

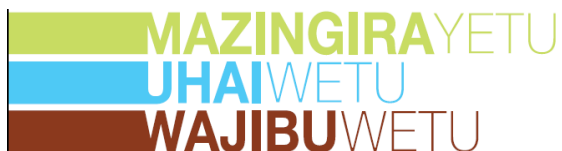


NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

NATIONAL GUIDELINES FOR THE ESTABLISHMENT OF MATERIALS RECOVERY FACILITIES

A photo depicting Circularity (flow of waste)

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FOREWORD

The environment sector is important in economic development of Kenya. This is because the sector provides raw materials to support various economic activities and livelihoods. However, the sector is also the recipient of waste products from production and disposal processes often becoming harmful to both human health and the environment. The situation has been escalated by population growth, changing consumption patterns and lifestyles leading to increased generation of waste.

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 proliferation of disease; environmental degradation and ultimate impact on livelihoods. Waste being one of the contributors of greenhouse gases, its improper management poses a threat to Climate Change and eventually in the achievement of sustainable development. For this reason the country, should develop sustainable waste management technologies and initiatives to curb this growing global challenge

Although, elimination of waste entirely may not be feasible, systematic application of modern waste management systems should be explored and the right infrastructure developed to assist in proper waste management. The material recovery facility is one such infrastructure that will play a critical role in the management of waste in Kenya. All county governments will be expected to construct material recovery facilities in their respective areas. For this infrastructure to function optimally, all stakeholders in the waste value chain must get involved. The document seeks to guide county governments and other private players on the requirement, establishment and operations of a material recovery facility, it is hoped this will go a long way in advancing waste management and hence environment protection in the country.

Emilio Mugo

BOARD CHAIRMAN

ACKNOWLEDGEMENT

This document is guided by the zero waste and circularity of waste principle. Waste is viewed as a resource that can be harnessed to create wealth, employment and reduce environmental pollution. The current handling of waste in the country with

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limited infrastructure has prompted NEMA to develop a guideline for a material recovery facility. The facilities will be used for the final sorting of waste before recycling or disposal. This initiative will require collaboration with the County Governments to ensure establishment of MRFs in strategic places and the segregation of waste at source.

To help the Country move towards sustainable waste management, the following taskforce members were involved in the development of the guidelines on the establishment of material recovery facilities. Sincere gratitude goes to Mr. David Ong'are Director Environmental Compliance; Margaret Njuki- Deputy Director Waste Management & chemicals; Veronica Kimutai- Senior Principal- Waste Management & Chemicals; Anne Theuri- Senior Principal Programmes; Oceanic Sakwa- Principal Compliance and Enforcement Officer; Anne Macharia - Principal Compliance & Enforcement Officer; Francis Chwanya- Senior Compliance & Enforcement officer; Newton Osoro- Senior Compliance & Enforcement officer and Mary Mutheki- Administrative secretary.

I wish to also appreciate the NEMA management for their substantive guidance, advice and managerial assistance throughout the process.

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EXECUTIVE SUMMARY

Currently Kenya is moving towards sustainable waste management. However, the prerequisite for this is the establishment of a legally binding framework which provides guidance to all stakeholders in this regard. As a result, the Ministry of Environment, Climate Change and Forestry (MoECCF) through the National Environment Management Authority (NEMA) have prepared guidelines for the establishment of Material Recovery Facilities to guide the various County Governments and the private sector.

A material Recovery facility is a waste infrastructure for the final sorting of waste before recycling or disposal. The guidelines proposes the development of the infrastructure at three levels: Manual, semi- mechanized and mechanized. A comprehensive awareness will be conducted among various stakeholders to build their capacity in waste segregation, construction and management of Material recovery facilities. Consultations with relevant stakeholders will also ensure ownership and effective implementation.

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ACRONYMS AND ABBREVIATIONS

CBD	Central Business District
CBO	Community Based Organization
EPR	Extended Producer Responsibility
EMCA	Environmental Management and Coordination Act
ESIA	Environmental and Social Impact Assessment
MEA	Multilateral Environmental Agreement
MRF	Material Recovery Facilities
NEMA	National Environment Management Authority of Kenya
OSHA	Occupational Safety and Health Act
PPE	Personal Protective Equipment
SOP	Standard Operating Procedure
SWM	Solid Waste Management
SWMA	Sustainable Waste Management Act

Waste stream: For purposes of this guidelines, a waste stream refers to the three categories of waste identified in the National Guidelines on Segregation of Municipal Solid Waste (Wet, Dry, Hazardous).

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1.0 BACKGROUND INFORMATION

Increasing population and urbanization in Kenya, has led to increasing challenges of collection, re-use, recycling, treatment and disposal of the ever increasing quantities of solid waste. According to the National Sustainable Waste Management Policy, 2021, it is estimated that more than 22,000 tons/ day of garbage is currently generated and only 10% is recycled. Private companies handling waste recycling have indicated that, most of the household waste is not sorted and comprises of 60% organic waste. Mixed waste has rendered recycling difficult and expensive.

The policy also estimates that 40% of the population in many parts of major cities receive waste management services. Currently, we have uncontrolled waste dumpsites where leachate pollutes waterways and underground aquifers, and open burning of waste emits toxic air and noxious fumes. There is no systematic waste segregation at source and recovery of recyclable items such as plastics, papers, glass and metals is done by informal waste picker groups who recover only a fraction of the total recyclable materials, mostly directly from the dumpsite. Informal waste pickers at these dumpsites are exposed to toxic chemicals, air pollution and disease causing vermin.

The Government has developed and enacted National waste management policy and legislations, including the National Sustainable Waste Management Policy, 2021, Environmental Management and Coordination Act CAP 387, Environmental Management and Coordination (Waste Management) Regulations, 2006, Sustainable Waste Management Act CAP 387C and the draft Environmental Management and Coordination (Extended Producer Responsibility) regulations for coordinated action. Systems are in place to address hazardous waste, electronic waste, industrial waste, agricultural chemicals and medical waste.

The National Sustainable Waste Management Policy, 2021 and the Sustainable Waste Management Act CAP 387C proposes the establishment of Materials Recovery Facilities (MRF) by county governments, a concept which allows sorting and prioritizing the recovery of valuable items from solid waste. A materials recovery facility (MRF) is a specialized plant where waste is received, separated and prepared as recyclable materials for marketing. The waste is sorted for subsequent use in terms of recycling of the dry materials and processing as secondary raw materials. The organic waste shall be composted. These facilities provide for an integrated waste management that enhance circular economy and value addition. The wastes are

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sorted and residual materials go for incineration or a sanitary landfill. The MRFs shall be regulated and controlled to ensure the protection of the health of workers, neighbouring communities and ultimately the environment.

1.1 Goal:

The overall Goal is to provide guidance on the establishment and operationalization of MRFs in order to promote a clean and healthy environment through a circular economy.

1.2 Objectives

The objectives of the guidelines are to:

- i Provide requirements for establishment of MRFs
- ii Provide requirements for operationalization of MRFs
- iii Propose model designs for different MRF
- iv Provide reporting framework by MRF operators

1.3 Scope

These guidelines provide simple and practical steps that serve as a basic reference for County Governments and the Private sector in establishing and operating Material Recovery Facilities. It also serves as a reference tool for regulators. The guidelines cover the design, location, and requirements for licensing, monitoring and reporting.

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2.0 SITUATIONAL ANALYSIS

2.1 Current status of waste management in Kenya

Waste from various sources are currently collected by transporters (both county government and private) and either taken directly to the designated dumpsites, private transfer stations, or directly to facilities that treat/ dispose such waste.

2.2 Existing waste collection systems

Various types of waste streams are handled differently in Kenya.

Domestic waste: commonly 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 disposal sites with minimal sorting/segregation.

Industrial waste: Industrial waste is the waste produced by industrial activity which includes any material that is rendered useless during a manufacturing process. Industries produce both hazardous and non-hazardous waste. These wastes include chemical solvents, paints, sand paper, and paper products, industrial by products, metals, municipal solid waste and radio-active waste. Currently, most of the hazardous industrial waste is not pre-treated 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 dumpsites.

Waste Segregation:

- Most of the waste is generated at household, market places, cities, towns, institutions and industrial zones
- Very few households segregate waste at the household level
- There is minimal waste segregation at source within the CBD areas, industries, institutions in most towns/cities.

Collection and Transportation:

- Waste in the CBDs is largely collected by the County Governments while private operators dominate collection in residential areas at a fee

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- Waste collection in low income and informal settlements is mainly done by organized groups and CBOs
- Waste collectors obtain permits from the County Governments to collect waste from designated areas.

2.3 Waste processing and disposal facilities

- Recyclable materials comprise 50 – 80% of the general waste stream; Several industries exist that receive recovered materials such as paper, polythene, plastics, glass, scrap metals, used oil, e-waste and waste tyres for recycling. There is low public awareness of these facilities and hence majority have not achieved optimal operations;
- A few composting facilities exist especially in horticultural farms;
- Thermal treatment of waste by use of incinerators and cement kilns is increasingly being adopted.
- Most of the municipal and domestic waste generated is disposed off in open dumpsites across the country. Although this is not a recommended practice it is the most common practice
- Biomedical waste is largely disposed through incineration and rudimentary kilns; Condemned, damaged or expired goods are disposed 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 workforce operating these disposal sites have minimal or no training on how to manage these facilities.

2.4 Status of MRFs in Kenya

Currently, a number of small scale Material transfer stations exist in various counties. Some of them include:

Takataka solutions in Nairobi, Sergeant Logistics in Kilifi, Taita Taveta MRF, Kisii County MRF at the Agricultural Training Centre among others.

2.5 Challenges

1. **Lack of awareness and knowledge:** There is limited awareness and knowledge on the importance of a clean and healthy environment. This has led to poor

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practices by the Public towards waste management which has led to environmental pollution.

2. **Political influence and lack of good will:** The waste management agenda has not been prioritized, leading to poor investments and funding. Inadequate budgetary allocation has led to low investment in waste management facilities and equipment.
3. **Disposal sites: Availability, siting and management:** Availability of public land for the purpose of a disposal site remains a challenge. In situations where the land is available, the neighbouring communities are opposed to it being in their backyard. This is as a result of poor management of the existing sites.
4. **Lack of segregation:** There is lack of waste segregation at source leading to mixed wastes which are collectively disposed off in the dumpsites. 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.
5. **Limited technical competencies.**
6. **Slow adoption of modern technologies:** This is largely due to inadequate financial resources to purchase the equipment, lack of incentives including tax waivers, resistance to change, lack awareness, unavailability of land and weak enforcement.

3.0 POLICY, LEGAL & INSTITUTIONAL FRAMEWORK

3.1 Multilateral Environmental Agreements (MEAs);

Kenya is an active participant in multiple international and regional conventions that address different aspects of the sustainable waste management challenge. These include agreements on sustainable development and reducing waste, the control of hazardous chemicals, electronic waste, and climate change:

- The Basel Convention, ratified in 2000, which 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.
- The Bamako Convention, a treaty amongst African nations 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 agreement on Hazardous Waste to help achieve the objectives of the convention.
- The Stockholm Convention on persistent organic pollutants (POPs) (ratified in 2004) which seeks to protect human health and the environment from these chemicals that remain intact in the environment for long periods and have harmful impacts on human health and the environment.
- The Rotterdam Convention (ratified in 2005) which sets out the procedure for Prior Informed Consent in the International Trade of hazardous chemicals and Pesticides.
- The Montreal Protocol which provides for the phase out of the production and consumption of ozone depleting substances to reduce their abundance in the atmosphere, and thereby protect the earth's fragile ozone Layer.

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- The fourth United Nations General Assembly (UNEA4 of 2019) resolution UNEP/EA/4/L.8 on environmentally sound management of waste called upon member states to promote integrated approaches to solid waste management through sustainable consumption and production not limited to circular economy, but also economic models, innovation, reduction of waste at source of origin, minimization of packaging materials, discouragement of planned obsolescence of products, removal of hazardous substance from waste before recycling as well as give special attention to recycling, re-use and reduction of landfilling as well as give application of waste hierarchy for all waste.

Kenya is a member of the United Nations and houses United Nations Environment and thus resolved to adopt the resolution

3.2 Constitution of Kenya (COK) 2010

- Article 42
- Article 69
- Article 70

Fourth Schedule on distribution of functions between the National and County governments.

Section 2(g) of Part 2 of the Fourth Schedule of the Constitution, the functions of refuse removal, refuse dumps and solid waste disposal have been devolved to County Governments

3.3 Vision 2030

Vision 2030 recognizes that efficient and sustainable waste management systems are required as the country develops into a newly industrialized state by 2030. One of the flagship projects is the Solid waste management initiative which calls for relocation of the Dandora dumpsite and the development of solid waste management systems in five (5) leading municipalities and in the economic zones planned under vision 2030

3.4 Environment Policy

Section 5.4.3 of the Environment Policy states that to achieve a clean and healthy environment, unsustainable patterns of production and consumption should be discouraged in addition to intensifying education and awareness. The Government in this policy commits to:

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1. Promote public procurement policies that encourage development and diffusion of environmentally sound goods and services.
2. Promote, strengthen, support consumer organizations and create awareness.
3. Create awareness on environmental impact of using non-biodegradable materials such as plastics.

Under Section 6.3.1 of the Policy, the Government recognizes that inefficient production processes, low durability of goods and unsustainable consumption and production patterns lead to excessive waste generation. Despite efforts to encourage reuse, recycling and recovery, the amount of solid waste generated remains high and appears to be on the increase. The Government therefore commits to:

- Develop an integrated national waste management strategy.
- Promote the use of economic incentives to manage waste.
- Promote establishment of facilities and incentives for cleaner production, waste recovery, recycling and re-use.
- On hazardous waste, the Government in section 6.5.1 commits to
- Develop a national policy on toxic and hazardous substances.
- Establish appropriate toxic and hazardous substances and disposal facilities.
- Collaborate with international community in curbing dumping of obsolete or banned toxic and hazardous substances and enforce the relevant MEAs.

3.5 National Solid Waste Management Strategy, 2015

- The guiding principle of this Strategy is to address the following:
 - The Current situation (Where are we now?)
 - The Preferred state (Where do we want to go?) and
 - Implementation of the Strategy (How do we get there?)

3.6 National Sustainable Waste Management Policy

The objectives of this Policy are to establish and maintain an effective legal and institutional framework to mainstream sustainable waste management measures and actions across relevant sectors and into integrated planning, budgeting, decision-making and implementation, at both the national and county levels.

The policy seeks to:

- Promote sustainable waste management through implementation of the waste hierarchy and circular economy concepts.
- Enhance waste segregation, collection, transportation and audit of waste across the nation.

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- Adopt inclusive management with clear financial and accounting mechanisms at national and county levels to encourage investment initiatives in implementation of sustainable waste management activities.
- Engage, strengthen and build partnerships with all stakeholders, including the private and informal sector, as well as the general public through education and provision of waste management services to promote responsible waste management behaviour.
- Incentivize private sector investment in building and operating sustainable waste management infrastructure.
- Facilitate widespread public awareness, participation, action and oversight of Kenya's sustainable waste management policy, law, mechanisms, actions and investments at the national and county level.
- Formalize the waste picker sector and ensure safe working conditions through training, financing and facilitating participation in decision-making

3.7 Environmental Management and Coordination Act (EMCA), 1999

- Section 3
- Section 86 - the CS to identify materials that are dangerous to human health and the environment.
- Section 86 –CS to issue guidelines and prescribe measures; standards of disposal
- Section 87 of EMCA prohibits the discharge of any waste in such a manner as to cause pollution to the environment. It prohibits the transportation of waste without a license and further prohibits the operation of a waste disposal site or plant without a license.
- Section 87 further provides that every person whose activities generates waste shall employ measures essential to minimize the waste.

3.8 Environmental Management and Coordination (Waste Management) Regulations, 2006

- Responsibility of waste generator
- Cleaner production methods
- Segregation of waste by generator
- Waste transportation license
- Responsibility of a waste transporter

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- License for disposal facility
- Waste treatment by operators of disposal sites
- Requirement of Environmental Audit
- Re-use and recycling plants
- Requirement for Environmental Impact Assessment
- Handling, storing and transporting of hazardous waste
- Treatment of hazardous waste
- Export Permit
- Transit of hazardous waste
- Register of Permits kept by NEMA

3.9 Sustainable Waste Management Act (SWMA), 2022

- Recognition and demarcation of roles for the citizen, county and national government
- Access to collection points and MRFs
- Creation of Material Recovery facilities (MRFs) within the Counties which shall receive mixed waste for final sorting, segregation, composting, and recycling. The resulting residual wastes shall be transferred to a long-term storage or disposal facility or sanitary landfill.
- Integration of the county waste management plan into the county development plan
- Closure of dumpsites/landfills
- Creating value in the entities involved in the waste management chain – recognizing the role of waste service providers, job creation
- Segregate non-hazardous waste into organic and non-organic fractions.
- The segregated waste shall be placed in properly labelled and colour coded receptacles, bins, containers and bags.

3.10 Climate change Act, 2016

4.0 TYPES AND DESIGNS OF MATERIAL RECOVERY FACILITIES

4.1 Types of MRFs

MRFs can be manual, semi-mechanised or mechanised. Manual MRFs entail separation of recyclable components by hand sorting; while mechanised MRFs entail separation through the use of mechanical equipment. Semi-mechanised MRFs will have some operations aided by machinery.

4.2 Categorization of MRFs

MRFs are generally classified as either **“clean”** or **“dirty,”** depending on whether the facility handles materials that are mixed with other municipal waste.

Clean MRF

A clean MRF takes in mixed recyclable materials that have been separated from municipal solid waste, by individuals, institutions or businesses.

Dirty MRF

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A dirty MRF takes in a broad stream of solid waste and separates out recyclable materials through manual and mechanical sorting. The recyclables are then processed for market, and the non-recyclable materials are sent to a landfill or other disposal facility. Generally, dirty MRFs are not encouraged, and shall be allowed to operate within the transition period as the country adopts segregation of waste at source.

4.3 Types of MRFs based on the materials they process

MRFs are designed to handle different types of materials, and they can be categorized based on the materials they process. Here are some of the common types of MRFs:

4.3.1 Single-Stream MRFs

Single-stream MRFs are designed to process mixed recyclables collected from households, institutions and businesses. These facilities accept a wide range of materials, including paper, cardboard, plastics, glass, and metals. The collected materials are sorted and separated using advanced sorting technologies, such as optical sorters and magnetic separators. Single-stream MRFs only accept a specific category of colour coded waste (which can be wet, dry or hazardous).

4.3.2 Multiple-Stream MRFs

Multiple-stream MRFs handle waste from more than one of the waste streams. The facilities can receive wet, dry and/or hazardous waste depending on their capacity.

4.3.3 Specialized MRFs

Specialised MRFs receive specific types of segregated waste for further sorting and processing. Such can be glass, plastic bottles, e-waste, scrap metal, etc. these waste can potentially be received directly from a generator, a transporter or another MRF.

4.5 Design of Material Recovery Facility:

The diagrams below present basic outlines of a manual and a mechanised MRF

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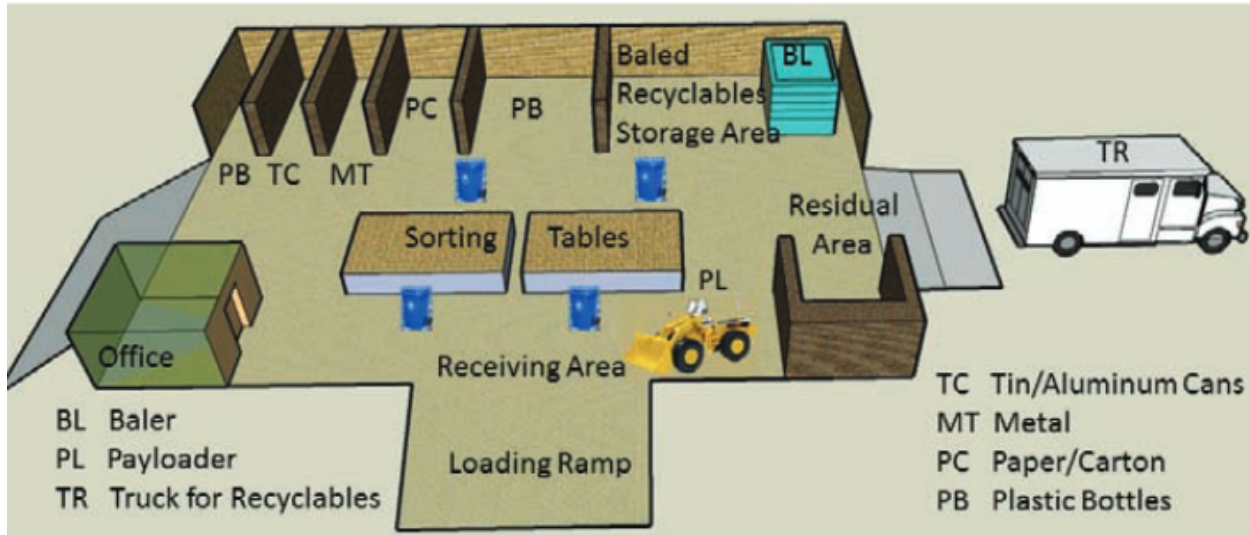
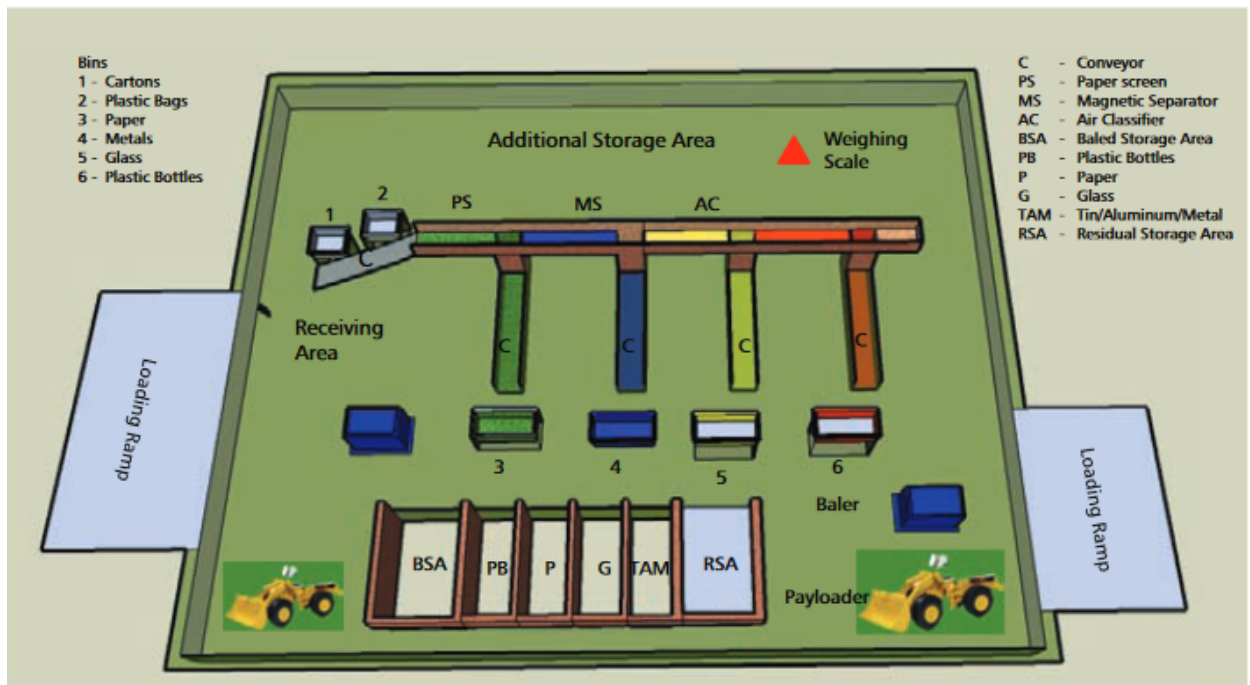


Diagram of Manual MRF (source: MRF Toolkit by ADB, 2013)



A sample mechanized Material Recovery Facility (source: MRF Toolkit by ADB, 2013)

As illustrated in the designs above, an MRF should have the following components:

- (i) Registration and Weighing area

A weighbridge/ weighing scale should be installed for weighing incoming waste and outgoing materials (sorted and residual). The details of the transporter/ client, source

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of waste and the waste stream shall be taken and recorded. The data recorded shall be remitted periodically to the Authority annually or as shall be guided.

(ii) Receiving or tipping area

All incoming waste shall be offloaded at the receiving area. The receiving area should be sufficient enough to accommodate waste beyond the capacity of the MRF.

(iii) sorting area

The waste shall be sorted into various types and kept in separate compartments.

(iv) storage area for recyclables

Sorted waste shall be held at the storage area temporarily before being transported to a recycling facility. The waste type being stored should be clearly labelled.

(v) residuals storage area

All non-recyclable materials shall be disposed in compliance with the waste management regulations, 2006. Tracking records for disposal through a licensed waste transporter to a licensed site shall be maintained on site for future inspections and monitoring.

(vi) Equipment area

Machines that are used within the facility shall be safely stored in designated area to ensure safety of the workers. The equipment should be regularly serviced and maintained in good working condition all the time while in use.

(vii) Office space

A provision for an office should be made within the MRF to ensure safe custody of records and provide space for day to day operations.

(viii) Loading area

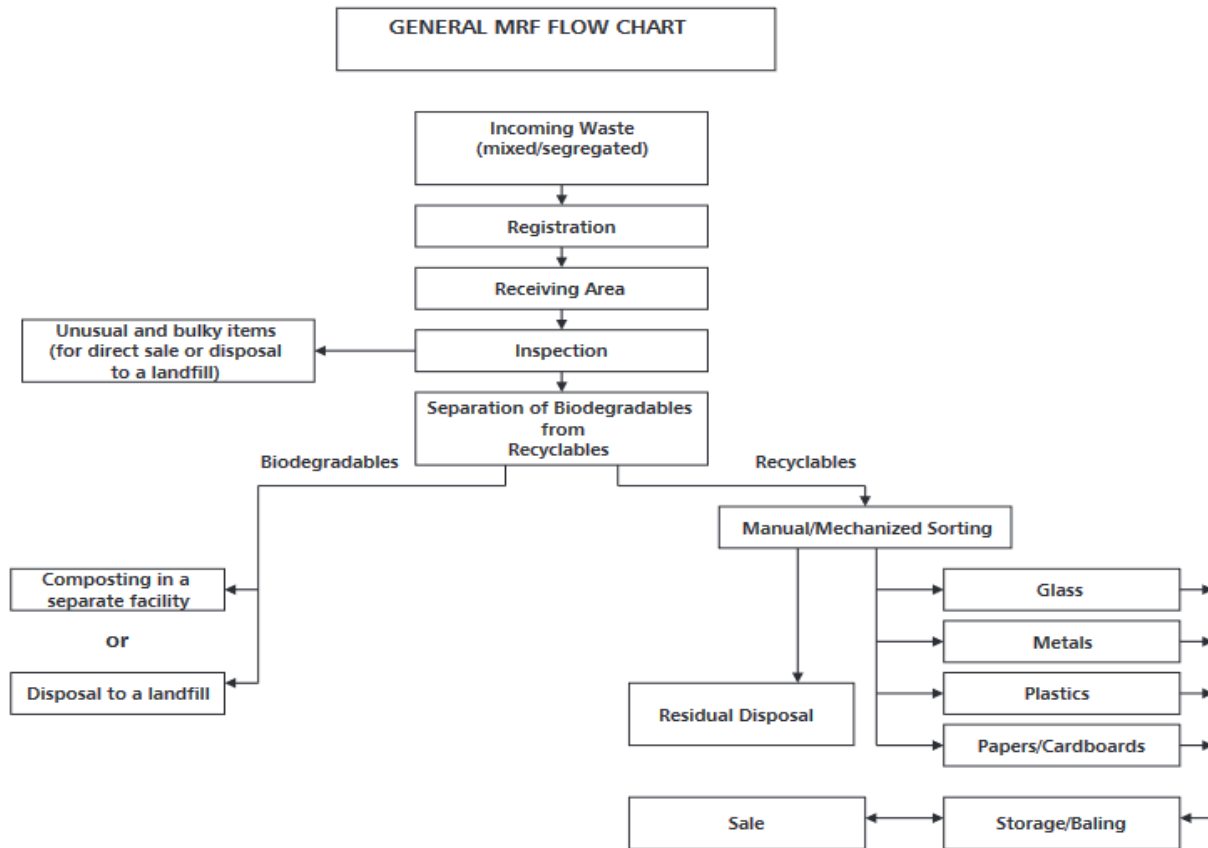
A loading bay should be provided for residuals and processed recyclables.

4.6 Material flow within an MRF

The general flow of a typical MRF may be as documented in the diagram below.

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MRF = materials recovery facility.

Source: Modified from KfW-CLSWM Project. 2008. *Technical Evaluation Manual, Philippines*.

4.7 Machinery/ equipment and infrastructure

~~MRFs use a series of conveyors that carry recyclable materials over sorting screens or other mechanisms that divide the materials. As single-stream recycling becomes more common, more facilities are designed to accept and separate various types of recyclable materials. Automated systems can sort a number of materials simultaneously, such as paper, cardboard, aluminium, plastic, and glass, using such tools as magnets and ultraviolet optical scanners. The mechanized process is augmented by workers who sort items by hand.~~

Once the materials have been sorted, they are melted, shredded, or pulped to prepare them for recycling. Glass is often pulverized and melted for use into new glass objects, although some facilities offer bottle reclamation, in which bottles are sterilized for reuse. Shredding is used to prepare plastic, metal, and paper for processing, and pulping converts paper products into a slurry that can be made again into paper. In salvaging, a product is stripped of valuable components, such as the

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removal of lead from car batteries. Processed materials are then shipped to facilities that specialize in using recycled goods for manufacturing.

MRFs tend to have more and more complex traffic movements than other types of waste facility. These include collection vehicles depositing wastes, larger lorries taking recyclates away, internal traffic movements by mobile plant etc. In addition, MRFs also tend to have more pedestrians on site. Traffic incidents are one of the most common causes of fatalities on MRF and similar sites. Traffic management needs to be considered carefully during design and operation.

4.7 Setting up an MRF

A typical MRF will be in a warehouse-type of building within a commercial/Industrial area with concrete flooring and enclosed by a perimeter wall over three (3) metre high for security.

It should also be provided with the basic connections for water and electricity and adequate space for the entry and exit of waste trucks.

Provisions for changing room, sanitary facilities and a waste water treatment system (where applicable) must be included.

The proposed MRF shall be subjected to the EIA process

Critical considerations in the setup of an MRF will include; Land acquisition; Site development; Facility construction; Equipment acquisition and training of operations personnel.

4.7.1 Land acquisition

This will be guided by the following:

- a. Size of the land: Minimum of 0.05 Hectares for single stream and specialised stream; Minimum of 0.2 Hectares for Multiple stream
- b. Proximity to Residential properties and/or Commercial premises:
All MRFs should NOT be sited in front of residential properties, on the frontages of buildings (commercial and residential). A minimum buffer distance of 50M should be observed from any residential property.
- c. The sites should be accessible and motorable and not located on railway reserves, road reserves and way leaves.
- d. Valid land ownership documents should be obtained, prior to being considered for licensing by the Authority.

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- e. Proximity to sensitive Ecosystem will be guided by the following:
 - i. No MRF should be located within 20m from the Riparian Reserve of any water body pursuant to the EMC (Water Quality) Regulations of 2006 and/or any other relevant legislation.
 - ii. No MRF should be located within an Urban forest, nature reserve, national park.

4.7.2 Equipment acquisition and training of operations personnel

Some of the equipment under the MRFs include the following:

No.	MRF Equipment	Intended Use
1.	Weighing Scale	Weighing of incoming waste and sorted recyclables
2.	Weighbridge	Weighing of large quantities of incoming waste
3.	Sorting table	Manual sorting and segregation of recyclables
4.	Pay loader	Loading of incoming waste into conveyor system, sorting tables; loading of baled recyclables into outgoing vehicles; Moving of biodegradable or residual waste out of the facility for composting or disposal respectively.
5.	Conveyor system	Mechanized and regulated movement of waste for segregation
6.	Magnet separator	Separation of iron-bearing materials
7.	Air Classifier	Separation of materials such as paper and plastic based on size, shape, and density
8.	Bottle perforator	Perforation of plastic bottles prior to compaction to optimize baling
9.	Baler	Compaction and binding of recyclables
10.	Forklift	Movement of baled waste within the MRF

4.8 Guidelines for operations

The operator of any MRF shall

- i. Demonstrate to the regulatory agencies full compliance with sectoral laws including the Occupational Safety and Health Act (OSHA), 2007 provisions
- ii. Formulate Standard Operating Procedures (SOPs) and adhere to them
- iii. Train all staff
- iv. Provide appropriate Personal Protective Equipment (PPE)
- v. Carry out periodic Medical Examination for all staff

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- vi. Maintain all equipment
- vii. Maintain high standards of housekeeping

Day to day operations shall entail;

4.8.1 Preparedness

- a. Premises of the facility, both inside & outside, shall be cleaned on a daily basis.
- b. Opening Stock of materials shall be updated on the register/log book.
- c. The transfer point shall be kept clear.
- d. Staff at MRF may provide support for customers to unload bulky quantities of wastes

4.8.2 Receipt

- a. Wastes shall be brought to point of receipt for checking & logbook/register entry.
- b. Wastes shall be inspected
- c. Wastes shall be weighed and recorded.
- d. Staff shall ensure that the wastes received is as per segregation categories displayed in the MRF.
- e. Wastes receipt slip shall be handed over to the customer once the material is accepted.
- f. Wastes shall be transferred to labeled storage compartments to await further sorting.

4.8.3 Storage

- a. Staff to ensure that only dry items are stored in designated labelled compartments.
- b. Wastes that need cleaning shall be taken to Cleaning Station and dried.
- c. Staff to ensure that compartments are not stored beyond their capacity.
- d. Compartments are to be cleaned regularly.

4.8.4 Dispatch

During dispatch, outgoing materials shall be weighed. Details of the receiver shall be recorded:

- Name
- Address
- Phone Number
- Material Dispatched
- Weight of Material
- Signature

4.8.5 Sale of Materials

Basic information about the purchaser shall be recorded in the register. The register should have the below-mentioned categories.

- Purchaser's Name
- Designation, Organisation & Address
- Material Bought
- Weight of Material

4.8.6 Reporting

- a. Quantity of materials received (in terms of weight) shall be reported per category.
- b. Quantity of materials dispatched, in terms of weight, shall be reported per category.

4.8.7 Display of Information

- a. Working hours shall be displayed outside the facility. The facility shall also display "OPEN" and "CLOSED" signboards during and after working hours respectively.
- b. Campaign posters on the following topics shall be displayed at the notice board:
 - Green Protocol
 - Segregation

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- Recyclability of material
- c. Notice announcing the availability of complaints and feedback register shall be displayed.
- d. The contact number of the Officer in Charge shall be displayed.

4.8.8 Maintenance Operation

Maintenance should be carried out regularly and during maintenance the following should be undertaken;

- a. Storage compartments shall be cleaned.
- b. The structural strength of the compartment shall be checked and if there are issues repair work shall be carried out.
- c. All equipment shall be cleaned and greased.
- d. The floor should be washed and all drain holes shall be cleared of debris.
- e. All compartments shall be checked for impurities and materials shall be sorted & stored as per correct classification.
- f. The functioning of all utilities like drinking water, toilet facilities, electrical fittings, rainwater harvesting system (if any), and solar panel & inverter (if any) should be checked for complaints and necessary repair work to be undertaken.
- g. Floor, Roof & sidewalls shall be checked & necessary repair to be done.
- h. All labels of storage compartments shall be cleaned and necessary repairs undertaken.

5.0 COMPLIANCE REQUIREMENTS FOR MRFs

The following factors should form part of environmental and safety considerations:

For effective operation of an MRF compliance is paramount.

5.1 Environmental concerns

1. As per the provisions of EMCA, 1999, MRFS shall undertake an Environmental Impact Assessment before being established.
2. as per the provisions of the Waste Management Regulations, 2006, the owner/ operator of the MRF shall obtain a licence to operate the facility.
3. All MRFs will be required to install anti-pollution / pollution control measures.
4. Open burning of waste that causes emission of air pollutants is prohibited.
5. The operator will be required to comply with the requirements of the Air Quality Regulations of 2014 on the following parameters:
 - ambient air quality
 - offensive odour
 - stack emission limits
6. The operator will be required to comply with the Water Quality Regulations of 2006 on protection of sources of water by refraining from any activity that may cause water pollution.
7. The MRF should be well secured, manned, and with signage at the yards.

5.2 Social and Governance concerns

8. The operator will develop a code of conduct for the workers as per the Labor Act
9. The operator shall comply with the provisions of OSHA 2007 with respect to the workplace.
10. Proper institutional management structure shall be put in place to ensure smooth running of the MRF operations. This includes hiring staff who are competent in waste management and EHS matters.
11. At any one time, there should be a duty officer at the MRF.
12. Emergency response measures shall be put in place
13. Continuous capacity building for the workers shall be undertaken.

5.3 Annual monitoring reports.

The MRF operator shall monitor the Environmental Management Plan of the Environmental and Social Impact Assessment report and submit reports to NEMA in the form of an Environmental Audit.

6.0 MONITORING, REPORTING & EVALUATION

6.1 Monitoring

1. Monitoring will be used to evaluate the performance efficiency and functionality of the MRF.
2. The MRFs are supposed to record all the data of segregated waste from various sources
3. The Authority will develop an M&E system that will record and monitor all the information related to classification of solid waste into various categories.

6.2 Reporting

A National Waste Information System shall be established by NEMA for annual reporting purposes. The report shall include the following details;

1. Name of Facility

- 2. Type of waste
- 3. EIA Licence Number
- 4. Location (County, Sub-County and Ward)
 - a) Physical Address
 - b) Postal Address
 - c) Email

a) Type Waste Received

- Organic - Quantity (Tonnes/Kgs)
- Dry Waste - Inorganic (Tonnes/Kgs)
- Paper & Cardboards (Tonnes/Kgs)
- Plastic bottles (Tonnes/Kgs)
- Glass (tonnes/Kgs)
- Metal (tonnes/Kgs)
- Others (Tonnes/Kgs)

b) Recyclables taken to:

- Organic - Quantity (Tonnes/Kgs)
- Dry Waste - Inorganic (Tonnes/Kgs)
.....
- Paper & Cardboards (Tonnes/Kgs)
.....
- Plastic bottles (Tonnes/Kgs)
.....
- Glass (tonnes/Kgs)
.....
- ...
- Metal (tonnes/Kgs)
.....
- ...
- Others (Tonnes/Kgs)
.....

c) Management of Residual Waste

Specify what type of waste and how it's managed (Tonnes/Kgs) _____

Residual waste taken to: _____

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- i. All Licensed MRFs will be required to report to the Authority on an annual basis within a calendar year.
- ii. The MRF report should be complete, contain accurate data and be submitted on time.
- iii. The report shall be in the prescribed format as provided for below
- iv. The report shall be sent through email at info@nema.go.ke or as may be provided by the Authority.

6.3 Evaluation

- i. Evaluation shall examine whether an intervention has achieved intended outputs and outcomes.
- ii. This shall be done 5 years into the operations of the MRFs.
- iii. Baseline information on the current waste management practices in various Counties in Kenya has already been undertaken and documented.

7.0 REFERENCES

Draft Environmental Management and Coordination (Extended Producer Responsibility) regulations, 2023

Environmental Management and Coordination Act 1999,

Environmental Management and Coordination (Waste Management) Regulations, 2006,

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Materials Recovery Facility Tool Kit, 2013 by the Asian Development Bank

Material Recovery Facility (MRF) – Britannica www.britannica.com

National Sustainable Waste Management Policy, 2021

Sustainable Waste Management Act, 2022