COUNTY GOVERNMENT OF NAKURU

NAIVASHA MUNICIPALITY

SOLID WASTE MANAGEMENT STRATEGY

MAY 2019

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FOREWORD

Accumulated waste deposits are an indication of societal lifestyles, waste management practices and production technology. Some societies at the peak of their development have stagnated due to inadequate management of their waste leading to the proliferation of diseases, environmental degradation and ultimate impact on livelihoods. Improper management of waste poses a threat to Climate Change and eventually in the achievement of sustainable development. Waste is one of the contributors of greenhouse gases affects climate change and it is for this reason that as a country, we should develop sustainable waste management technologies and initiatives to curb this growing global challenge.

Through our commitment to sustainable development, Naivasha Municipality aims to balance the broader economic and social challenges of development and environmental protection. For this reason, the country subscribes to the vision of a prosperous and equitable society living in harmony with our natural resources. This is also reinforced in the Constitution under the fundamental right to a clean and healthy environment. Sound environmental management entails the use of waste reduction technologies in production, sustainable product design, resource efficiency, re-using products where possible and recovering value from products. Although elimination of waste entirely may not be feasible, systematic application of modern waste management systems should be explored and implemented.

The challenge of waste management affects every person and institutions in society. The measures set out in this strategy cannot be undertaken without a collective approach to waste challenges and the involvement of a broad range of stakeholders in their implementation. This Naivasha Municipal Solid Waste Management Strategy (NMSWMS) seeks to establish a common platform for action between stakeholders to improve systematically waste management in the Municipality. The Strategy lays the framework for improved waste management.

Eng. Festus K. Ngeno
County Executive Committee Member
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Nakuru County

PREFACE

Every person in Kenya is entitled to a clean and healthy environment, has the duty to safeguard and enhance the Environment. The Environment Management and Co-ordination Act _Ammendment_2015 and both the draft National and Nakuru County Waste Management Bills are guided with among others the following principles of public participation in the development of policies, plans and processes for the management of the environment, the principle of inter-generational and intra-generational equity, the polluter-pays principle and the precautionary principle.

It is in this context that Vision 2030 recognized that efficient and sustainable waste management systems are required as the country develops into a newly industrialized state by 2030. In this regard, Vision 2030 set flagship projects for the five cities namely; Mombasa, Kisumu, Eldoret, Nakuru and Thika to have fully functional and compliant waste management systems by developing strategies towards achieving sustainable waste management and enhancing a clean, healthy environment for all.

Although only the County Governments of these five municipalities were engaged in developing this Strategy, it was observed that waste challenges were similar in all other counties thus these systems can be replicated in other counties countrywide.

It is with this spirit that the County Government of Nakuru strived to develop this Naivasha Municipality Solid Waste Management Strategy, which will assist the public and institutions involved to adopt a **7R** oriented society, by **R**educing; **R**ethinking; **R**efusing; **R**eusing; **R**epairing; **R**efilling and **R**ecycling their waste.

All the efforts were driven towards compliance with the Environmental Management and Coordination Act of 1999 and the Environmental Management and Coordination (Waste Management) Regulations of 2006, Draft National Sustainable Waste Management Bill and policy and Draft Nakuru County Waste Management bill and Policy in order to ensure a clean and healthy environment for all, keeping in line with Article 42, of the Constitution of Kenya 2010.

Sam Weru
Chairman
Naivasha Municipal Board
Nakuru County

ABBREVIATIONS AND ACRONYMS

CBD	Central Business District
CBOs	Community Based Organizations
CGN	County Government of Nakuru
CSOs	Civil Society Organizations
CSR	Corporate Social Responsibility
EEEs	Electrical and Electronic Equipment
EMCA	Environment Management and Co-ordination Act
ENRED	Environment, Natural Resources, Energy, and Water Department
HDPE	High-Density Polyethylene
IDO	Industrial Diesel Oil
MB	Municipal Board
MEAs	Multilateral Environmental Agreements
NEMA	National Environment Management Authority
NGOs	Non-governmental Organizations
NMSWMS	Naivasha Municipal Solid Waste Management Strategy
OSHA	Occupational Safety and Health Act
PET	Polyethylene Terephthalate
POPs	Persistent Organic Pollutants
PPP	Public-Private Partnership
SWM	Strategic Waste Management

Members of the technical comittee

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CHAPTER 1

Background

Globally anthropogenic activities generate waste, which requires to be properly managed to protect humanity and the environment while enhancing its aesthetics value. The scenario is particularly evident in urban settlements, which generate large quantities of solid waste due to the high human population. Rapid urbanization has made solid waste management a serious problem today. Eight out of seventeen of the SDGs directly address issues of sanitation capturing solid waste management as a key component to safe cities. The impacts of poor solid waste management within the urban settlements, particularly cities and big municipalities can be disastrous. As such, there is a need for proper and efficient waste management practices.

The Kenya Vision 2030, the country's long-term national development blueprint, provides the framework for transforming Kenya into a newly-industrialized, middle-income country providing a high quality of life to all its citizens in a clean and secure environment by 2030. The Vision 2030 recognizes the need for efficient and sustainable waste management systems to be established as the country develops into a newly industrialized state by 2030. The perception of the people has always been that waste management is solely a responsibility of local authorities. County Governments are constitutionally bound to keep their territories clean. For some time now, they have been experimenting with several innovative & participatory methods of Reduce, Reuse and Recycle. The urban areas and cities act 2011, further decentralized waste management to municipal boards as the smallest planning unit. The municipal chatter gives the municipality full mandate on the management of solid waste. It is at the backbone of this that the Naivasha municipal board has developed this solid waste management strategy as a tool to realize its responsibility in management of waste within its area of jurisdiction.

Naivasha municipality

Naivasha is the second largest town in Nakuru County after Nakuru Town. Nationally, it is a principal town and leads in hospitality, tourism and floriculture. The municipality area covers the entire Naivasha and part of Gilgil Sub Counties an area of 951Km^2(ISUDP 2014-2034). According to the Kenya National Housing Census (2019), the Naivasha municipality resident population stood at 198,444 people, consisting of 99,109 males and 99,313 females. Using urban population growth projection of World Bank 2014 of 4% constant growth, and with the current rate of urbanisation, Naivasha Municipality will have the population threshold for a City, in the next 5 years, depicting the need for proper urban planning, land use bylaws, and supporting infrastructure.

Table 1 Population Projection

Year	2019	2029	2039	2049
Total	198,444	238,133	285,759	342,911

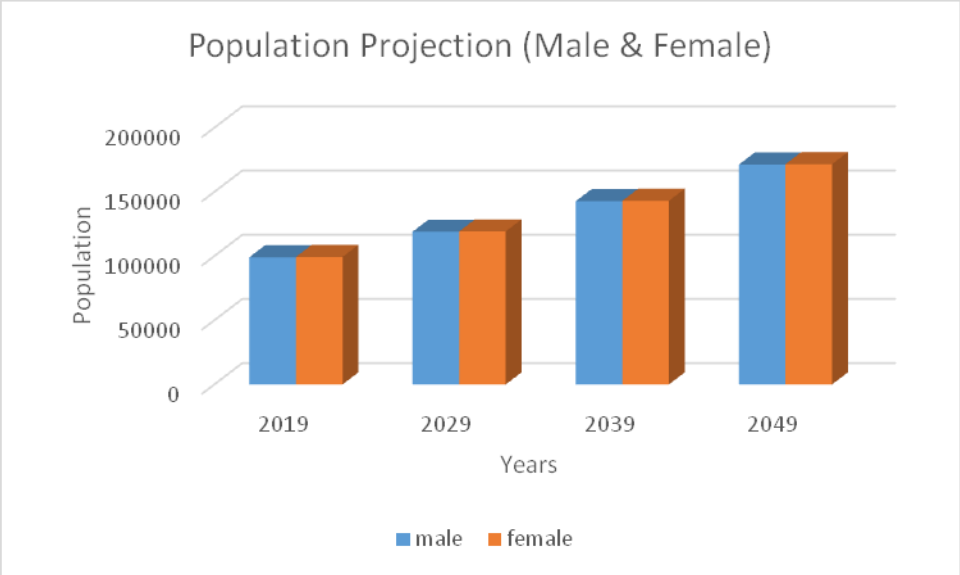

Figure 1: Population Project graph

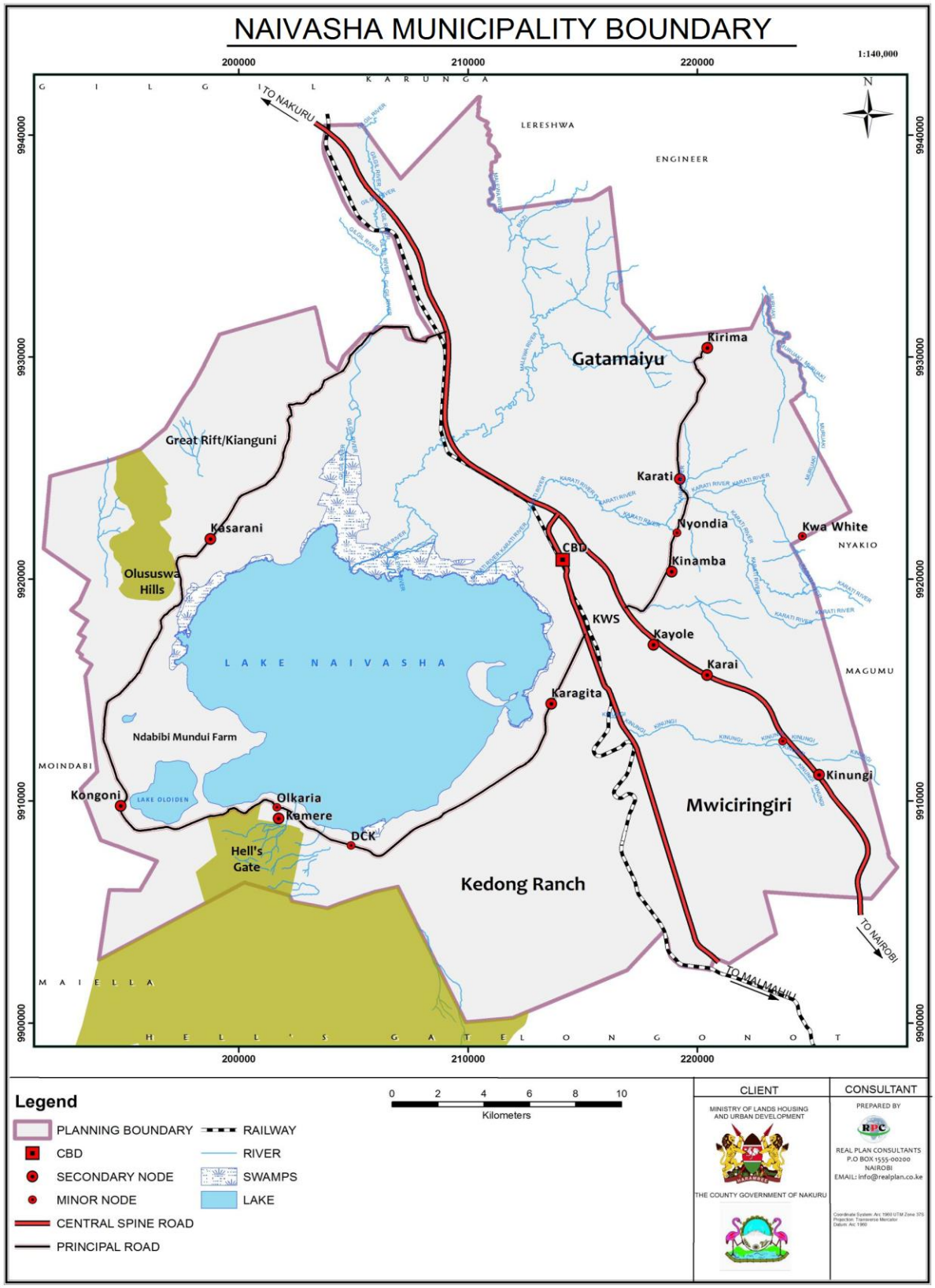

Figure 2: Naivasha Municipality Boundary Map

Goal and objectives

The goal of the Naivasha Municipal Solid Waste Management Strategy is to guide sustainable solid waste management in Naivasha to facilitate a healthy, clean and safe environment for all by 2023.

To facilitate the attainment of its goal, the strategy will pursue the following strategic objectives;

1. To increase access to improved and safely managed solid waste for all by 2023 through appropriate technologies adaptable to the needs of the municipality and conditions.

2. To establish and operate integrated and sustainable waste management systems for the protection of the environment, water sources and human health by 2023.

3. To promote private sector participation and investment in the provision of solid waste management services in Naivasha Municipality by 2023.

4. To strengthen policy, institutional and regulatory environment for efficient and effective provision of solid waste management services.

5. To promote integrated solid waste management planning and ensures sustainable financing for the same in line with county's financing commitments.

6. To strengthen solid waste management research and knowledge management framework for evidence-based decision making, programming, advocacy and learning.

Expected outcomes and impact

It is expected that successful implementation of the NMSWMS shall lead to the following outcomes:

a) Eradication of Open Dumping;
b) Access to improved and safely managed solid waste services for all;
c) Improved hygiene practices;
d) Assured enabling environment for solid waste management;
e) Increased private sector investment in provision of solid waste management services;
f) Increased public investment and sustainable solid waste management financing achieved;
g) Water resources and environment protected;

Ultimately, NMSWMS is expected to realize (i) improved environment, human health status and quality of life for all; and (ii) a clean, healthy, competitive and economically prosperous municipality.

Scope of the Strategy

Solid waste management remains a major challenge in service delivery in Naivasha municipality. Under the Urban Areas and Cities Act, Municipalities are expected to plan and establish clear solid waste management strategies within their jurisdiction. This sustainable solid waste management strategy shall be applied to Naivasha Municipality.

The strategy seek to answer the following questions:

- ***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?)***

In an effort to address the challenges of solid waste management, this strategy seek to provide for the continuous promotion of efficient solid waste management practices and build on the on-going waste management efforts towards the attainment of full compliance and ensuring a clean and healthy environment to attain zero waste within a five (5) year implementation framework.

Existing Legal Framework
Global context
International obligations – Multilateral Environmental Agreements (MEAs)
The evolving system of international conventions, agreements and treaties have provided an important framework for waste management policies across the globe.

The current global environmental governance is to a large extent a result of the Rio Earth Summit of 1992 and Agenda 21, which amongst others advocates for four major waste-related programs:

- Minimizing waste
- Maximizing environmentally sound waste disposal and treatment
- Promoting environmentally sound waste disposal and treatment
- Extending waste service coverage

The summit set in motion a series of multilateral environmental agreements (MEAs) dealing with land-based sources of marine pollution, water quality, regional trans-boundary movement of hazardous waste, the management of toxic chemicals, and the trans-boundary movement of radioactive waste, among others.

In relation to hazardous substances and waste, five principal conventions apply:
The **Basel Convention** was ratified and entered into force in Kenya in the year 2000. This convention addresses the need to control the trans-boundary movement of hazardous wastes and their disposal, setting out the categorization of hazardous waste and the policies between member countries.

Kenya became a signatory to the **Stockholm convention** on persistent organic pollutants (POPs) in 2001 and ratified it in 2004. This treaty seeks to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment. Member countries are required to phase out pops and prevent their import or export.

The **Rotterdam Convention** that Kenya ratified in 2005 sets out the procedure for Prior Informed Consent in the International Trade of hazardous chemicals and Pesticides. The convention promotes transparency in enforcing open exchange of information and calls on exporters of hazardous chemicals to use proper labeling, include directions on safe handling, and inform purchasers of any known restrictions or bans.

The **Montreal Protocol**, to which Kenya became a signatory in 1987 and ratified the subsequent amendments provides for the phase-out of the production and consumption of ozone-depleting substances in order to reduce their abundance in the atmosphere and thereby protect the earth's fragile ozone Layer.

Kenya is also a signatory to the **Bamako Convention** since 2003. This is an African nations treaty that prohibits the import of any hazardous (including radioactive) waste into Africa. The convention is a response to Article 11 of the Basel convention, which encourages parties to enter into bilateral, multilateral and regional agreements on Hazardous Waste to help achieve the objectives of the convention.

Country context
Constitution of Kenya:
In the Constitution of Kenya, Article 42 on the Environment provides that-

"Every person has the right to a clean and healthy environment, which includes the right

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

Article 69 on Obligations to the Environment, the Constitution provides that –

(1) The State shall—

(e) Encourage public participation in the management, protection, and conservation of the environment;
(f) Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;
(g) Eliminate processes and activities that are likely to endanger the environment; and
(h) Utilize the environment and natural resources for the benefit of the people of Kenya.

(2) Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources. ***Part 2 of the Fourth Schedule in the Constitution of Kenya*** also explicitly provides that the County Governments shall be responsible for; refuse removal, refuse dumps and solid waste disposal.

Vision 2030

In Vision 2030, one of the flagship projects is the Solid waste management initiative which calls for the relocation of the Dandora dumpsite and the development of solid waste management systems in five (5) leading municipalities (Nakuru, Mombasa, Kisumu, Thika,and Eldoret) and in the economic zones planned under vision 2030.

The Environmental Management and Coordination Act (EMCA), 1999 and the Amended 2015

Section 3 of EMCA, 1999 stipulates that - "Every person in Kenya is entitled to a clean and healthy environment and has a duty to safeguard and enhance the environment."

Section 86 of EMCA, 1999 provides that – "The Standards and Enforcement Review Committee shall, in consultation with the relevant lead agencies, recommend to the Authority measures necessary to:-

(2) Prescribe standards for waste, their classification, and analysis, and formulate and advise on standards of disposal methods and means for such wastes; or

(3) Issue regulations for the handling, storage, transportation, segregation and destruction of any waste."

Section 87 of EMCA 1999 states that – "(1) No person shall discharge or dispose of any wastes, whether generated within or outside Kenya, in such manner as to cause pollution to the environment or ill health to any person.

(2) No person shall transport any waste other than –

(a) In accordance with a valid license to transport wastes issued by the Authority; and

(b)To a wastes disposal site established in accordance with a license issued by the Authority.

(4) No person shall operate a wastes disposal site or plant without a license issued by the Authority.

(5) Every person whose activities generate wastes shall employ measures essential to minimize wastes through treatment, reclamation, and recycling.

Environmental Management and Coordination (Waste Management) Regulations of 2006

Regulation 2 and 5 outlines the responsibility of waste generator throughout the solid waste management chain.

There are also clear provisions in the Regulations, which govern the Responsibilities of a Transporter, to own or operate treatment facilities and disposal sites and/or facilities.

The Occupational Safety and Health Act, 2007

The Occupational Safety And Health Act (OSHA), 2007 Part IX, Chemical Safety, Section 83 Subsection IV states that:- "at every workplace where chemicals or other toxic substances are manipulated, the

employer shall develop a suitable system for the safe collection, recycling and disposal of chemical wastes, obsolete chemicals and empty containers of chemicals to avoid the risks to safety, health of employees and to the environment."

The Public Health Act, 2012

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 connection 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.

Part—(c) any street, road or any part thereof, any stream, pool, ditch, gutter, watercourse, sink, watertank, cistern, water-closet, earth-closet, privy, urinal, cesspool, soak-away pit, septic tank, cesspit, soil-pipe, waste-pipe, drain, sewer, garbage receptacle, dust-bin, dung pit, 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 wastewater, 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.

The Environmental Management and Co-ordination (Water Quality) Regulations, 2006.
Part III – Water for Industrial Use and Effluent Discharge,

Subsection 11. No person shall discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit any person to dump or discharge such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards set out in the Third Schedule to these Regulations.

The Environmental (Impact Assessment and Audit) Regulations, 2003

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 II - The Project Report, 7. (1) A proponent shall prepare a project report stating –

(a) The materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal.
(b) The products, by-products, and waste generated the project.

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

County context

Within the county context there are a number of legislative frameworks that provides standard guidelines on waste management within the respective sector and/or department. Solid waste has been extensively covered within the operation policy frameworks within the ministry of health department of public health and the ministry of environment. This strategy shall be guided by the following existing county legal frameworks.

Nakuru county Public health and Sanitation Act 2017

Part V – street cleansing as covered under section 27 -36

Part IX – addresses solid and liquid waste management under sections 82-92

The County has draft regulations on fecal sludge management. Further the department has also developed the county draft SOPs on fecal sludge.

Nakuru county solid waste management bill 2019

The bill that awaits assembly approval has been developed as the mother legislative framework to facilitate countywide management of all operations in relation to solid waste.

The County Governments Act, 2012

Section 120, Tariffs and pricing of public services, subsection (3) A tariff policy adopted under subsection (1) shall reflect following guidelines — **part (h)** promotion of the economic, efficient, effective and sustainable use of resources, the recycling of waste, and other appropriate environmental objectives.

The Urban Areas and Cities_ Amendment_ Act 2019

Functions of a Board

Section 20(1) part q. Promote a safe and healthy environment.

CHAPTER 2

SOLID WASTE SITUATION ANALYSIS

The Naivasha municipal solid waste management strategy is developed in the context, and takes cognizance of international, national and county policy enunciations. These include the Sustainable Development Goals, the Constitution of Kenya, 2010, the Kenya Vision 2030, the Kenya Environmental Sanitation and Hygiene Strategic Plan (2016-2030), the National Water Master Plan 2030, and the second Nakuru County Integrated Development Plan (2018-2022) among others.

OVERVIEW OF THE CURRENT STATUS OF WASTE MANAGEMENT IN NAIVASHA MUNICIPALITY

WASTE MANAGEMNET SERVICE CHAIN

The waste management service chain depicts current status in the Municipality.

Figure 3: Current waste service chain

Waste Generation and storage

Once the wastes are generated, the owners of the premises temporarily store them within the premises awaiting collection. The owners of the premises provide own storage receptacles .Waste from the Lake is removed and collected periodically. The wastes is majorly not segregated apart from the health care facilities.

Street Cleansing and Markets Cleaning

The Municipality uses permanent municipal staff however due to understaffing, hired casuals labourers are engaged on a three (3) months contract. The municipality provides street cleansing at public spaces (squares, streets, parks, and gardens, markets). Private contractors undertake litter picking within their respective zone areas where they provide services.

Waste Collection

To ease waste Management Naivasha municipality has established six (6) zones (insert table and map) .Based on the current trends the municipality intends to review the zoning. The municipality has mandated

private entities (registered groups & companies) to offer waste collection service within specific zones through a contractual agreement while in the CBD task is done by the municipality. A collection schedule is used by all the service providers ensuring that routinely waste management is adhered to. However there are not designated waste transfer stations to ease the collection process within the municipality.

Photo: Stationed Waste Bins

Waste Loading and transportation

Manual loading is done by use of improvised tools and equipment (shovels and gunny bags).The personnel /waste handlers have protective gears however sometimes inappropriate and inadequate.

Waste transportation is largely rudimentary using open trucks and tractors trailers. These transportation modes, sometimes lead to littering, making waste an eyesore.

Most of the access roads are in deplorable state hence makes frequent breakdown of waste transportation vehicles in estates and at the dump site.

Disposal Sites and Recycling

naivasha municipality has one designated dumpsite located in Kayole-Unity farm seven (10) kilometers from CBD. On-site data collection is lacking: without effective data management, waste disposal estimates are unreliable. Data from the municipal environment office indicate that approximately 56tons of waste is delivered at the site per day (around 8 trucks per day). The disposal site does not meet the minimum standards for a standard sanitary landfill as stipulated in the NEMA waste regulation 2006. Waste recycling is done on small scale by private scavengers located within the dumpsite, however there are no clear legal framework to guide the process. It should also be noted that the current recycling process takes up a minimum percentage targeting only non-biodegradables i.e. plastics, paper, iron bars.

This strategy provides an entry point for the municipality to establish a clear legislative framework that will facilitate enhanced waste recycling.

Waste Composition

According to a study carried by Matt MacDonald in 2017, over 80% of the waste generated from both residential and commercial areas was biodegradable. A broader representation of solid waste composition in the municipality is as follows;

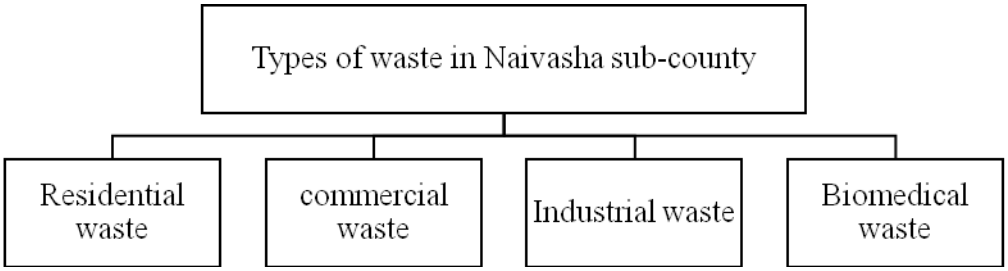

Figure 4: Types of Waste in Naivasha Sub County

Residential Waste

Waste collected from residential areas is nearly 80% biodegradable materials, which is a combination of organic food, paper, cardboard, textiles, and fines. The remaining 20% of non-biodegradable materials comprised plastics, glass, ferrous, non-ferrous, hazardous waste, and miscellaneous combustibles. In the residential waste stream, organic food waste is the main category at 57%. Meanwhile rural and high-income areas have less food waste in the residual waste stream when compared with middle-income areas.

Textiles/rags are present in predominately-low income and rural areas, this is informed by the fact that the Kenyan culture encourages families to hand over used clothing to those in need within and outside the family unit. Waste from high-income predominantly comprise of packaging material (paper, cardboard, non-ferrous drink cans, glass, and polyethylene terephthalate (PET)).

Table 2: Residential waste composition

Waste Category:	***kg:***	**Percentage:**	**Mean:**	**High:**	**Low:**
Paper	*179.6*	7.1%	7.3%	9.9%	3.9%
Cardboard	*45.5*	1.8%	1.7%	2.5%	0.0%
HDPE	*27.5*	1.1%	1.2%	3.4%	0.0%
PET	*44.0*	1.7%	1.7%	4.2%	0.0%
Other Plastics	*263.6*	10.4%	10.3%	12.9%	4.1%

Glass	*97.5*	3.9%	3.9%	12.1%	0.0%
Textiles	*72.0*	2.8%	3.3%	10.7%	0.0%
Organic Food	*1439.4*	56.9%	56.6%	82.4%	39.1%
Organic Garden	*0.0*	0.0%	0.0%	0.0%	0.0%
Ferrous	*31.2*	1.2%	1.2%	1.6%	0.6%
Non-ferrous	*10.5*	0.4%	0.4%	1.1%	0.0%
Hazardous	*3.0*	0.1%	0.1%	0.6%	0.0%
WEEE	*0.0*	0.0%	0.0%	0.0%	0.0%
Hard Plastics	*29.5*	1.2%	0.9%	5.6%	0.0%
Misc. Combustibles	*27.0*	1.1%	1.1%	3.2%	0.0%
Nappies	*46.0*	1.8%	1.7%	4.7%	0.0%
Fines	*212.5*	8.4%	8.7%	12.4%	3.2%
Total:	2528.7	100.0%			

Commercial Waste

The waste stream from the commercial areas of Naivasha is distinct from the residential waste and represents the growth of the hospitality and leisure sector of the municipality which is expanding at a fast pace.

The wholesale market waste produces predominately fruit and vegetable waste (>97%). The remaining waste is made up of paper, cardboard, textiles, and plastics. The textiles are worn out hessian bags used to transport fruits and vegetables.

Waste from the wholesale market is collected 6 days a week and has little contamination (<4%) making it ideal for organic waste treatment. The waste from the remaining commercial areas represents the hospitality and leisure sector with packaging (paper, card, high-density polyethylene (HDPE), PET, other plastics, glass, ferrous and non-ferrous) contributing 46% and organic food 39%.

Table 3: Commercial waste collection by private contractors

Waste Category:	**kg:**	**Percentage:**	**Mean:**	**High:**	**Low:**
Paper	283.5	12.0%	14.1%	37.8%	6.6%
Card	168.5	7.1%	7.4%	12.4%	0.9%
HDPE	8.5	0.4%	0.4%	0.7%	0.0%
PET	66.0	2.8%	2.7%	4.4%	0.8%
Other Plastics	321.0	13.6%	13.9%	18.7%	9.7%
Glass	159.0	6.7%	5.8%	13.0%	0.0%
Textiles	77.0	3.3%	2.9%	6.1%	0.5%
Organic Food	917.8	38.9%	37.5%	57.1%	21.4%
Organic Garden	0.0	0.0%	0.0%	0.0%	0.0%
Ferrous	36.2	1.5%	1.5%	1.9%	1.0%
Non-Ferrous	39.5	1.7%	1.8%	5.6%	0.0%

Hazardous	0.0	0.0%	0.0%	0.0%	0.0%
WEEE	0.0	0.0%	0.0%	0.0%	0.0%
Hard Plastics	0.0	0.0%	0.0%	0.0%	0.0%
Misc. Combustibles	26.5	1.1%	1.3%	2.4%	0.0%
Nappies	1.0	0.0%	0.0%	0.2%	0.0%
Fines	257.5	10.9%	10.6%	12.5%	7.7%
Total	2362.0	100%			

Types of waste streams and their management

There are various waste streams generated in, Naivasha Municipality that can be categorized as domestic, municipal, industrial and hazardous wastes. Other emerging waste streams, such as e-waste, and waste tires are as a result of growing industrialization and growth of ICT. The composition of general waste varies considerably between households, businesses, and industries.

Domestic waste:

Domestic waste is also referred to as garbage, refuse or trash. It consists mainly of biodegradable waste, which is food, and kitchen waste, green waste paper and non-biodegradable such as plastics, glass bottles, cans, metals and wrapping materials. The composition of the domestic waste streams is a function of income, consumption patterns and recycling opportunities. Nationally domestic waste is not adequately managed and is disposed of at our disposal sites with minimal sorting/segregation.

Waste Tyres:

Waste tires are an emerging waste stream that has reached their end of life due to wear or damage and cannot be recycled or reused. There are no established formal systems for collection and recycling of tires with the exception of retreading. As such the bulk of the tiresare informally collected and often illegally burnt in the open to recover steel for recycling. This emits harmful gases causing air pollution and soil contamination arising from the residues. Currently, only two facilities in the country are using waste tires as fuel and for producing industrial diesel oil (IDO). To address the management of waste tires, NEMA has developed relevant regulations.

Construction and demolition waste:

This is waste that is generated as a result of new construction works, remodeling or demolition. Construction waste comprises debris, steel, timber, iron sheets, tiles and ceramics among others. Although construction and demolition waste is not classified as hazardous, a mixed waste source requires separation into component parts for the purposes of recycling. These wastes currently end up in the disposal sites or are used for backfilling in our road networks.

Asbestos Waste

Demolition wastes may include asbestos, which is hazardous and can present a significant health risk when improperly disposed or reused. NEMA has developed guidelines on safe management and disposal of Asbestos.

Industrial waste:

Industrial waste is the waste produced by industrial activity, which includes any material that is rendered useless during the manufacturing process. Industries produce both hazardous and nonhazardous waste. These wastes include chemical solvents, paints, sandpaper, and paper products, industrial by-products, metals, municipal solid waste and radioactive waste.

Currently, most of the hazardous industrial waste is not pretreated before reuse, recycling or disposal. This poses health risks to the handlers and causing damage to the environment. Disposal of hazardous industrial waste illegally occurs at the municipal landfills. However, some industries have embraced best practices in disposing of the industrial waste by seeking guidance from NEMA on appropriate disposal methods.

Biomedical Waste

Biomedical waste also referred to as medical waste refers to waste generated in health facilities, research institutions or during immunization of human beings and animals. It's classified into; Infectious waste, sharps, pharmaceutical wastes, chemical waste, and pathological waste. Biomedical wastes pose risks to human health due to its pathogenic characteristics and hence require prior treatment before disposal.

Currently, segregation is fully embraced in most hospitals and clinics based on the guidelines issued by the Ministry of Health. Although the biomedical waste is expected to be disposed of through incineration, some find its way to the municipal landfills while some are handled through rudimentary facilities such as kilns. While big hospitals have embraced proper biomedical waste management, the major challenge remains the small clinics, which practice illegal disposal of these wastes.

E-waste:

E-waste is an emerging waste stream arising from Electrical and Electronic Equipment (EEEs) becoming obsolete at the end of life. Kenya has experienced a rapid increase of e-waste due to the adoption of ICT across all sectors and an influx of low-quality EEEs. E-waste comprises of heavy metal components and materials used in the manufacture of electronic goods. Some of these include mercury, brominated flame retardants, and cadmium which are considered hazardous if not well handled during dismantling or recycling can become harmful to human health and the environment.

As a municipality, limited infrastructure has been put in place to deal with e-waste. NEMA has developed E-waste Regulations which assist the municipality in regulating e-waste by registering producers, licensing of recyclers and preventing the entry of sub-standard EEEs. In addition, the Regulation has extended responsibility to producers to bare the cost of recycling of the products commonly known as

extended producer responsibility. Currently, however there are only two licensed facilities in the Country, which are undertaking e-waste management.

Batteries:
Batteries can either be alkaline (dry cells) or acid based which support domestic and industrial applications. The acid based (rechargeable and silver oxide) batteries contain heavy metals such as mercury and cadmium, which are classified as hazardous substances. This hazardous material if not properly handled and disposed of presents a risk the human health and the environment.

Currently, there are no recycling or disposal facilities for alkaline, rechargeable and silver oxide batteries. As such the batteries are disposed in the open landfills alongside domestic waste. On the other hand, lead-acid batteries, which are also considered hazardous waste, are recyclable and by February 2015 NEMA had licensed two facilities for their recycling in the country.

Fluorescent Lamps:
Fluorescent lamps are used for illumination and contain a small amount of mercury. The mercury is a neurotoxin and can be harmful even in small quantities. Fluorescent lamps can be successfully recycled and the mercury recovered. However, if poorly handled at any stage this releases the mercury, which is hazardous. Increasingly people are adopting florescent lamps as energy saving devices across the country, which is likely to compound the challenge of their disposal. So far, NEMA has licensed one facility for recycling fluorescent lamps.

Pesticide Waste:
Pesticides are chemicals used to control pests. Pesticide waste consists of expired and contaminated pesticides as well as the used containers. Due to their toxicity, potential to pollute and threat to human health, pesticide wastes are extremely hazardous and must be transported, treated and disposed of accordingly. These pesticides can contain persistent organic pollutants (POPs), which can accumulate in the food chain if not well managed. Large-scale generators of pesticides waste incinerate or export the waste to developed countries for treatment or disposal. However small scale generators dispose of in their farms.

Used Oil and Sludge:
Used Oil and Sludge arises from the use of petroleum products. This contains potentially hazardous compounds such as poly-aromatic hydrocarbons that have carcinogenic and mutagenic properties. Used oil and sludge have a slow rate of decomposition and hence any spillage can accumulate in the environment causing soil and water pollution. This waste is currently recycled to produce lubricants and industrial oil used in furnaces and boilers. Though illegal, used oil is also largely applied in the treatment of timber and dust suppression. NEMA has developed guidelines for the management of used oil and sludge and has licensed a few used oil and sludge handlers.

Sewage Sludge:

Sewage sludge is a sediment material that accumulates over time in the sewage treatment plants and ponds. The widespread disposal of industrial effluent via sewage treatment works results in contamination of sewage sludge with hazardous chemicals, thereby posing particular challenges for its disposal. The sewage sludge that is contaminated by heavy metals from industrial effluent can severely contaminate agricultural land to which it is applied. However, a high proportion of the contaminated sewage sludge continues to be disposed of in landfills. In this regard, there is need to pre-treat contaminated sewage sludge before disposal. Uncontaminated sewage sludge has a variety of commercial uses and can be recycled.

Current Waste Management Practices

Waste Segregation

- Most of the waste is generated at household, market places, public institutions, and commercial areas including industrial sites. It is however expected that all the waste is segregated at the point of generation, a practice that has not seen the light yet. Noted yet is that most of the segregation works are done at the dumpsite by scavengers. Most of the segregation activities are done at the dumpsite by informal groups as the municipality works on formalizing.

Waste Collection and Transportation

- Waste in the CBDs is largely collected by the municipality while private operators contracted by the County Government undertakes collection in residential areas at a fee under terms set by the county
- Waste collectors obtain permits from the County Governments to collect waste from designated areas
- NEMA issues annual licenses to waste transporters in accordance with the provisions of the waste management regulations of 2006. However, some waste transportation vehicles operate illegally as they do not meet NEMA requirements.

Waste Treatment

- Waste treatment technologies have not been fully embraced by the municipality, this is associated to the lack of a clear policy framework. However, there are on-going efforts to enhance waste treatment practices through public private partnership framework that is under trial at the county level. The World Bank funded Nakuru County to undertake a feasibility study on Integrated Waste Management PPP Project, which has seen a PPP arrangement between Naivawasco and private sector Sanivation on a small scale project on use of sludge to make briquettes. The municipality is keen on thriving on this model as it streamlines waste management through this strategy.
- It is believed that recyclable materials comprise 50 – 80% of the general waste stream. Some private entities exist that receive recovered materials such as paper, polythene, plastics, waste tires for recycling. There is low public awareness of these facilities and hence majority have not achieved optimal operations;

- Fecal sludge and other non-biodegradable waste from the sewerage treatment plant is not properly treated.
- A few composting facilities exist especially in horticultural farms;
- Thermal treatment of waste by use of incinerators is increasingly being adopted by health facilities. However, most incinerators do not comply with the requirements of the Third Schedule of the waste management regulations of 2006.

Waste Disposal

- Most of the municipal and domestic waste generated is disposed of in open dumpsite (Naivasha Dumpsite). Although this is not a recommended practice it is the most common practice
- Biomedical waste is largely disposed of through incineration and rudimentary kilns;
- Condemned, damaged or expired goods are disposed of through incineration or in the cement kilns.
- The existing incineration facilities have been largely burners and kilns and do not meet the requirements stipulated the Third schedule of the waste management regulations of 2006.
- Most of the workforce operating these disposal sites have minimal or no training on how to manage these facilities.
- Construction and demolition wastes currently end up in the disposal sites or are used for backfilling in our road networks and also dumped in open spaces.

Challenges in Waste Management

Waste management challenges within the municipality are broadly categorized under; waste management systems, limited knowledge, attitude and practices, political will, technical and financial resources.

The Absence of a Municipal-level SWM Strategy:

Naivasha Municipality does not have a solid waste management strategy of its own. As a result, SWM is largely viewed solely as an engineering responsibility for collection and disposal. Solid waste management is no more a technical issue. It needs social, fiscal and administrative solutions as well. The enactment of the Urban Areas and Cities Act 2011 (Amendment 2019), municipalities were vested with full mandate to administer best practices to waste management. This mandate has facilitated the development of the Naivasha Municipal Solid Waste Management strategy 2019-2023. The strategy lays down the principles of waste management and clearly defining the roles of each player in the waste management hierarchy.

Lack of awareness and knowledge:

There are limited awareness and knowledge on the importance of a clean and healthy environment. This has led to poor practices by the Public towards waste management, which has led to environmental pollution. As such there is poor handling of waste at the household level including lack of segregation, reuse, reduce and recycling. In addition, negative attitude towards waste management and failure to take individual responsibility has contributed to poor practices such as littering, illegal dumping, and open

burning. 'We dump – They collect' is the general attitude among the residents by over a long period. Solid Waste Management and adoption of 7Rs approach is not their concern.

Negative public perception:
The average resident views SWM as a Municipal responsibility. The general public carries a negative perception of the role played by the municipality mainly because of the conspicuous quantities of waste lying uncollected on the town's open spaces and stormwater drains for days. At the same time, there is widespread resistance to the call for separation of waste at the household level. It is viewed as a move by the Municipality to shy away from one of its customary responsibilities and hand over the same as the responsibility of the households. This lack of civic awareness and public cooperation has always plagued the municipal efforts to keep it clean.

Political influence and lack of good will:
Political goodwill is key to the ultimate success of proper waste management in the municipality. The political class bares the legislative role that influence policy formulation process. It is clear that without a clear policy framework, enforcement of adherence to proper waste management practices could be a process in futility. In view of this the municipal board to engage the legislature so as to give more funding on solid management agenda.

Disposal sites: Availability, siting and management.
Site/location-the Naivasha waste disposal site is located at Kayole. The site happen to be on an elevated topography that makes it vulnerable to emission of pollution. Residential homesteads have be built around the site posing a health threat.

Management of the disposal site- management of the site cognizant with its location poses a serious challenge to the municipality.

Funding:
Improper prioritization for waste management in the counties has led to inadequate budgetary allocation. As a result, management of the entire waste management cycle (collection, transportation, and disposal) is hampered. Low funding has also affected investment in waste management facilities and equipment.

Lack of segregation:
There is a lack of waste segregation at source leading to mixed wastes which are collectively disposed of in the landfills. Where sorting is done, the problem is compounded by the lack of compartmentalized vehicles for transportation of the sorted waste leading to the remixing. This hampers material recovery, reuse, and recycling. The sorting has largely been relegated to the lowly in society such as the waste pickers and street urchins.

Limited Institutional Capacity:
The Municipality experiences inadequate financial & human resources to address solid waste issues effectively. Under the circumstances, they have had very little opportunity to expand their knowledge horizons and enhance technical expertise. They need exposure to modern SWM applications.

Slow adoption of modern technological options:
Although there are many waste management technologies in the country, there has been low adoption of the same by the relevant practitioners. This as a result of diverse factors including inadequate financial resources to purchase the equipment, lack of incentives including tax waivers, resistance to change, lack awareness, unavailability of land and weak enforcement.

Weak Partnerships (PPP):
Like many municipalities across the country, Naivasha municipality has engaged through a county structured private partnership framework private waste collectors who have invested in the sector**.** It is however noted that inadequate legislation on private public partnership engagement has been the biggest hindrance to attaining full potential and harnessing the benefits of this arrangement.

Lack of adequate database and record keeping on solid waste management chain:
Proper record keeping is a key element in sustainable waste management as it is an instrument to check and track waste through the chain. There is no weighbridge to weigh the volume of waste that gets into the dumpsite per day. There is a need to know the volumes of waste generated per day both from residential and commercial areas. Without adequate record keeping and realistic databases it is difficult to improve the quality of planning and delivery of waste services in the Municipality.

Lack of data backup- currently there is a hand book for recording information at the dumpsite but no back up for the same hence the risk of losing it. There is need for equipped site office.

Inadequate participatory mechanisms:
The municipal administration does not have adequate institutional mechanisms to engage the residents, public organizations, Civil Society Organizations (CSOs) and other stakeholders on a regular basis to assist in indecision making and solid waste program implementation. The role that these stakeholders can play in educating the masses and mobilizing their communities has not been adequately utilized.

SWOT Analysis:

STRENGTHS	WEAKNESSES
1. Existence of public private partnerships **2. Human resources** **3. Recognition of solid waste management options** **4. Existing solid waste infrastructure** **5. Law and policy framework** **6. Existence of other infrastructure and land** **7. Budget allocated for solid waste management** **8. Political goodwill for solid waste management projects**	**1.** Low budgetary allocation and limited resources 2. Old infrastructure 3. Low coverage of sanitation and solid waste management 4. Low levels of awareness, education and research 5. Lack of solid waste management strategic plan 6. Inadequate skilled and non-skilled technical staff

	7. No County environmental law/policy/guidelines 8. No Municipal environmental law/policy/guidelines 9. Poor coordination and an overlap of responsibilities among departments 10. Weak enforcement structure 11. Inequality and exclusion 12. Poor implementation of procedures 13.Old and substandard tools and equipment/vehicles 14. inadequate office space
OPPORTUNITIES	**THREATS**
1. Willingness of stakeholders to support solid waste management activities **2. Availability of donor funding** **3. Diverse technologies** **4. Availability of technical expertise** **5. Existing policies/guidelines/strategies/bills awaiting approval** **6. Availability of land for expansion** **7. Research institutions - support** **8. Political alignment** **9. Topographical alignment**	1. Rapid population growth 2. Disease outbreaks i.e. emerging and re-emerging diseases 3. Weak political goodwill at municipal ward level 4. Pollution of water courses and lakes 5. Vandalism and theft of infrastructure 6. Climate change – floods, droughts 7. Delayed funding by partners 8. New unplanned centers and markets

CHAPTER 3

The Waste Management Cycle and the ideal approaches:
The waste management cycle comprises;

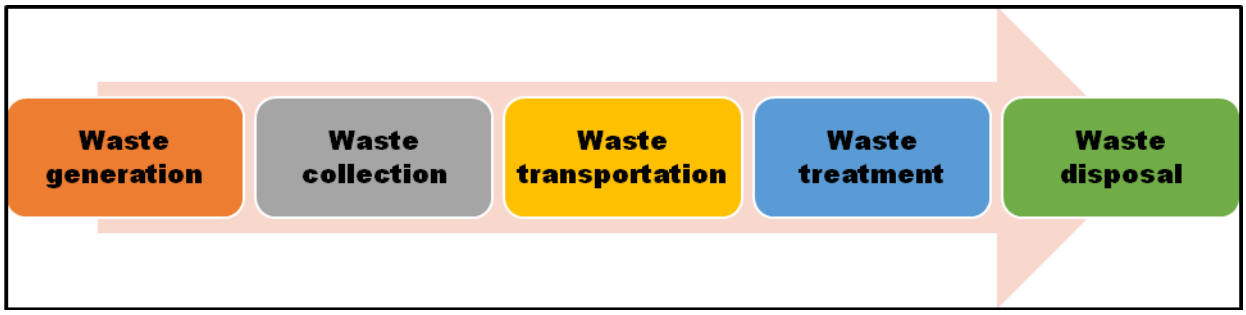

Figure 5: Solid Waste Management Cycle

Waste Generation
Most of the waste is generated at household, market places, urban and peri urban centres, institutions and industrial zones. Ideally, the waste generator should endeavor to minimize waste by reducing, reusing, refusing, returning waste or by adopting cleaner production technologies;

All waste generated should be segregated at source;

The municipality and the licensed service providers should provide color-coded bags or bins as per the NEMA guidelines for the segregated waste;

Waste Collection
Waste collection is the main point of interface between the public and waste service providers who are either the Government or the private sector.

Collection centers/transfer stations should be established at strategic areas within a town.They should be fully equipped with waste receptacles, which should either be color coded or labeled with the specific waste stream to promote waste segregation.

All waste collection centers should be zoned/ designated by the municipality.

These collection areas should be properly managed and maintained with frequent and timely collection of waste to avoid scattering into undesignated areas.

Adequate measures should be put in place to manage any leachate from the waste receptacles and collection areas;

The municipality should strengthen Public-Private-Partnerships with organized groups to enhance waste collection within the informal settlements and low-income areas.

Waste Transportation

The municipality and private collectors should provide adequate transport for the various segregated waste streams;

The waste transportation conform to NEMA guidelines on waste transportation and the County Public Health and sanitation Act 2017, Public Health Act Cap 242 LOK.

Waste Treatment

The following waste treatments technologies are highly recommended to enable the Municipality to achieve a reduction of waste directed to Landfills and other disposal facilities.

Material recovery technologies

Recycling

Recycling is the processing of waste material into a new product of similar chemical composition.

Recycling prevents wastage of potentially useful materials, reduces the consumption of fresh raw materials and energy usage in addition to reducing pollution.

Composting

Composting is the biological decomposition of biodegradable solid waste under controlled aerobic conditions to produce compost

Compost is used as an organic fertilizer in agricultural production. The municipality shall endeavor to provide favorable environment for waste composting.

Waste to energy/ Energy recovery technologies

Thermal treatment of waste:

Thermal treatment is the combustion of waste at specific temperatures with or with no air supply as part of the process and includes waste incineration, gasification and pyrolysis. The un-reusable and unrecyclable wastes can be subjected to thermal treatment, which is an environmentally sound technology that reduces the volume of waste and inserts any hazardous components. At the same time, energy can be recovered as an end product:

Waste Incineration

Incineration is controlled the burning of solids, liquids, and gaseous waste.

The technology is applicable in the management of both hazardous waste streams as well as municipal solid waste.

Incineration should be undertaken in facilities that meet the requirements in the Third Schedule of the Environmental Management and Coordination (Waste management) Regulations of 2006.

Gasification:

Gasification is a process of reacting waste at high temperatures greater than (>700 °C), without combustion, with a controlled amount of oxygen and/or steam to generate useful products such as electricity, chemicals, fertilizers, and natural gas. This could be an important option in Landfills.

Pyrolysis:

A pyrolysis is a form of treatment that chemically decomposes organic materials by heating the absence of oxygen. Pyrolysis typically occurs under pressure and at operating temperatures above 400-500 degrees Celsius. The National Solid Waste Management Strategy highly recommends thermal treatment of waste as it leads to the generation of useful products besides waste treatment.

Biological treatment of waste:

This is a natural process that occurs where plant and animal materials (biomass) are broken down in the presence of microorganisms. Biological treatment of waste can either be anaerobic or aerobic. In anaerobic treatment, waste is broken down in the presence of microorganisms and in the absence of air while in the aerobic treatment, biological degradation of organic waste takes place in the presence of oxygen. Useful products are derived from these two processes mainly biogas which produces electricity and organic fertilizer.

Sanitary Land Fills

Disposal refers to the depositing or burial of waste on land.

The Sanitary landfills should be lined with systems to collect leachate and methane gas.

There should be frequent spreading, compacting and covering of waste with soil or any other appropriate covering material to avoid environmental pollution and scavenging.

The National Solid Waste Management Strategy highly recommends minimal disposal of waste and the establishment of properly engineered sanitary land fill Landfills with systems to collect leachate and methane gas.

CHAPTER 4

WASTE MANAGEMENT STRATEGY

The Strategy has been formulated with the aim of gearing the Municipality towards achieving sustainable solid waste management with Zero Waste status.
The Naivasha Municipal Solid Waste Management Strategy is anchored on the premise that:

Solid Waste Management covers all activities pertaining to the solid waste management system in accordance with best principles and practices of public health, Environment, economics, engineering, conservation and aesthetics. Its scope will include administrative, financial, legal, planning and engineering aspects.

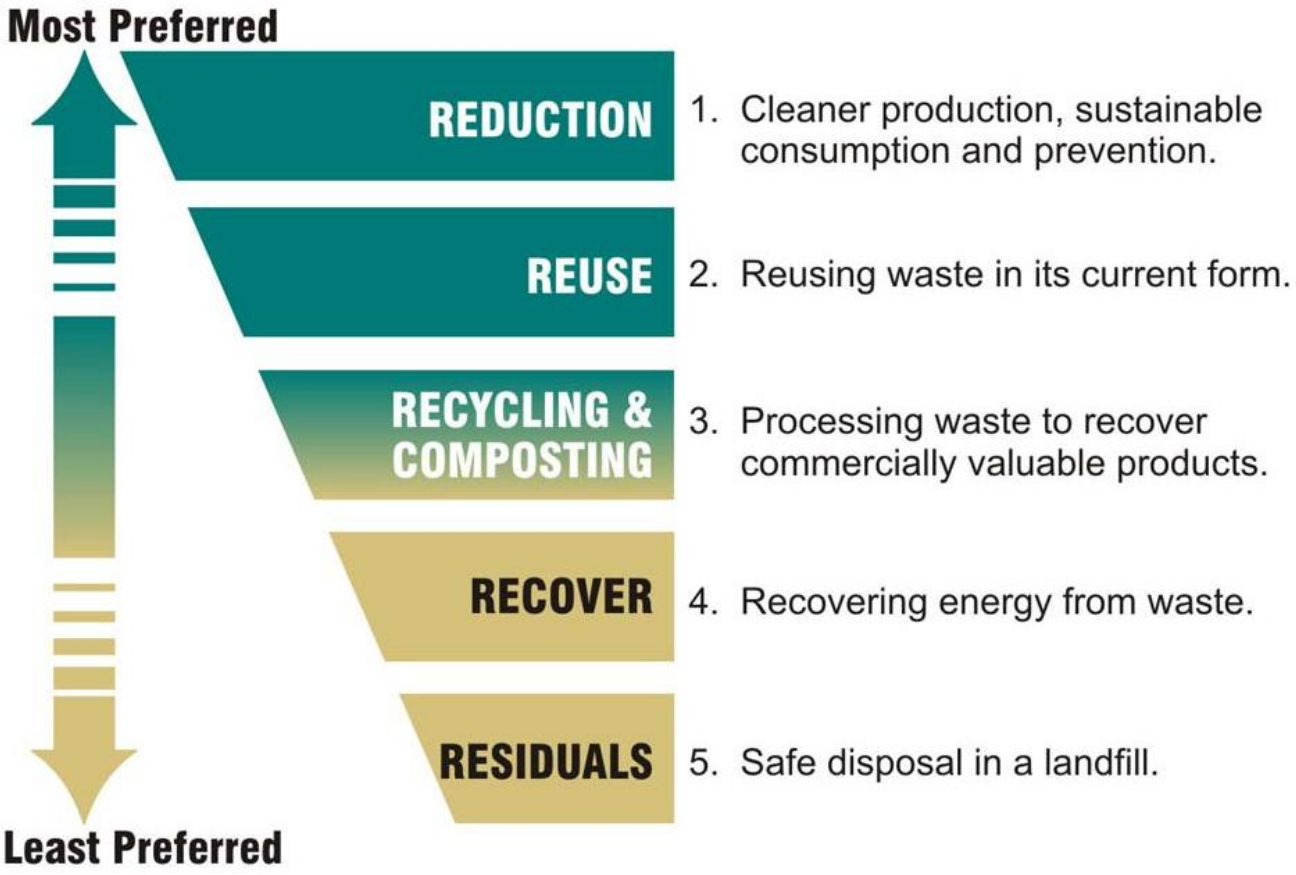

Figure 6: Integrated Waste Manageent Hierarchy

The Strategy is guided by several key principles which includes;

Guiding principles

Guiding principles dictate how the solid waste management in Naivasha municipality will do things in the future. They define a method of grappling with the situation and of ruling out a vast array of possible actions, they help tackle obstacles identified in the diagnosis of the current situation and are built on strengths and opportunities identified for the municipality. Guiding principles will ensure future actions are coherent with the strategy and will help reach the vision 2030. The guiding policy/principles outlines an overall approach for overcoming the obstacles highlighted in the diagnosis of the current situation.

Governance, institutional and financial aspects

G1. Transparency and accountability

Spending on solid waste management practices shall be earmarked and ring-fenced in a unified agreed upon the municipality solid waste management budget. An evaluation framework shall be in place to ensure regular monitoring of solid waste management investments. All service charges and levies must be redirected back to the line departments.

G2. Institutional strengthening

Resources shall be allocated to capacity building, training and continual professional development and institutional strengthening. Responsibilities of different departments for solid waste management and shall be clearly defined.

G3. Public private partnerships

Existing capacities shall be taken advantage of through public-private partnerships and Corporate Social Responsibility principles applied.

Social aspects

S1. Social inclusion and human rights

Available resources for solid waste management and sanitation shall be allocated on a per-capita basis to serve all, including vulnerable and marginalized groups. No person shall be excluded from services on the basis of tenure security. Cross-subsidy principles shall be adopted to ensure equitable access to services and social inclusion. [Refer to articles 10 and 56 of the Constitution of Kenya]

S2. Public participation

The opinions of the users shall be taken into account in making decisions concerning the provision of solid waste management services. [Refer to article 174[c][d] of the constitution of Kenya]

S3. Service approach

Instead of the classic project-oriented approach that limits itself to the implementation of solid waste management and sanitation structures, a service-oriented approach sensitive to the needs of the low-income segments of the population shall be adopted. This approach is long term, focuses on the user and takes life cycle costs of solid waste management and sanitation solutions into account.

S4. Community awareness, social marketing and behavioural change

Solid waste free environment and health promotion services and good household hygiene practices are essential components of solid waste management services. Awareness campaigns and behavioural change strategies that are sensitive to cultural aspects shall be adopted and implemented in urban and peri-urban contexts alike.

Environmental aspects

E1. Water source protection

Water sources shall be properly mapped, inventoried and protected in strict adherence to the environmental laws and by applying the principles of subsidiarity and "polluter pays". International conventions regarding environmental protection shall inform municipal level guidelines.

E2. Reduce, re-use, re-cycle

Any solid waste management practices and sanitation solution shall take into account the whole chain from user-interface to final disposal or re-use.

A considerable number of municipal residents must be whipped to support municipal SWM efforts to adopt a **7R** principle (**R**educing; **R**ethinking; **R**efusing; **R**eusing; **R**epairing; **R**efilling and **R**ecycling) and are seeking municipal guidance and follow-up

Technical aspects

T1. Choice of technologies. When evaluating SWM and sanitation technologies, preference shall be given to those alternatives which:

• Are appropriate to local conditions, i.e. materials available and available capacity for operation and maintenance

• Are demanded or accepted by the users

• Minimize the environmental impact

• Have the lowest total costs. The total cost for a SWM and sanitation alternative includes investment costs, capital maintenance costs and operations and management costs along the whole SWM chain: user interface, collection and transport, treatment and final disposal/re-use.

T2. Knowledge management

A proportion of the - SWM budget for the municipality shall be allocated towards research and development for validation, innovation and continuous improvement of SWM solutions. Technical as well as social staff shall be constantly trained and professionalized.

Implementation of the strategy

The strategy applies to the entire SWM sector in Naivasha municipality and shall be implemented on all levels. However, for the municipality to gain experiences on how to implement the strategy most successfully, a gradual and incremental implementation can be valuable. In order to successfully implement the strategy, several elements need to be in place:

• An organization that owns the strategy and that has the potential of carrying out the strategy successfully – the municipal board;

• Adequate resources: financial and human resources, as well as knowledge;

• Strategy-encouraging policies and strategic leadership;

• Communication of the strategy and engagement of all relevant stakeholders, including the community;

• Monitoring of the organization's progress in following the guiding principles towards achieving the vision;

• Definition of the rhythm of the strategic implementation: how often should meetings take place, how should the implementation of the strategy be aligned with relevant existing processes within the municipality, etc.

The framework

The Strategy has been developed to enable the Municipality to meet the goals for solid waste management as summarized below:

Table 4: Summary of goals for solid waste management

Overall strategy goals	**i. Protection of public health Improve the health of the residents-Review** **ii. Reduction of poverty improvement of socio-economic status** **iii. Reduction of waste management costs** **iv. Protection of environment**
Guiding principles	Zero Waste Principle (Waste is a resource that can be harnessed to create wealth, employment and reduce pollution of the environment)
Long-term goals	achieve approximately 80% waste recovery (recycling, composting and waste to energy) and 20% landfilling in a Sanitary landfill (inert material)by 2030
Mid-term goals	Achieve 50% waste recovery (recycling, composting and waste to energy) and 50% semi-landfilling by 2025
Short-term goals	Achieve 30% waste recovery (recycling, composting) and 70% controlled dumping (tipping, compacting and covering) in key urban areas by 2020
Key Priority areas	• Preparation of Municipal based waste management action plans that are consistent with County and national solid waste management strategy and other relevant policies. • Capacity building at all levels of planning and decision making (national and the county government levels) to promote transformative leadership • Enactment of county laws to regulate waste recovery and disposal to serve as a regulatory regime for the use of waste as a resource

INSTRUMENTS	SPECIFIC ACTION/PROGRAMS SUB HEADING
Legal instruments	Solid waste recovery and disposal laws (emphasis for SWM should be on reuse and recycling), enactment/enforcement of regulatory and supervisory statutes
Financial instruments	Levying taxes as disincentives for landfilling to encourage source reduction, provide incentives for waste recyclers, preferential use of recovered materials over virgin materials.
Communication instruments	Advocacy for behavioral change through media campaigns, communication, and technology, dissemination of waste management information
Institutional instruments	Decentralized SWM, public-private partnerships (e.g. voluntary agreements), strengthened entrepreneurial activities (e.g. for SMEs) training of SWM managers, demonstrations, promotion of research and development in SWM.

Objectives of the Strategy

This strategy is to be implemented through seven (7) key objectives.

1. To formulate policies, legislation and economic instruments to reduce waste quantities.
2. To inculcate responsible public behavior on waste management.
3. To promote waste as an income generating venture.

4. To promote waste segregation at source.
5. To promote resource recovery for materials.
6. To promote resource recovery through energy generation.
7. To establish environmentally sound infrastructure and systems for waste management.

Table 5: Log frame on the Naivasha Municipal solid waste management strategy objectives

Overall goal: Sustainable solid waste management with Zero Waste in Naivasha Municipality by the year 2023			
Objectives	**Key result areas**	**Outcomes**	**Activities**
To formulate policies, legislation and economic instruments to reduce waste quantities	Policies and economic instruments on waste management Uptake of efficient technologies Compliance and enforcement of waste management legislation	Sustainable management of solid waste	Develop and harmonize municipal legislation on waste management Develop policies on municipal economic instruments Implement policies and economic instruments Peer reviews on appropriate SWM technologies Enforcement of waste management standards and legislation Establishment of specialised enforcement unit
To inculcate responsible public behavior on waste management	Capacity building in waste management Informed public on waste management	Public behavior changed on waste management	Sensitize the public on responsible waste management Create awareness of suitable waste management options Educate the public on

			integrated waste management Undertake monthly clean-ups Develop sensitization materials
To promote waste as an income generating venture	The market for the recovered and recycled products More entrepreneurship in waste management activities Increased uptake of modern technology	Enhanced income from waste management activities	Explore market opportunities for the recovered and recycling materials Promote the use of recycled and recovered materials Promote modern technologies on recovery and recycling Promote Public-Private Partnership in waste management
To promote waste segregation at source	Improvement in Knowledge, Attitude and Practice towards SWM Segregated waste services	Segregated wastes	Intensified waste segregation campaigns Pilot waste segregation Provision of equipment for waste segregation Provision of segregated waste transport systems to designated points. Promote Public-Private Partnership in waste management

To promote resource recovery for materials	Recycling and composting facilities Market availability for recovered materials Acceptance of recovered materials Collaborations in recycling	Enhanced materials recovery and use	Enhance modern technologies for recycling and composting of waste Explore market opportunities for recovered materials Develop promotion programs for the use of recovered materials Enhance collaboration with stakeholders on recycling
To promote resource recovery through energy generation	Waste to energy generation plants Energy generated Collaboration in waste to energy recovery initiatives		Promote energy recovery plants Enhance waste to energy resources Enhance collaboration with stakeholders on energy recovery
To establish environmentally sound infrastructure and systems for waste management	Improvement on existing waste management facilities, collection and transportation systems, transfer stations, treatment, and disposal facilities	Existence of environmentally sound solid waste management collection, transportation, transfer stations, treatment and disposal facilities	Improve existing waste management facilities, Provision of adequate and appropriate collection facilities and services Provision of adequate and appropriate transport systems for segregated waste

			Build and operate transfer stations Develop standard incinerators with energy recovery facilities Establish composting facilities Establish recycling facilities Develop sanitary landfill Establish facilities to handle hazardous waste including; Asbestos, E-waste, Healthcare waste, Sludge

Key approaches to implementing the strategy

Depending on the situational analysis of the waste management practices in the municipality, the strategy will be implemented using the following approaches;

i. Strategic alignment and recognition of partners through a public-private partnership
ii. Introduction of incentives in the waste management cycle (generation, segregation, collection, transportation, treatment, and disposal)
iii. Introduction of extended producer responsibility and public awareness campaigns and education;
iv. Establishment of efficiency and value addition in the waste management cycle
v. Compliment the input from CBO's and other private-public activities.
vi. Phase out open waste burning
vii. Establish waste operational zones
viii. Upscale the activities of the informal sector to link up with the existing formal recycling industries.
ix. Establishment of infrastructure and systems for residual waste through a stepwise phasing out of illegal landfills to establishment of sanitary landfills

ROLES OF COLLABORATING ACTORS:

Successful implementation of this strategy requires the involvement of several actors whose roles are outlined below;

NEMA:

a) Formulate policies, legislation and economic instruments relevant to achieving sustainable waste management;
b) Develop and disseminate public information on the regulatory requirements for waste management in Kenya;
c) Undertake to benchmark regionally and internationally on appropriate waste management technologies;
d) Enhance the capacity of the county governments and municipalities on waste management systems and approaches applicable in the respective jurisdiction;
e) Hold public awareness sessions (for example, school workshops, public consultation exhibitions, and public events) on waste management initiatives;
f) Support the dissemination of waste management research and development findings
g) Involve mass media dissemination techniques, such as the publication of news articles and press releases, in addition, to ensure coverage in both print and media outlets.

County Government of Nakuru:

a) Undertake enforcement activities of the laws developed on solid waste management and surveillance exercises on illegal waste-related activities.
b) Monitoring and evaluation of the strategy.

c) Formulate County policies, legislation and economic instruments relevant to achieving sustainable waste management in the county
d) Allocate funds to Naivasha municipal board to run the waste management function and capacity building
e) Responsible for drawing up action plans for implementation of applicable solid waste management systems within their counties;
f) Source adequate funding for the development of sustainable waste management initiatives in the entire cycle;
g) Put in place measures for enhanced Public-Private-Partnerships (PPP);
h) Benchmark on best practices of appropriate technologies;

Naivasha Municipal Board:

a) Formulation and implementation of Municipal Waste Management Strategy; execute the strategy
b) Continuous management of activities/facilities to ensure all the waste is collected, sorted and transported to the designated waste disposal sites in a timely manner
c) Undertake periodic clean-up activities within the mmunicipality
d) Ensure timely enforcement of waste management laws and regulations
e) Monitoring and evaluation of the strategy
f) Zone waste operation areas within the municipality
g) Undertake periodic clean-up activities within the municipality;
h) Provision of equipment for waste segregation and transport systems;
i) Monitoring and evaluation of the strategy
j) Ensure wide coverage and no littering of waste through improved collection methods and facilities;
k) Utilize social media to attract wider stakeholder participation and change attitudes towards waste management within the municipality;
l) Progressively improve the designated official municipal disposal site towards a sanitary landfill.

The Nakuru County Treasury:

a) Channel funding to the Naivasha municipal board for the development of waste management initiatives and facilities.

Civil Society Organizations (CSOs) and NGOs:

a) Promote and /or undertake income-generating ventures in waste management initiatives;
b) Represent the public's interest in the solid waste management agenda within the municipality
c) Support in identification of illegal waste-related activities.
d) In partnership with the municipality undertake advocacy campaigns for change in the public's knowledge, attitude and practice towards sustainable solid waste management.

Private Sector

a) Through PPP, Involvement in the development of effective and efficient solid waste management facilities;
b) Prioritize on corporate social responsibility (CSR) on solid waste management
c) Empower communities and other stakeholders in understanding waste management related issues and in finding solutions for the same.
d) In partnership with the municipality undertake occasion research on best practices on solid waste management

The Citizens/Public

a) Change in attitude and practice to embrace the concept of a waste generator's responsibility by ensuring waste is appropriately managed at source and/or in all phases of the waste management cycle;
b) Adopt the 7R (Reuse, Recycle, Reduce, Rethink, Refuse, Refill, Repairing) and/or an integrated solid waste management approach in the management of all waste streams;
c) Collaborate with other government entities, CSOs, NGOs and other informal groups in waste management through the PPP approach.

CHAPTER 5

IMPLEMENTATION MATRIX

Table 6: Strategic Objective 1

To formulate policies, legislation and economic instruments to reduce waste quantities

Activity		**Key performance targets**	**Key performance indicators**	**Time frame (years)**					**Outcomes**	**Actors**	**Budget – Kshs (M)**
				1st	**2nd**	**3rd**	**4th**	**5th**			
Policies and economic instruments on waste reduction	Develop and harmonize policies and economic instruments	Harmonized policies and economic instrument	Policies and economic instruments						Reduced quantities of solid waste	CGN, Municipal Board& other relevant lead agencies	10M
	Implement policies and economic instruments	Implementation of policies and economic instruments	Policies and economic instruments implemented								
Uptake of efficient technologies	Undertake to benchmark on best practices of appropriate technologies	Best practices of appropriate technologies benchmarks	Appropriate technologies adopted							CGN, Municipal Board	10M
Compliance and enforcement of waste management	Compliance and enforcement of waste management	Compliance and enforcement to set standards	Level of compliance and enforcement							CGN, Municipal Board with other relevant	10M

	standards and legislation									lead agencies	

Table 7: Strategic Objective 2

To inculcate responsible public behavior on waste management

Activity		**Key performance targets**	**Key performance indicators**	**Time frame (years)**					**Outcomes**	**Actors**	**Budget – Kshs (M)**
				1st	**2nd**	**3rd**	**4th**	**5th**			
Capacity building in waste management	Sensitize the public on responsible waste management	A sensitized public on responsible waste management	Number of people sensitized						Public behavior changed on waste management	CGN, Municipal Board, Media& other relevant lead agencies	25M
Informed public on waste management	Create awareness of suitable waste management options	Awareness created on suitable waste management options	Number of Campaigns							CGN, Municipal Board, Media& other relevant institutions, CSOs, NGOs, the public/citizenry	
	Educate the public on integrated waste management	Educated public on integrated waste management	Number of clean-ups							CGN, Media houses & other relevant institutions, CSOs, NGOs, the public/citizenry	25M
	Develop sensitization materials	Sensitization materials developed	Number of sensitization materials							CGN, MB	5M

			developed								

Table 8: Strategic Objective 3

To promote waste as an income generating activity

Activity		**Key performance targets**	**Key performance indicators**	**Time frame (years)**					**Outcomes**	**Actors**	**Budget – Kshs (M)**
				1st	**2nd**	**3rd**	**4th**	**5th**			
The market for the recovered and recycled products	Explore market Opportunities for the recovered and recycled materials	Market opportunities for the recovered and recycled materials explored	No. of market opportunities sourced/explored for the recovered and recycled materials						Enhanced income from waste management activities	CGN, MB& other relevant lead agencies	50M
More entrepreneurship in waste management	Promote the use of recycled and recovered materials	Recycled and recovered materials in use	Percentage of recycled and recovered materials in use in the Municipality							CGN, MB, public/ citizenry	
	Promote modern technologies on recovery and recycling	Modern technologies in use for recovery and recycling	Modern technologies in use for recovery and recycling							CGN, MB, public/ citizenry	
	Promote Public-	Public-Private	No. of Public-Private							CGN, MB &other	

	Private Partnership in waste management	Partnerships enhanced on various aspects of waste management	Partnerships in existence in the Municipality							relevant lead agencies, CSOs, NGOs, the public/citizenry	

Table 9: Strategic Objective 4

To promote waste segregation at source

Activity		**Key performance targets**	**Key performance indicators**	**Time frame (years)**					**Outcomes**	**Actors**	**Budget – Kshs (M)**
				1st	**2nd**	**3rd**	**4th**	**5th**			
Segregated waste services	Provision of equipment for waste segregation	Equipment for waste segregation provided	No of equipment provided						Segregated wastes	CGN, MB	50M
	Provision of segregated waste transport systems	Segregated waste transport systems provided	No of transport system provided							CGN, MB	100M
	Intensified waste segregation campaigns	Campaigns on segregation undertaken	Number of campaigns							CGN, CSOs, NGOs, the public/ citizenry	20M
	Initiate pilot	Waste	No of pilot							CGN, MB&other	50M

	waste segregation	segregation pilot schemes	schemes initiated							relevant lead agencies, CSOs, NGOs, the public/citizenry	

Table 10: Strategic Objective 5

To promote resource recovery for materials

Activity		**Key performance targets**	**Key performance indicators**	**Time frame (years)**					**Outcomes**	**Actors**	**Budget – Kshs (M)**
				1st	**2nd**	**3rd**	**4th**	**5th**			
Recycling and composting facilities	Enhance modern technologies for recycling and composting of waste	Enhanced recycling and composting of waste	Percentage of recycled and composted materials						Enhance materials recovery and use	Local and international investors, CGN, MB Relevant Government agencies, NGOs, CBOs. Etc.	(Dependent on investor potential as well as the type of facility) 50M
Market availability of recovered materials	Explore market opportunities for recovered materials	Market opportunities for recovered materials explored	No. of market opportunities sourced/ explored for the recycled and composted materials								
Acceptance of recovered	Develop promotion	Promotion programs for	No. of promotion								

materials	programs for the use of recovered materials	the use of recovered materials developed	programs undertaken countrywide to enhance or promote the use of recovered materials								
Collaboration in recycling	Enhance collaboration with stakeholders on recycling	Mechanisms of collaborations with stakeholders on recycling enhanced	No. of collaborations								

Table 11: Strategic objective 6

To establish environmentally sound infrastructure and systems for waste management

Activity		**Key performance targets**	**Key performance indicators**	**Time frame (years)**					**Outcomes**	**Actors**	**Budget – Kshs (M)**
				1st	**2nd**	**3rd**	**4th**	**5th**			
Improvement of existing waste management facilities	Upgrade existing waste management facilities	Upgraded waste management facilities	No. of upgraded waste management facilities						Existence of environmentally sound waste management collection, transportation, transfer station,	CGNwith support from various funding bodies	100M
Waste collection	Provision of adequate	Adequate and appropriate	No of appropriate							Local and international	100M

and transportation systems	and appropriate collection facilities and services	collection facilities provided	facilities provided						treatment and disposal facilities	investors, CGN, MB with support from various funding bodies	
	Provision of Adequate and Appropriate transport systems for segregated waste	Appropriate transport systems provided	No of appropriate transport systems provided							CGN, MB with support from various funding bodies	
	Provision of motorable access roads	Motorable access roads constructed	No of KMs of access road constructed							CGN, Municipal board	100M
Waste transfer stations	Build and operate transfer stations	Transfer stations built and operational	No. of transfer station built and operational							Local and international investor, CGN, MB with support from various funding bodies	100M
Waste treatment facilities	Establish recycling facilities	Recycling facilities established	No. of recycling facilities established							Local and international investors	Dependent on investor potential

	Establish composting facilities	Composting facilities established	No. of composting facilities established								
Waste disposal facilities	Develop sanitary Landfills	Sanitary Landfills developed	No. of sanitary Landfills developed							CGNwith support from various funding bodies	1 Billion
	Develop standard incinerators	Standard incinerators	No. of standard incinerators with energy recovery facilities developed							Local and international investors, CGN with support from various funding bodies	
	Establish facilities to handle hazardous waste including; Asbestos, E-waste, Healthcare waste, Sludge	Adequate facility to handle hazardous waste	No. of facilities established							CGN, National Government,	100M

CHAPTER 6

FUNDING MECHANISM

The sources of funding for the implementation plan will be from the municipal budget, county government, Public-Private Partnerships, waste generators, and the development partners. The funding must be self-sustaining in the long run and strategically integrated into all facets of the waste management system. These facets include initiatives to minimize generation of waste at source, improve collection and transportation systems as well as managing the disposal of waste that cannot be recycled or reused (residual)

The NMSWMS has outlined strategic priorities and specific actions and interventions at various levels of solid waste management service delivery chain that provide the basis for formulating resource requirements for its implementation over the next five years. As part of the NMSWMS implementation efforts therefore, the following actions will be taken within the first six months of its launch to determine the resource requirements for NMSWMS implementation starting the FY 2019/2020:

a) Cost the NMSWMS 2019 - 2023 to determine the total gross resource requirements

b) Conduct a resource gap analysis and propose strategies of bridging the gaps

c) Develop NMSWMS Resource Mobilization Strategy

d) Develop an annual NMSWMS Operational Plan and budget within the municipality planning and budgeting framework.

In a context of limited resources and to maximize allocative efficiencies, it is critical that resource allocation shall be aligned to the NMSWS priorities. The purpose will be to provide an enabling framework for attracting funding to the sector and ensuring sustainable financing for solid was management through public, private and development partners' investment.

CHAPTER 7

MONITORING AND EVALUATION

Environmental monitoring will be a key component of this strategy. This is because poor solid waste management has direct and indirect effects on the public health and the environment and must be monitored. There are essential parameters to monitor the quality of the environment and does provide basic information on the levels of deviation on the set standards of environmental quality.

The NMSWMS monitoring and evaluation will be carried out within the national and county frameworks while taking into account Kenya's regional and global reporting commitments and obligations. The M&E framework for NMSWMS and its implementing and operational instruments will be accompanied with common national, county and community level indicators to monitor performance and measure changes at various levels. The aim of the monitoring and evaluation framework will be threefold:

a) to track progress in the implementation of the NMSWMS and its implementing and operational instruments at all levels;

b) to provide quality, timely and accurate evidence to aid decision making at different levels of the SWM service delivery chain; and

c) to ensure maximum accountability, efficiency and effectiveness in the implementation of the NMSWMS at decentralized unit.

Monitoring processes

The implementation of the NMSWMS and its implementing and operational instruments will be monitored continually at agreed intervals based on the defined statements of objectives, activities, results and indicators. The monitoring process will involve information gathering and feedback through periodic meetings; quarterly review meetings; performance appraisals; monthly, quarterly, and annual reporting reports.

Evaluation processes

The evaluation function will involve both process and impact evaluation approaches.

a) **Process Evaluation**: The process evaluation will involve ongoing and periodic NMSWMS reviews. The purpose will be to determine the extent to which NMSWMS objectives and targets are being achieved. This would provide the basis for making improvement and adjustments in the course of the Strategy implementation. The process evaluation processes will include

quarterly reviews, annual general meetings, budget implementation reviews, annual financial audits, and the midterm review/evaluation.

b) **End term Evaluation**: This form of evaluation will focus on assessing and evaluating the overall performance, outcomes and impacts of the NMSWMS and its implementing and operational instruments at the decentralized unit. The outcome of the evaluation will provide the basis for the next strategic planning cycle.

c) **Specific Evaluation**: Specific SWM program evaluations will be undertaken based on specific program objectives, activities and results.

Monitoring and evaluation framework

Frequency	**Target**	**Focus**	**Level of M&E**
Monthly	Monthly activity reports	Identify activities whose implementation is delaying of outputs, and plan to address challenges	Activity level
Quarterly	Quarterly progress and performance reports	Hold quarterly review meetings to assess implementation progress towards the annual targets Identify outputs whose achievement during the year is threatened and plan to address challenges affecting them	Output level
Annual	Annual progress and performance reports	Internal assessment of progress issues and challenges affecting implementation of outputs and make recommendations of priorities for coming	Output level

		year	
Mid Term	Mid-term review/ evaluation report	In-depth external evaluation to examine accomplishments by SWMS midterm against expected results Identify progress, issues and challenges affecting implementation of outcomes towards supporting the achievement of the overall goal and make recommendations for adjustments during the remaining half of the SWMS	Outcome level
End term	End term review/ evaluation report	In depth external evaluation to assess progress and success of the SWMS implementation in achieving intended outcomes and impacts as well as the overall sector goals and make recommendations for the next strategic framework	Sector goal – outcome and impact level

REFERENCES

1. The Environmental Management and Coordination _ Amendment_ Act 2015 (CAP 387),;
2. The National Waste Management Strategy 2015;
3. The Environmental (Impact Assessment and Audit) Regulations of 2003;
4. The Environmental Management and Coordination (Waste Management) Regulations of 2006;
5. The Environmental Management and Coordination (Water Quality) Regulations of 2006;
6. The National Sustainable Waste Management Bill 2019 (Draft);
7. The National Waste Management Policy 2019 (Draft);
8. Nakuru County Solid Waste Management Bill 2019 (Draft);
9. Nakuru County Waste Management Policy 2019 (draft);
10. The World Bank (2017), Nakuru Integrated Solid Waste Management PPP Project Feasibility Study Report and PPP Implementation Plan
11. Department of Environmental Affairs (2010); National Waste Management Strategy; Republic of South Africa;
12. Sri Jayewardenepura Kotte Municipal Council/UN-Habitat Basic Urban Services Initiative International Water & Sanitation Centre (IRC) (2005), Solid Waste Management Strategy- Guiding Principles and Strategic options