Public awareness coverage	Limited	90% population reached	Annual	Municipality
Operational waste data reporting	Limited	Fully functional digital tracking	Annual	Municipality

The results framework provides measurable indicators for tracking progress in implementation of the solid waste management plan. Performance shall be reviewed periodically to assess effectiveness of interventions and inform adaptive management and planning adjustments.

CHAPTER 10

Implementation Timeline

The implementation of the Solid Waste Management Plan for Kimilili Municipality shall be carried out in a phased approach to ensure realistic planning, efficient resource allocation, and progressive improvement of waste management services.

The phased implementation approach allows the municipality to prioritize urgent interventions, strengthen institutional capacity, mobilize financial resources, and gradually develop advanced waste management infrastructure.

Implementation shall be aligned with municipal planning cycles, county development plans, and available financial resources.

10.1 Phased Implementation Approach

Implementation phases are aligned with the capital investment schedule and financing framework defined in Chapter 8 of this Plan

The implementation of the SWM Plan shall be carried out under three main phases:

- **Phase 1: Short Term (0–3 Years)** — Focus on service improvement, institutional strengthening, and basic infrastructure development.
- **Phase 2: Medium Term (3–5 Years)** — Focus on expansion of treatment infrastructure and strengthening recovery systems.
- **Phase 3: Long Term (5–10 Years)** — Focus on advanced waste treatment systems and full circular economy integration.

Table 42 Phased Implementation Plan

Phase	Timeframe	Key Focus Areas
Phase 1	0 – 3 Years	Improve collection, awareness, basic infrastructure, institutional strengthening
Phase 2	3 – 5 Years	Expand recycling, composting, transfer stations, disposal site upgrades
Phase 3	5 – 10 Years	Sanitary landfill, advanced treatment technologies, full circular economy systems

10.2 Phase 1: Short-Term Implementation Actions (0–3 Years)

Focus shall be on strengthening basic service delivery and institutional systems.

Table 43 Short-Term Implementation Actions

Activity	Lead Institution	Expected Outcome
Procure waste collection vehicles and bins	Municipality / County	Improved collection coverage
Expand door-to-door collection services	Municipality / Private Sector	Increased service reliability
Public awareness campaigns	Municipality / CBOs	Improved public participation
Introduce source segregation pilots	Municipality	Improved recycling potential
Identify land for waste facilities	Municipality / County	Infrastructure development readiness
Strengthen enforcement of waste bylaws	Municipality / Public Health	Reduced illegal dumping

10.3 Phase 2: Medium-Term Implementation Actions (3–5 Years)

Focus shall be on infrastructure development and waste recovery systems.

Table 44 ***Medium-Term Implementation Actions***

Activity	Lead Institution	Expected Outcome
Establish transfer stations	Municipality / PPP Partners	Improved transport efficiency
Develop Material Recovery Facility (MRF)	Municipality / Private Sector	Increased recycling rates
Establish composting facilities	Municipality / PPP Partners	Reduced organic waste disposal
Upgrade disposal site management	Municipality / County	Reduced environmental pollution
Strengthen PPP waste service models	Municipality / Private Sector	Improved service coverage

10.4 Phase 3: Long-Term Implementation Actions (5–10 Years)

Focus shall be on advanced waste management infrastructure and circular economy systems.

Table 45 ***Long-Term Implementation Actions***

Activity	Lead Institution	Expected Outcome
Develop sanitary landfill	County / Municipality	Environmentally safe disposal
Introduce landfill gas and leachate	Municipality / County	Reduced environmental risks

systems		
Explore waste-to-energy options	County / PPP Partners	Energy recovery
Scale circular economy programs	Municipality / Private Sector	Reduced waste disposal dependency

10.5 Implementation Coordination and Oversight

Implementation shall be coordinated by the Municipal Board in collaboration with County Government departments, private sector partners, community organizations, and development partners.

10.6 Implementation Risk Management

Key implementation risks include:

- Funding constraints
- Land acquisition challenges
- Community resistance
- Technical capacity limitations
- Equipment maintenance challenges

Mitigation measures shall include stakeholder engagement, phased investment planning, PPP partnerships, and institutional capacity strengthening.

10.7 Implementation Monitoring

Implementation progress shall be monitored through the Monitoring and Evaluation Framework outlined in Section 9, with regular reporting to the Municipal Board and County Government.

10.8 Solid Waste Management Implementation Matrix

The implementation matrix provides an integrated framework linking strategic interventions, financing arrangements, institutional responsibilities, and performance monitoring. It ensures alignment between the financial strategy (Chapter 8), implementation planning (Chapter 9), and monitoring and evaluation framework (Chapter 10)

PHASE 1: SHORT TERM (0–3 YEARS)

Strategic Program	Key Activity	Timeline	Lead Agency	Support Agency	Financing Source	Output	KPI (Chapter 9 Link)
Waste Collection Expansion	Procure 4 enclosed waste collection trucks	Year 1–2	Municipality	County Govt	County Budget + Development Grant	Modern fleet operational	% increase in collection coverage
Waste Collection	Establish zoned door-to-door collection system	Year 1	Environment Dept	Private Collectors	Municipal OPEX	Formalized collection zones	Coverage reaches 75%
Segregation	Roll out color-coded segregation system	Year 1–3	Municipality	CBOs	Municipal + Donor	Segregation implemented	% households segregating
Infrastructure	Develop 1 Municipal Transfer Station	Year 2–3	Municipality	Contractor	Development Partner + PPP	Transfer facility operational	Reduction in transport cost
Data Systems	Establish digital waste tracking system	Year 1–2	Municipality IT	Environment Dept	Donor Support	Functional digital system	Monthly reporting rate
Financial Reform	Introduce structured billing and tariff system	Year 1	Finance Dept	Municipal Board	Municipal Budget	Operational tariff system	Revenue collection efficiency
Dumpsite Management	Begin phased closure of uncontrolled dumping sites	Year 2–3	Municipality	NEMA	Development Partner	Site rehabilitated	Number of sites closed

PHASE 2: MEDIUM TERM (3–5 YEARS)

Strategic Program	Key Activity	Timeline	Lead Agency	Financing Source	Output	KPI
Recycling Infrastructure	Construct Material Recovery Facility (MRF)	Year 3–5	Municipality + PPP	PPP + Donor	MRF operational	Recycling rate reaches 25–40%
Organic Waste Management	Construct 2 composting facilities	Year 3–5	Municipality + PPP	Climate Finance + PPP	Compost plants operational	% organic waste diverted
Informal Sector Integration	Formalize waste picker cooperatives	Year 3–4	Municipality	Donor + NGO	Registered cooperatives	Number of integrated waste pickers
Institutional Strengthening	Develop municipal waste SOPs	Year 3	Municipality	Internal Budget	Standard procedures adopted	Compliance rate
Revenue Strengthening	Review tariff structure	Year 4–5	Municipal Board	Municipal Budget	Revised tariff	Cost recovery ratio improves

PHASE 3: LONG TERM (5–10 YEARS)

Strategic Program	Key Activity	Timeline	Lead Agency	Financing Source	Output	KPI
Final Disposal	Develop engineered sanitary landfill	Year 5–10	Municipality + PPP	County + National + Donor + PPP	Sanitary landfill operational	Disposal compliance
Environmental Control	Install leachate & gas systems	Year 6–10	Contractor	Capital Investment	Environmental safeguards	NEMA compliance reports
System Expansion	Expand MRF capacity	Year 6–10	PPP	PPP reinvestment	Increased processing capacity	Diversion rate reaches 40%+
Financial Sustainability	Gradual reduction of operational subsidy	Year 6–10	Municipal Board	Revenue Growth	Financial sustainability	Operational cost recovery ≥ 85%

Implementation of the above activities shall be guided by annual municipal work plans, budget allocations, and stakeholder coordination mechanisms. The implementation matrix shall be reviewed annually and updated based on performance progress and emerging priorities.

Chapter 11: Conclusion and Way Forward

Conclusion and Way Forward

This Solid Waste Management Plan provides a comprehensive framework for improving waste management services in Kimilili Municipality through integrated planning, infrastructure development, institutional strengthening, and stakeholder participation. The plan establishes clear strategies for waste reduction, segregation, collection, transportation, treatment, and environmentally sound disposal.

Implementation of this plan will require sustained institutional commitment, adequate financial resources, effective stakeholder coordination, and continuous monitoring of performance. The municipality shall prioritize progressive implementation of planned interventions to improve service coverage, enhance resource recovery, and minimize environmental and public health risks associated with poor waste management.

Successful implementation will support sustainable urban development, environmental protection, climate resilience, and improved quality of life for residents of Kimilili Municipality. The municipality shall periodically review and update the plan to respond to emerging challenges, technological advancements, and changing waste generation patterns.