

**LIVINGSTONE CITY COUNCIL**  
**GEF/ UNIDO BAT/BEP – SOLID WASTE**  
**MANAGEMENT PROJECT**

**2022 – 2025 Solid Waste Management Plan**

**First Draft**

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## Table of Contents

1.0	BACKGROUND INFORMATION.....	5
1.1	LEGAL FRAMEWORK ON SOLID WASTE MANAGEMENT.....	5
1.1.2	<i>The Local Government Act No. 2 of 2019</i> .....	5
1.1.2	<i>The Solid Waste Regulations and Management Act No. 20 of 2018</i> .....	5
1.1.3	<i>The Public Health Act CAP 295</i> .....	5
1.1.4	<i>The Water Resources Management Act No. 21 of 2011</i> .....	6
1.1.5	<i>The Zambia Environmental Management Act No. 12 of 2011</i> .....	6
1.1.6	<i>The Local Government (Street Vending and Nuisances) (Amendment) (No. 2) Regulations, Statutory Instrument No. 12 of 2018</i> .....	6
1.1.7	<i>The Local Government (Solid Waste Management) Regulations, Statutory Instrument No. 100 of 2011</i> .....	6
1.1.7	<i>The Markets and Bus Station Act, No. 7 of 2007</i> .....	7
1.2	PRIORITY AREAS.....	7
1.3	OVERALL WASTE PROBLEMS FOR TARGET AREA.....	7
1.4	LINKAGES TO OTHER PLANS AND AREAS OF LOCAL AND NATIONAL POLICY.....	8
1.4.1	THE 7 <sup>TH</sup> NATIONAL DEVELOPMENT PLAN.....	8
1.4.2	THE NATIONAL STRATEGIC PLAN OF 2004.....	9
1.4.3	THE LIVINGSTONE CITY COUNCIL STRATEGIC PLAN.....	9
1.4.4	THE LIVINGSTONE CITY COUNCIL SOLID WASTE MANAGEMENT PLAN OF 2006.....	9
1.5	INPUTS FROM THE CONSULTATION PROCESS.....	10
2.0	CURRENT STATUS AS REGARDS WASTE MANAGEMENT IN THE AREA COVERED.....	10
2.1	Waste assessment and composition.....	10
2.1.1	Waste sources and stream.....	10
	<b>Present Solid Waste Management System</b> .....	10
2.1.2	Amount of Waste and Types.....	12
2.1.3	Waste management options.....	12
	<b>Generation</b> .....	13
	<b>Storage</b> .....	13
	<b>Collection</b> .....	13
	<b>Reuse/Recycling</b> .....	13
	<b>Waste Treatment and disposal options</b> .....	13

2.2 Waste collection and treatment for the available options .....	17
2.3 Waste generation trends and projection.....	17
2.3.1 Generation trends.....	17
2.3.2 Waste generation projections.....	17
2.3.3 Estimates of waste composition by type in tonnes .....	18
2.4 Organisation and Financing.....	18
2.4.1 Organisation.....	18
2.4.2 Financing.....	22
2.5. Socio-Economic Projections .....	22
2.6. Assessment of previous objectives (if any) .....	23
2.7. Strong and weak points .....	24
3.0 PLANNING, PROJECTIONS AND ASSESSMENT .....	26
3.1 Risks and Assumption for Planning.....	26
3.1.2 The Legal Mandate of the Local Authority in Waste Management.....	26
3.1.3 Organizational Structure.....	26
3.1.4 Financing Mechanisms .....	26
3.1.5 Creditworthiness of Private Waste Collectors .....	26
3.1.6 Willingness and ability to pay for waste collection services by waste generators.....	27
3.1.7 Manufacturing methods.....	27
3.2 Forecast in terms of waste generation total and per waste stream.....	27
<b>Generation</b> .....	28
<b>Storage</b> .....	28
<b>Collection</b> .....	28
<b>Reuse/Recycling</b> .....	28
<b>Waste Treatment and disposal options</b> .....	28
3.3 Objectives of Forecasted Waste Management Options .....	31
<b>Generation</b> .....	31
<b>Storage</b> .....	31
<b>Collection</b> .....	31
<b>Reuse/Recycling</b> .....	31
<b>Waste Treatment and disposal options</b> .....	31
4.0 Action and Implementation Plan.....	36

5.0 Monitoring and Evaluation .....	36
6.0 Conclusion.....	37
7.0 References.....	39

## **1.0 BACKGROUND INFORMATION**

This chapter looks at the existing legal frameworks applicable to solid waste management and describes how the implementation of the solid waste management plan will comply with respective legal provisions. It also looks at waste management priority areas which subsequently set the tone for the plan's main objectives. Furthermore, the chapter describes the linkages of existing plans and areas of local and national policy to the solid waste management plan.

### **1.1 LEGAL FRAMEWORK ON SOLID WASTE MANAGEMENT**

#### *1.1.2 The Local Government Act No. 2 of 2019*

The Act provides for an integrated local government system, gives effect to the decentralization of functions, responsibilities and services at all levels of local government, ensures democratic participation in, and control of, decision making by the people at the local level, revises the functions of local authorities, provides for the review of tariffs, charges and fees among other within the area of a local authority. In line with these provisions, the Solid Waste Management Plan shall ensure that appropriate solid waste tariffs, charges and fees are in line with the Local Government Act No. 2 of 2019.

#### *1.1.2 The Solid Waste Regulations and Management Act No. 20 of 2018*

The Act provides for sustainable regulation and management of solid waste, solid waste services, and the incorporation of solid waste management companies. It also defines statutory functions and licensing of solid waste service providers as well as construction, regulation, operations and maintenance of landfills and other waste disposal facilities.

The Solid Waste Management Plan shall in line with this legislature ensure that the Local Authority facilitates for the involvement of credible waste collection companies for effective solid waste management.

#### *1.1.3 The Public Health Act CAP 295*

The Act provides for the prevention and suppression of diseases and regulates all matters connected with public health in Zambia.

The Act will serve as useful tool to maximize compliance to sound solid waste management by waste generators as it defines public nuisances, nuisance abatement procedure and penalties for violators

*1.1.4 The Water Resources Management Act No. 21 of 2011*

This Act provides for the management, development, conservation, protection and preservation of water resources and its ecosystem.

The solid waste management plan shall endeavor to protect the water resources by ensuring sound waste management by waste generators operating on and along the Zambezi River and other water bodies in the City.

*1.1.5 The Zambia Environmental Management Act No. 12 of 2011*

The Act provides for integrated environmental management, protection and conservation of the environment including sustainable management and use of natural resources. Specifically, the Act compels local authorities to report annually to Zambia Environment Management Agency on the types of waste and the quantity of each type of waste generated and disposed of within its area of jurisdiction. It also compels local authorities to put in place an integrated waste management plan.

*1.1.6 The Local Government (Street Vending and Nuisances) (Amendment) (No. 2) Regulations, Statutory Instrument No. 12 of 2018*

The legislature provides for additional situations that constitute public nuisances in relation to street vending. It also provides for penalties for the offences hence a very useful piece of legislature for enforcement to ensure sound waste management.

*1.1.7 The Local Government (Solid Waste Management) Regulations, Statutory Instrument No. 100 of 2011*

These Regulations apply to the management of solid waste generated in, imported into or transferred through an area and other waste managed together with or in the same facility as solid waste.

For purposes of enforcement of these regulations, the solid waste management plan will ensure that Livingstone City Council

- a) Monitors service delivery by waste managers;

- b) Sets minimum standards for levels of service;
- c) Designates waste disposal facilities in compliance with the environmental management Act of 2011;
- d) Operates waste disposal facilities in compliance with the Environmental Management Act;
- e) Monitors the management and use of waste disposal facilities; and
- f) Ensures compliance with these regulations by waste producers and waste managers within the city.

#### *1.1.7 The Markets and Bus Station Act, No. 7 of 2007*

The Act provides for the establishment and regulation of markets and bus stations; to provide for the establishment of management boards for markets and bus stations. It also places the responsibility of management the affairs of markets on the local authorities. The plan encompasses measures for sound waste management for waste generated in public markets and bus stations.

## **1.2 PRIORITY AREAS**

In line with the zero waste to the dumpsite concept, the following are the priority solid waste management areas for Livingstone City's SWM plan:

- Waste minimization and reduction of waste
- Waste collection systems
- Material recovery, reuse and recycling
- Public private partnership
- Community participation/involvement

## **1.3 OVERALL WASTE PROBLEMS FOR TARGET AREA**

- **The uptake rate** of managed waste collection services in the townships is still very low (estimated 30 – 50%). Attempts to involve the private sector through franchise contracts has resulted in a high work abandonment rate at implementation stage.
- Poor adherence by people to responsible waste management practices;
- Lack of willingness/ability by waste producers (citizens) especially in peri-urban areas to pay for waste collection services in areas where both the Local Authority and private companies operate.

- **Population increase** which is triggered by a number of factors such as rural-urban drifts and also different forms of population movement from other cities, regions and even from other countries are responsible for rapidly changing the urban population. This dynamic urban growth has generated significant stress on city's solid waste management system in providing the necessary basic infrastructure and equipment among other solid waste management services to expanding neighborhoods and settlements due to increase in waste generation rates.
- **A non-engineered dumpsite.** There is no notable work on waste spreading and compaction to reduce the safety risks, the visual nuisance and wind sweepage.
- **An open access to the dumpsite.** Minimal vehicular restrictions apply but only during daylight hours, so uncontrolled tipping is a real and ready risk.
- **The existing dumpsite's location** presents several challenges, not least, the lack of appropriate fencing as well as the wetland area which forms its Eastern and North-Eastern boundary.
- **Short-circuiting** of the bulk of the waste from point of generation to the dumpsite. (Livingstone Solid Waste Management Assessment Report, 2019).

#### 1.4 LINKAGES TO OTHER PLANS AND AREAS OF LOCAL AND NATIONAL POLICY

##### 1.4.1 THE 7<sup>TH</sup> NATIONAL DEVELOPMENT PLAN

The Seventh National Development Plan (7NDP) is the supreme plan for the Republic of Zambia aimed at fostering development through a number of programs. The 7NDP, among other, seeks to promote sustainable environmental management to address climate change through:

- Enhancing a number of solid waste treatment facilities with methane capture
- Enhancing waste water treatment facilities with methane capture
- Increasing percentage of total waste generated that is collected and safely disposed in municipalities
- Undertaking of feasibility studies on solid and liquid waste treatment disposal and GHG emissions

Livingstone City Council SWM plan focuses on reducing the waste generation rate, amount of waste collected for disposal and improve waste transportation and disposal to support the attainment of objectives of the 7NDP.



#### **1.4.2 THE NATIONAL STRATEGIC PLAN OF 2004**

In line with the National Strategic Plan of 2004, Livingstone SWM plan seeks to;

- Minimize the generation of waste
- Maximize waste collection efficiency
- Reduce the volume of waste requiring disposal and
- Maximize the economic value of waste.

#### **1.4.3 THE LIVINGSTONE CITY COUNCIL STRATEGIC PLAN**

The SWM plan is in with the Livingstone City Council's Strategic Plan as it seeks to:

- Improve coordination among key stakeholders in the District
- Ensure at least 75% refuse storage receptacle coverage for registered and public premises in the city
- Ensure that all private SWM service providers comply with legal requirements

#### **1.4.4 THE LIVINGSTONE CITY COUNCIL SOLID WASTE MANAGEMENT PLAN OF 2006**

The most recent SWM plan for Livingstone City Council lasted from 2006-2010 covering the following objectives;

- To provide a waste collection service (door-to-door or skip collection) to 75% of households by the end of 2010.
- To implement ongoing improvements in waste disposal and to develop a disposal site that can be operated on a sustainable basis to minimise the environmental and public health impacts, using the available resources at LCC.
- To develop and capacity build the SWM Unit at LCC, with full responsibility and accountability for SWM performance in Livingstone, and with capacity to provide a sustainable waste collection service.

The four (4) years plan expired in 2010. The Council has had no detailed Solid Waste Management Plan apart from the 2017-2021 strategic plan.

For this reason, relevant objectives from the 2006 – 2010 SWM plan have been incorporated in the 2022 – 2024 SWM plan.

## 1.5 INPUTS FROM THE CONSULTATION PROCESS

The development of the Solid Waste Management Plan was subjected to consultations with various key stakeholders and during data collection, the project team interacted with stakeholders such as the Ward Development Committees, the Market committees, various institutions and households for validation of findings. Furthermore, a fully developed plan was subjected to a Council meeting held on ..... for approval as indicated on minutes number.....

## 2.0 CURRENT STATUS AS REGARDS WASTE MANAGEMENT IN THE AREA COVERED

This chapter focuses on giving an outline on the current status as regards waste management in Livingstone.

### 2.1 Waste assessment and composition

#### 2.1.1 Waste sources and stream

Table 1 highlights the waste sources and streams as well as the present solid waste management systems in Livingstone.

*Table 1: Waste Management Sources and Streams*

Source/Stream	Present Solid Waste Management System
Commercial areas in Central Business District	<ul style="list-style-type: none"><li>• Waste collection services provided by the LCC in the Central Business District (CBD) through door-to-door collection</li><li>• Others bring waste to assigned collection points such as skip bins and refuse bays</li><li>• Others dump waste indiscriminately</li></ul>
Large markets	<ul style="list-style-type: none"><li>• Market people put waste in skip bins or pile waste at accumulation points such as refuse bays</li><li>• LCC collects waste in most of the markets</li><li>• Some markets do not have a waste collection system in place.</li></ul>
Low density areas	<ul style="list-style-type: none"><li>• Serviced by LCC and private companies, Livingstone City Council collects bulk waste in some peri urban areas.</li><li>• Individual contracts are entered into between households and different Community Based Entrepreneurs (CBEs)</li></ul>

	<ul style="list-style-type: none"> <li>• Some household dump waste indiscriminately</li> <li>• Reliability of contractor not always satisfying</li> </ul>
Light, medium and heavy industrial areas	<ul style="list-style-type: none"> <li>• Served by LCC and private contractors</li> <li>• Individual contracts are entered into between industries and different Community Based Entrepreneurs (CBEs) or Franchise Companies</li> <li>• Some Industries dump waste indiscriminately</li> <li>• Reliability of contractor not always satisfying</li> </ul>
High density areas	<ul style="list-style-type: none"> <li>• No regular service is provided</li> <li>• Bulk collection of waste done by LCC in some undesignated dump site within the neighbourhoods.</li> </ul>
Final Disposal	<ul style="list-style-type: none"> <li>• Dumped at the Airport dumpsite along Lusaka road near the weigh bridge</li> <li>• No regular dumpsite management in place</li> <li>• 44% of the Livingstone waste is collected and correctly disposed whilst 56% is dumped indiscriminately and often burned (Livingstone City Council, 2019 Solid Waste Management Annual Report).</li> </ul>

## Waste Streams

The types of solid waste generated include:

- Domestic waste - which is generated as a result of daily activities in homes. This Waste comprises of paper, bottles, plastics and organic waste.
- Commercial waste - which is generated from commercial activities and other related Premises.
- Industrial waste - which is generated from industries.
- Waste generated from Markets
- Institutional waste - which is generated from institutions such as schools, government departments e.t.c
- Medical waste - generated from hospitals and clinics
- Hazardous waste which is dangerous waste
- Municipal waste - waste generated from street sweepings, public walkways, drainages, common dumping points, public bins, bus stations, taxi ranks e.t.c.

### 2.1.2 Amount of Waste and Types

Livingstone City Council does not have a waste characterization survey report and the survey which provide information on the composition of household and non-households municipal waste. However using the formula below, the amount of solid waste generated per year can be established.

#### *Using 0.5kg per capita day per of solid waste of urban population*

- ✓  $0.5\text{kg/person/day} \times 365\text{days} = 182.5\text{kg/person/per year}$

#### **Urban population at 139,509**

- ✓  $182.5\text{kg/person/per} \times 139,509 = 25,460,390.5\text{kg/ year}$
- ✓ Converting to tonnes gives 25,460.4 Tons of solid waste generated per year.

The common types of solid waste generated in residential areas of Livingstone generally comprise the following:

- Paper.....15.5%
- Plastic.....22%
- Food items (organic)...29%
- Metal..... 6.5%
- Fabric.....10%
- **Others..... 3.6%**

### 2.1.3 Waste management options

Information on the current waste management options was obtained from the Solid Waste Management Assessment Report for Livingstone which was done prior to the preparation of the Draft Waste Management Plan. Table 2 gives detailed information on the same.

**Table 2: Waste management options**

<b>Source/Stream</b>	<b>Generation</b>	<b>Storage</b>	<b>Collection</b>	<b>Reuse/Recycling</b>	<b>Waste Treatment and disposal options</b>
Commercial and Industrial Waste - Business Entities	<p>The types of waste generated include paper, plastic, glass, organic, fabric, metal. Paper and plastic are the most generated waste by business entities.</p> <p>Bars generate high levels of glass waste.</p>	<p>Most business entities store their waste in bins</p> <p>A few generators heap waste within their premises.</p> <p>Some business entities store waste in enclosed storage receptacles/rooms.</p>	<p>Livingstone City Council Collects waste in the business entities using a refuse collection truck.</p> <p>The type of system used is the door to door waste collection system.</p> <p>Waste is collected at least once in a week.</p>	<p>One (1) of the Business entities Minor Hotels is into material recovery of (PET Plastic, metal cans, glass bottles and paper (card boxes).</p> <p>Another business entity IB Blocks is into the recycling of glass bottles for block making</p>	<p>One (1) of the Business entities Minor Hotels is into composting of organic waste.</p> <p>This company disposes the remainder of the waste at a separated place within the council dumpsite where sanitary landfilling of waste is practiced.</p>
Waste from Markets	<p>The types of waste generated include paper, plastic, glass, organic, fabric, metal. paper, plastic and organic waste are the most generated waste by markets. The largest generators of waste in the markets are the shops. Majority of the organic waste in markets</p>	<p>Most of the shops and restaurants store the generated waste in sacks. Some shops also use bins to store their waste. The market stalls use other means of storage such as boxes in addition to</p>	<p>Livingstone City Council Collects waste in the markets through a communal waste collection method.</p> <p>However, the council does not service two (02) of the markets. One (01) market is irregularly</p>	<p>Though not a good practice, some marketeers are into the reuse of plastic and glass bottles for repackaging of fluids such as munkoyo (a local drink) and cooking oil.</p>	<p>The remainder of the waste is finally taken to the council dumpsite where crude dumping is practiced.</p> <p>Some of the waste is burnt.</p>

	<p>comes from the restaurants.</p> <p>Other types of waste generated in the markets include hair, wood and sawdust.</p>	<p>the sacks. Six (06) markets have been provided with 5.5 cubic meter s capacity skip bins</p>	<p>serviced (once in two months.</p>		
<p>Domestic Waste - Households</p>	<p>The types of waste generated by households include paper, plastic, glass, organic, fabric, metal. Plastic and organic waste is the most generated by households.</p>	<p>Most of the households store their waste in sacks. Some high cost residential houses have sanitary bins and also use bin liners to store their waste. Majority of the low cost residential households use sacks and open pits</p>	<p>Livingstone City Council collects waste in the high cost residential areas in the Central Business District in accordance with the established waste management zones/districts. Some high cost areas such as Ellaine Brittel, Batoka, Dambwa North, Highlands and Norttie Broadie are serviced by franchise companies through a door to door waste collection system.</p> <p>From 2019 to 2020 Medium and Low Cost households which are mostly located in the peri urban part of the city were serviced by Community Based Enterprises.</p>	<p>There are a few small scale informal collectors of recyclables within the residential areas for the purposes of sale.</p> <p>Some of the recyclable materials e.g plastic bottles are used for repackaging of water and other fluids for human consumption and use.</p> <p>Organic waste is used for making compost for gardening</p>	<p>The remainder of the waste is finally taken to the council dumpsite where crude dumping is practiced.</p> <p>Some of the waste is burnt or buried.</p> <p>Some types of waste polythene nature are melted to make wax.</p>

			<p>Out of the six (06) that were engaged only one is still active as the rest have since been disengaged for non-compliance.</p> <p>As of May 2020, eleven (11) new CBEs have been engaged to provide door to door waste collection services in the affected peri urban areas.</p> <p>Bulk waste from undesignated dumpsites is collected by local authority.</p>	<p>purposes.</p>	
Institutional Waste	<p>The types of waste generated by institutions include paper, plastic, glass, organic, fabric, metal.</p> <p>Paper and Plastic waste is the most generated by institutions.</p>	<p>Majority of the institutions store their waste in bins and refuse bays</p>	<p>Institutions within the CBD are serviced by the Local Authority. A few institutions outside the CBD are serviced by Franchise Companies and CBEs while the rest have either not subscribed to the established waste collection system or have no access to waste collection services.</p> <p>Some schools collect and transport their waste to</p>	<p>There are a few small scale informal collectors of recyclables who visit institutions.</p> <p>Some of the recyclable materials e.g plastic bottles are used for repackaging of water and other fluids for human consumption and</p>	<p>The remainder of the waste is finally taken to the council dumpsite where crude dumping is practiced.</p> <p>Some of the waste is burnt or buried within the institution premises.</p>

			the council dumpsite.	use.  Organic waste is used for making compost for gardening purposes	
Medical Waste					
Municipal Waste (waste generated from street sweepings, public walkways, drainages, common dumping points, public bins, bus stations, taxi ranks)	The types of waste generated include paper, plastic, glass, organic, fabric, metal.  Paper, Plastic and organic waste is the most generated from the sources.	The majority of waste is stored in skip bins and fabricated metallic bins (210 litres) provided by the Local Authority in the CBD.	The local authority is responsible for the collection of Municipal waste.	There are a few small scale informal collectors of recyclables who visit institutions.  Some of the recyclable materials e.g plastic bottles are used for repackaging of water and other fluids for human consumption and use.	The remainder of the waste is finally taken to the council dumpsite where crude dumping is practiced.  Onsite burning occurs at the common dumping points and in skip bins.



## **2.2 Waste collection and treatment for the available options**

There are three (03) solid waste collection systems which are being used in Livingstone i.e. door-to-door, communal and bulk collection system.

## **2.3 Waste generation trends and projection**

Considering a waste generation factor of 0.5 Kgs of waste per capita per day (Pathak, 2017) and the population of Livingstone during the period 2017 – 2019, the waste generation quantities and trends were determined. Similarly projections of estimates for the amount of waste generated were also done for the period 2020 – 2025. The tables below give an illustration of the estimates for the waste generation trends and projections.

### **2.3.1 Generation trends**

#### **Total waste generation estimates for the period 2017 – 2019**

<b>Year</b>	<b>Population</b>	<b>Waste Factor per person per day</b>	<b>Total waste generated Annually (tons)</b>
2017	174,408	0.5	31,393.4
2018	179,665	0.5	32,339.7
2019	185,003	0.5	33,300.54

### **2.3.2 Waste generation projections**

#### **Total waste generation estimates for the period 2020 – 2025**

<b>Year</b>	<b>Projected Population</b>	<b>Waste Factor per person per day</b>	<b>Total waste generated Annually (tons)</b>
2020	190,419	0.5	34,275.42
2021	195,916	0.5	35,264.88
2022	201,495	0.5	36,269.1
2023	207,162	0.5	37,289.16
2024	212,924	0.5	38,326.32
2025	218,786	0.5	39,381.48

### 2.3.3 Estimates of waste composition by type in tonnes

Year	Total Waste generated Annually per waste Stream						
	Paper 15.5%	Plastic 22%	Organics 29%	Glass 13.5%	Textile 10%	Metal 6.5%	Others 3.5%
2020	5,312.69	7,540.59	9,939.87	4,627.18	3,427.54	2,227.90	1,199.64
2021	5,466.06	7,758.27	10,226.82	4,760.76	3,526.45	2,292.22	1,237.77
2022	5,621.71	7,979.20	10,518.04	4,896.33	3,626.91	2,357.49	1,269.42
2023	5,593.37	8,203.62	10,813.86	5,034.04	3,728.92	2,423.80	1,305.12
2024	5,940.58	8,431.79	11,114.63	5,174.05	3,832.63	2,491.21	1,341.42
2025	6,104.13	8,663.93	11,420.63	5,316.50	3,938.15	2,559.80	1,378.35

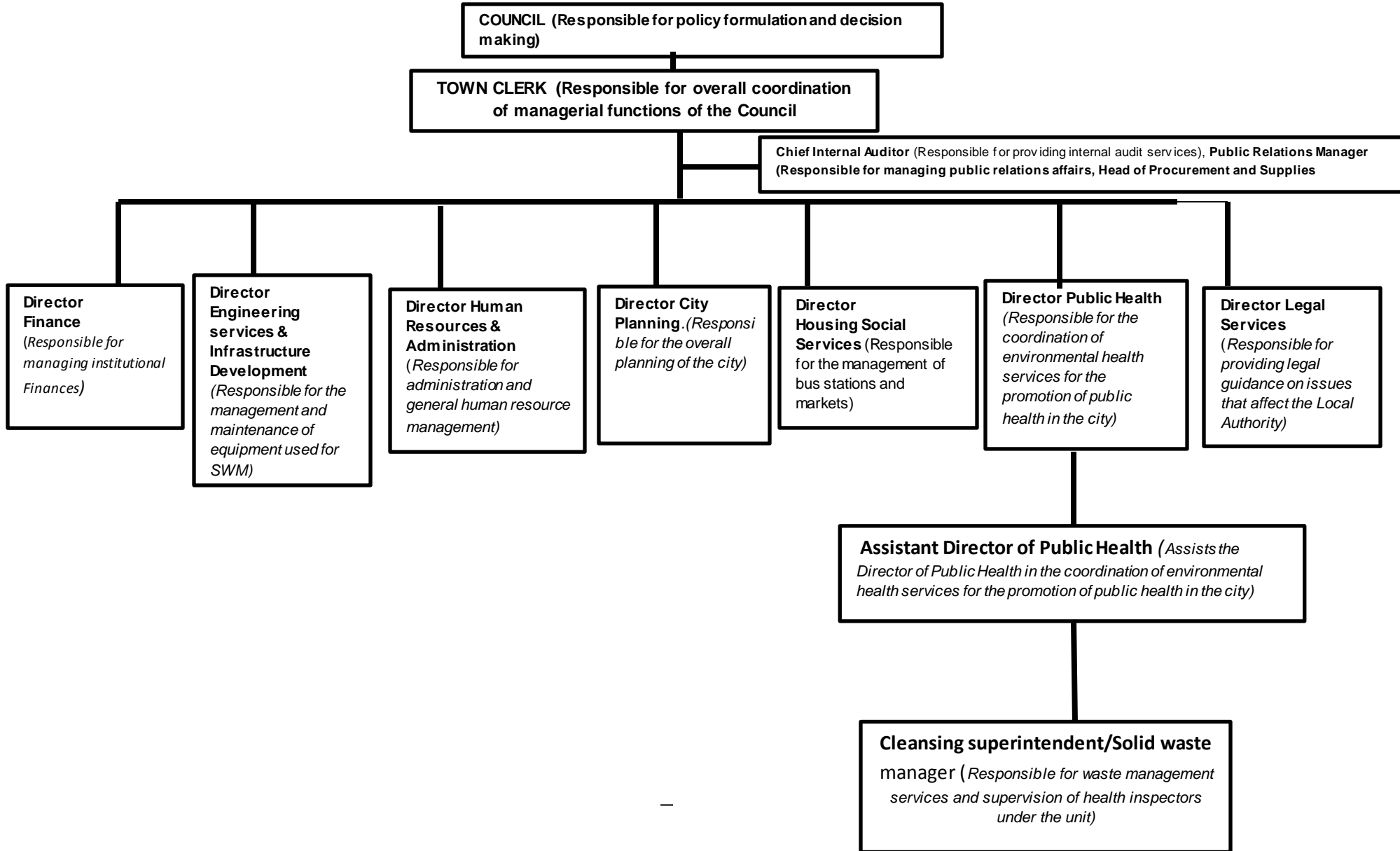
## 2.4 Organisation and Financing

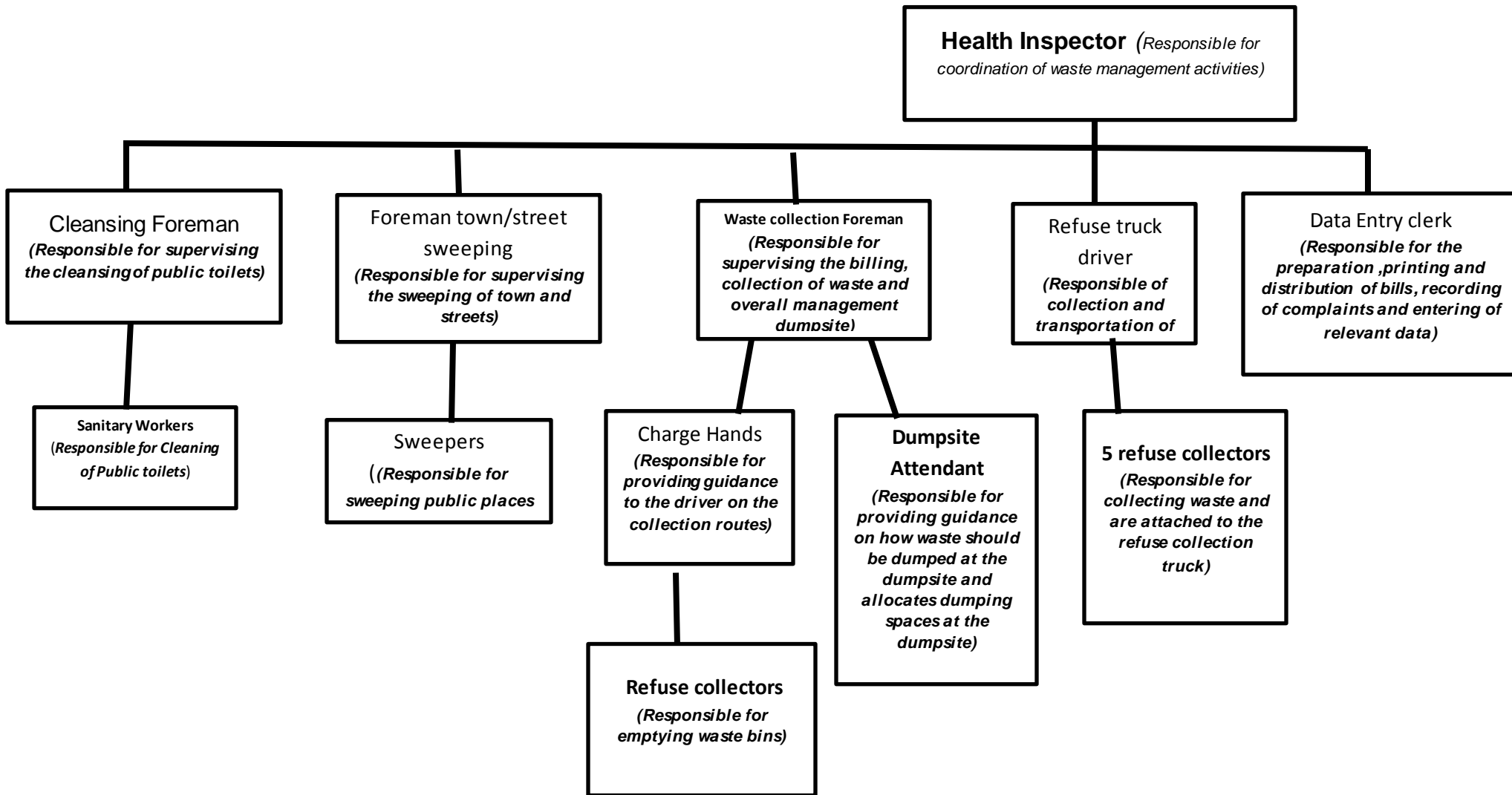
### 2.4.1 Organisation

Livingstone City Council is responsible for the overall management and coordination of solid waste management activities within the City. The various departments within the Council have clearly defined roles that they play with regards to solid waste management. The department of Public Health coordinates all waste management activities in the District. The organizational structure given clearly highlights the officers involved and their respective roles.

Livingstone has two dumpsites, one managed by the local municipality and the other by a local hotel, Minor Hotels. Livingstone City Council through the Solid Waste Management Unit (SWMU) Collects waste in the Central Business District. Franchise companies and Community Based Entrepreneurs have also been engaged to collect waste in other urban and peri urban areas respectively.

**ORGANISATIONAL STRUCTURE FOR LIVINGSTONE CITY COUNCIL**







#### *2.4.1.1 Frequency*

The frequency of collection is at least once per week. The contractors have been left to optimize their own routing in the zones where they operate; the routes vary depending on households who have paid up for the service that month.

#### *2.4.1.2 Segregation*

There is no realistic provision for segregation at point of generation.

### **2.4.2 Financing**

Solid waste management is one of the functions of the Local Authority that requires a lot of resources. In order to ensure that this function is adequately executed, Livingstone City Council uses various modes of financing though not adequate. These include; local revenue, donor funding, grants and waste collection fees.

### **2.5. Socio-Economic Projections**

Livingstone City is the tourist capital of Zambia. Tourism is the engine of the district's economy. In 2010, 96% of the district's population was classified as urban.

According to the 2010 Census, there were a total of 30,461 households in Livingstone and the average household size was 4.8 persons, which is lower than the average household size for the nation which is 5.2. Assuming the same household size of 4.8 persons, and the projected population of 190,419, it is estimated that there are some 39,670 households in Livingstone in 2020. The number of houses on the valuation roll in 2020 represents less than 40% of households in the district.

Again, assuming the household size is unchanged, the number of households in Livingstone will increase by 5,910 to 45,580 by 2025 and by a further 6,476 households to 52,056 by 2030. The estimate is that there could be an additional 12,386 households to be provided with services by 2030 but also many of these households have potential to contribute to the tax base of the Council. This has an implication on the amount of waste that will be generated in the district.

The construction of the intercity bus terminus and the modern market will also have implications on the amount of waste generated in the CBD.

Livingstone City Council has opened up new areas for development accommodating over 2000 plots ranging from residential, commercial, and institutional which once developed will lead to an increase in the amount of waste generated.

## 2.6. Assessment of previous objectives (if any)

S/N	Previous Objectives	Source Document	Remarks
1.	Provision of a <b>waste collection service</b> (door-to-door or skip collection) to 75% of households by the end of 2010.	2006 Solid Waste Management Plan for Livingstone	As at 2020 the percentage coverage for waste generators serviced by Livingstone City Council stands 65%. However, there is need to segregate this coverage by different categories of waste producers as well as collect percentage coverages by CBEs and Franchise companies (Solid Waste Management Reports, LCC, 2019).
2.	Implementation of ongoing improvements in waste disposal to develop a disposal site that can be operated on a sustainable basis to minimise the environmental and public health impacts, using the available resources at LCC.	2006 Solid Waste Management Plan for Livingstone	Not yet implemented
3.	Development and capacity building of the SWM Unit in LCC, with full responsibility	2006 Solid Waste Management Plan for Livingstone	Solid Waste Management Account was opened

	and accountability for SWM performance in Livingstone, and with capacity to provide a sustainable waste collection service.		Solid Waste Management Unit in place
4.	To achieve full <b>cost recovery</b> in SWM by 2010, including financial planning for replacement of vehicles and other assets.	2006 Solid Waste Management Plan for Livingstone	As at 2017 the cost recovery rate was 67%

## 2.7. Strong and weak points

### Strengths

- The Central Business District is very well serviced by the Local Authority
- Availability of well-trained public health personnel in the Department of Public Health
- Livingstone City Council has been exploring innovative ideas to increase collection and to manage the dumpsite better.
- Availability of Land
- Availability of equipment

### Weaknesses

- Yet to complete a full Waste Analysis and Characterization Study (WACS)
- Inadequate funds
- Inadequate programmes and plans aimed at promoting the ZERO Waste Concept
- None availability of a bye law to compel waste generators implement the Zero Waste Concept.



## **Opportunities**

- Much goodwill from many stakeholders for better waste management to keep tourist town credentials.
- Relatively low population
- Relatively high unemployment in city (low-skill roles especially those required to actualize the Zero Waste Concept easy to fill)
- Some already implemented recycling and waste sorting activities, ready to scale up.
- Unregulated waste pickers available
- Rich experience of franchised/contracted door-to-door waste collection private service providers.
- Availability of recyclable materials in most waste streams.
- Availability of individuals in the business of collection of recyclable materials.

## **Threats**

- Unregulated waste pickers
- Open burning and waste burying in backyard pits (both observed even in high-income areas)
- Dumpsite in ecologically sensitive location
- Crude dumping being practiced at the Council Dumpsite
- Low uptake of collection service especially in peri-urban areas
- Rapid population growth combined with limited and unequal development
- High rates of urbanization, with a majority of growth occurring in informal or unplanned settlements
- Little or no knowledge on the Zero waste concept amongst the residents
- Lack of a clear policy, regulatory, governance, and accountability framework around waste recovery and processing activities.
- Lack of sanitary landfills, which poses a threat to groundwater and health of the surrounding community, and results in open dumping of collected municipal waste
- Underutilization of valuable waste streams and an under-developed market for recycled material

### 3.0 PLANNING, PROJECTIONS AND ASSESSMENT

#### 3.1 Risks and Assumption for Planning

##### **3.1.2 The Legal Mandate of the Local Authority in Waste Management**

It is assumed that the current mandate of the local authority regarding management of solid waste shall remain unchanged during implementation of the plan. The Local Government Act Cap 2 of 2019 first schedule (section 16(2) paragraph 11 (j) requires local Authorities to manage refuse removal, refuse dumps and disposal of solid waste.

##### **3.1.3 Organizational Structure**

It is assumed that the current organizational structure for the Local Authority as city council which provides for the establishment of a solid waste management unit under department of public health remains unchanged. The solid waste management unit comprises employees who are responsible for the day to day implementation of waste management activities. It is therefore assumed that any change to the current establishment will affect the implementation to the plan.

##### **3.1.4 Financing Mechanisms**

If funds for carrying out the major investments cannot be found, then it is not possible to implement the waste management plan. In addition, financial sustainability will require the larger part of these funds to be in grant form. Hence, adequate support from the donor community is assumed forthcoming. This will presuppose also support to actualize plan implementation from the Government of Zambia.

##### **3.1.5 Creditworthiness of Private Waste Collectors**

The creditworthiness of private waste collection companies is closely linked to the issue of funding availability. In the past, Most of these companies experienced difficulties in borrowing due to among others smallness of size and the line of business. If the creation of a successful franchising system, acting as a security to lenders, is insufficient for obtaining funding, then the waste collection system as foreseen cannot be implemented as the necessary collection capacity in terms of vehicles and containers will not be made available.

### 3.1.6 Willingness and ability to pay for waste collection services by waste generators

The success of the SWM unit and private waste collection companies is in the provision of waste collection services is dependent on willingness by waste generators to pay applicable fees for the services. It is assumed that the willingness among waste generators to pay for waste collection services will improve so as to ensure sustainability.

### 3.1.7 Manufacturing methods

Changes in the methods of manufacturing certain products may affect the implementation of the plan as this may give variation in terms of chemical and physical characteristics of certain types of waste.

It must be noted however that it is never easy to give a precise estimate of future waste generation. There is need for a reliable basis for securing the necessary capacity for the system especially in the planning period which will have to look in matters of investments and establishment of collection systems

### 3.2 Forecast in terms of waste generation total and per waste stream

Table 3 : Projected estimates of the total yearly waste generation in tonnes

Year	Projected Population	Waste Factor	Total Waste generated Month (tons)	Total waste generated Annually
2020	190419	0.5	2,856.29	34,275.42
2021	195916	0.5	2,938.74	35,264.88
2022	201495	0.5	3,022.43	36,269.1
2023	207162	0.5	3,107.43	37,289.16
2024	212924	0.5	3,193.86	38,326.32
2025	218786	0.5	3,281.79	39,381.48

Table 4: Projected Estimates of waste composition by type in tonnes

Year	Projected Quantities per Year per Waste Stream						
	Paper 15.5%	Plastic 22%	Organics 29%	Glass 13.5%	Textile 10%	Metal 6.5%	Others 3.5%
2020	5,312.69	7,540.59	9,939.87	4,627.18	3,427.54	2,227.90	1,199.64
2021	5,466.06	7,758.27	10,226.81	4,760.76	3,526.49	2,292.21	1,237.77
2022	5,621.71	7,979.20	10,518.04	4,896.33	3,626.91	2,357.49	1,269.42
2023	5,593.37	8,203.61	10,813.85	5,034.04	3,728.92	2,423.79	1,305.12
2024	5,940.58	8,431.79	11,114.63	5,174.05	3,832.63	2,491.21	1,341.42
2025	6,104.13	8,663.93	11,420.63	5,316.50	3,938.15	2,559.80	1,378.35

The estimates were determined using a waste generation factor of 0.5kg per capita per day (Pathak, 2017) multiplied by the projected population for each particular year.

**Table 5: Forecasted Waste Management Options**

<b>Source/Stream</b>	<b>Generation</b>	<b>Storage</b>	<b>Collection</b>	<b>Reuse/Recycling</b>	<b>Waste Treatment and disposal options</b>
Commercial and Industrial Waste - Business Entities	Reduced quantity of waste generated by commercial entities and collected for disposal	Increased availability and use of suitable waste storage facilities	Increased coverage of door to door collection services  Increased waste collection frequency i.e. at least once in a week.	Increase number of formal small, medium and large entrepreneurs involved in material recovery and recycling	Increase in number of investors involved in composting of organic waste.  Reduced quantity of waste for disposal  Enhance sanitary disposal of solid waste at council dumpsite where sanitary through land filling.
Waste from Markets	Reduced quantity of waste generated and collected for disposal	Increased availability and use of suitable waste storage facilities	Increase in frequency of waste collection in markets i.e. at least once in a week.  Regularise collection of	Reduced bad practices such as using plastic and glass bottles for packaging of beverage for	Reduced quantity of waste for disposal and stop open air burning of waste in the

			waste at two (2) markets. Commence provision of waste collection services at one market	human consumption as these materials will instead be sold to material recovery facilities	market.
Domestic Waste - Households	Reduced quantity of waste generated in house holds	Increased availability and use of suitable waste storage facilities	Increase in frequency of waste collection in markets i.e. at least once in a week.	Increase in number of formal small, medium and large entrepreneurs involved in material recovery and recycling	Reduced quantity of waste for disposal and stop burying, indiscriminate disposal and open air burning of waste.
Institutional Waste	Reduced quantity of waste generated and collected for disposal	Increased availability and use of suitable waste storage facilities	Increase in frequency of waste collection in Institutions i.e. at least once in a week.	Increase in number of formal small, medium and large	Reduced quantity of waste for disposal Enhance sanitary

				entrepreneurs involved in material recovery and recycling	disposal of solid waste at council dumpsite where sanitary through land filling.
Medical Waste		Increased availability and use of suitable waste storage facilities			
Municipal Waste (waste generated from street sweepings, public walkways, drainages, common dumping points, public bins, bus stations, taxi ranks)	Reduced quantity of waste generated and collected for disposal	Increased availability and use of suitable waste storage facilities	Increase in frequency of waste collection in Institutions i.e. at least once in a week.	Increase in number of formal small, medium and large entrepreneurs involved in material recovery	Reduced quantity of waste for disposal and stop indiscriminate disposal and open air burning of waste.
Hazardous Waste other than medical waste					

### 3.3 Objectives of Forecasted Waste Management Options

Source/Stream	Generation	Storage	Collection	Reuse/Recycling	Waste Treatment and disposal options
Commercial and Industrial Waste - Business Entities	<p>Reduced quantity of waste available for disposal</p> <p><b>Objective No. 1:</b> <i>To raise awareness by 75% among business operators on options for waste minimisation and reduction by December 2024</i></p> <p><b>Objective No. 2:</b></p> <p><b>Objective No. 3:</b> <i>To ensure 50 % recovery at source of selected recyclable materials (i.e. PET plastic, metal cans, glass</i></p>	<p>Increased availability and use of suitable waste storage facilities</p> <p><b>Objective No. 8:</b> <i>To ensure 75% of commercial and industrial business entities have suitable waste storage facilities by December 2024</i></p>	<p>Increased coverage of door to door collection services</p> <p>Increased waste collection frequency i.e. at least once in a week.</p> <p><b>Objective No. 13:</b> <i>To increase coverage of door to door waste collection services to 80% by December 2024</i></p> <p><b>Objective No. 14:</b> <i>To increase</i></p>	<p>Increase number of formal small, medium and large entrepreneurs involved in material recovery and recycling</p> <p><b>Objective No. 18:</b> <i>To create a database for all formal and informal entrepreneurs involved in material recovery, reuse and recycling by December 2022</i></p> <p><b>Objective No. 19:</b> <i>To facilitate for the formation of a registered organisation for entrepreneurs involved in material recovery, re-use and recycling by December 2023</i></p> <p><b>Objective No. 20:</b> <i>To facilitate for at least two (2) large scale investments in</i></p>	<p>Increase in number of investors involved composting of organic waste.</p> <p>Reduced quantity of waste for disposal</p> <p>To effectively manage the dumpsite</p> <p>Enhance sanitary disposal of solid waste at council dumpsite where sanitary through land filling.</p> <p><b>Objective No. 23:</b> <i>To establish a waste disposal facility at a suitable site by December 2024.</i></p> <p><b>Objective No. 24:</b> <i>To facilitate for the establishment of a formal organisation for waste pickers at the dumpsite by December</i></p>

	<i>bottle, and paper) in the waste stream by December 2024</i>		<i>waste collection frequency to at least once per week by December 2024</i>	<i>recycling in Livingstone by December 2024</i>	2024
Waste from Markets	<p>Reduced quantity of waste available for disposal</p> <p><b>Objective No. 4:</b> <i>To raise awareness by 75% among marketers in 17 markets on options for waste minimisation and reduction by December 2024</i></p>	<p>Increased availability and use of suitable waste storage facilities</p> <p><b>Objective No. 9:</b> <i>To provide suitable waste storage facilities in all markets by December 2024</i></p>	<p>Increase in frequency of waste collection in markets i.e. at least once in a week.</p> <p>Regularise collection of waste at two (2) markets.</p> <p>Commence provision of waste collection services at one market</p> <p><b>Objective No. 15:</b> <i>To ensure 100% coverage of waste collection services in markets by December 2023</i></p>	<p>Reduced bad practices such as using plastic and glass bottles for packaging of beverage for human consumption as these materials will instead be sold to material recovery facilities</p> <p><b>Objective No. 21:</b> <i>To facilitate for the establishment of a recyclables collection centre to offer competitive prices for recyclables by December 2024</i></p>	Reduced quantity of waste for disposal and stop open air burning of waste in the market.
Domestic Waste -	Reduced quantity of waste available	Increased availability and	Increase in frequency of	Increase in number of formal small, medium and large	Reduced quantity of waste for disposal



Households	<p>for disposal from house holds</p> <p><b>Objective No.5:</b> <i>To establish a demonstration site involving 100 households for piloting best environmental practices for sound waste management by December 2022</i></p> <p><b>Objective No. 6:</b> <i>To replicate best environmental practices for sound waste management to 500 households by December 2024</i></p> <p><b>Objective No. 7:</b> <i>To raise awareness among households on options for waste minimisation and reduction by</i></p>	<p>use of suitable waste storage facilities</p> <p><b>Objective No. 10:</b> <i>To ensure 75% adherence to availability of suitable waste storage facilities in households by December 2024</i></p>	<p>waste collection in households i.e. at least once in a week.</p> <p><b>Objective No. 16:</b> <i>To establish waste collection systems in all the 17 wards in the district by December 2022</i></p> <p><b>Objective No. 17:</b> <i>To increase waste collection frequency by service providers to at least once per week</i></p>	<p>entrepreneurs involved in material recovery and recycling</p> <p><b>Objective No. 22:</b> <i>To facilitate for setting up of at least 6 recyclables collection centres in 6 wards by December 2024</i></p>	<p>and stop burying, indiscriminate disposal and open air burning of waste.</p>
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	<i>December 2024</i>				
Institutional Waste	<p>Reduced quantity of waste generated and collected for disposal</p> <p><b>Objective No. 7:</b> <i>To raise awareness in learning institutions and faith based organisations on options for waste minimisation and reduction by December 2024</i></p>	<p>Increased availability and use of suitable waste storage facilities</p> <p><b>Objective No. 11:</b> <i>To ensure 75% adherence to availability of suitable waste storage facilities in learning institutions and faith based organisations by December 2024</i></p>	<p>Increase in frequency of waste collection in institutions i.e. at least once in a week.</p>	<p>Increase in number of formal small, medium and large entrepreneurs involved in material recovery and recycling</p>	<p>Reduced quantity of waste for disposal</p> <p>Enhance sanitary disposal of solid waste at council dumpsite where sanitary through land filling.</p>
Medical Waste		<p>Increased availability and use of suitable waste storage facilities</p>			
Municipal Waste (waste generated from street sweepings,	<p>Reduced quantity of waste available for disposal</p>	<p>Increased availability and use of suitable waste storage facilities</p>	<p>Increase in frequency of waste collection in Institutions i.e. at least once</p>	<p>Increase in number of formal small, medium and large entrepreneurs involved in material recovery</p>	<p>Reduced quantity of waste for disposal and stop indiscriminate disposal and open air burning of waste.</p>

<p>public walkways, drainages, common dumping points, public bins, bus stations, taxi ranks)</p>		<p><b>Objective No. 12:</b>  <i>To ensure availability of public waste collection facilities in public walkways, bus stations, and taxi ranks in the CBD by December 2024</i></p>	<p>in a week.</p>		
<p>Hazardous Waste other than medical waste</p>					

Aspect	Forecast	Objectives
A. Responsibilities	Increase in number of human resource and other service providers	To establish clear roles and responsibilities in solid waste management and accountability
B. Economy and financing		

#### **4.0 Action and Implementation Plan**

This chapter gives information relating to the plan of actions as well as how the waste management plan will be implemented (see Appendix A). The plan will be implemented in a period of three (03) years starting in 2022. An assessment of the available capacities has been presented under section 2.4 where the Livingstone City Council Organizational Structure highlighting the available staff and respective responsibilities has been availed. Similarly, the policy and legal framework has been discussed under section 1.1.

The implementation plan has a component of public awareness and communication with various stakeholders. The estimated costs of the various activities in the plan is specified. It is hoped that the plan will be financed using various financing mechanisms including Public Private Partnerships, Donor Funding, Government Grants and Council local revenue.

#### **5.0 Monitoring and Evaluation**

The plan shall be monitored by the Zambia Environmental Management Agency (ZEMA). It is hoped that the monitoring shall be done on a quarterly basis starting at the end of the first quarter of 2022.

In terms of evaluation, assessment shall be carried out annually and reports are to be generated by the Department of Public Health. The report will assess the progress made according to the set indicators and targets in the action plans. In addition, the Department will be expected to submit Evaluation Reports to the Zambia Environmental Management Agency (ZEMA)

## **6.0 Conclusion**

The preparation of the Draft Waste Management Plan for Livingstone was done through various consultative processes to ensure that a multi sectoral approach to planning is adopted. To make certain that the plan is aligned to the available policies and in line with the existing pieces of legislation, various policy and legal documents were reviewed. It is also important to note that the plan also took into consideration the emerging issues in solid waste management.



## **7.0 References**

1. Waste Management Study – Livingstone, Zambia *Assessment Of Opportunities For The Reduction Of Open Burning Practices*
2. Hogg, Dominic/Eunomia Research & Consulting/ECOTEC Research & Consulting (2002), Cost For Municipal Waste Management in the EU – Final Report to the Directorate General, European Commission, European Commission
3. Volume 17 of the Laws of Zambia
4. Lusaka City Council: Strategic Municipal Solid Waste Management Plan for Lusaka City, October 2003