CHAPTER 1

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1.1 Definition and classification of waste

Wastes are materials which a generator has no further use for production, transformation or consumption and which are required to be disposed of. Poor waste management not only causes multiple environmental problems such as emission of greenhouse gases, water and soil pollution but also causes many vector and water-borne diseases such as cholera, dysentery, jaundice, typhoid and diarrhoea. Additionally, there are social consequences of improper waste management, especially for the workers engaged in and directly exposed to improperly managed waste. Since improper waste management has an adverse impact on the environment as well as on the health of the people, proper waste management is a major area that needs to be addressed effectively.

Waste is classified as biodegradable, non-biodegradable, combustible, dry and inert, based on their characteristics. By virtue of their nature, waste is generally classified into solid waste, bio-medical waste, plastic waste and e-waste as detailed below:

(i) ***Solid waste*****:** mainly consists of household waste, construction and demolition debris, sanitation residue and waste from streets.

(ii) ***Bio-Medical waste*****:** consists of any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals, or research activities pertaining thereto, or in the production or testing of biological or in health camps, including human and animal anatomical waste, soiled waste, expired or discarded medicines, needles and blades.

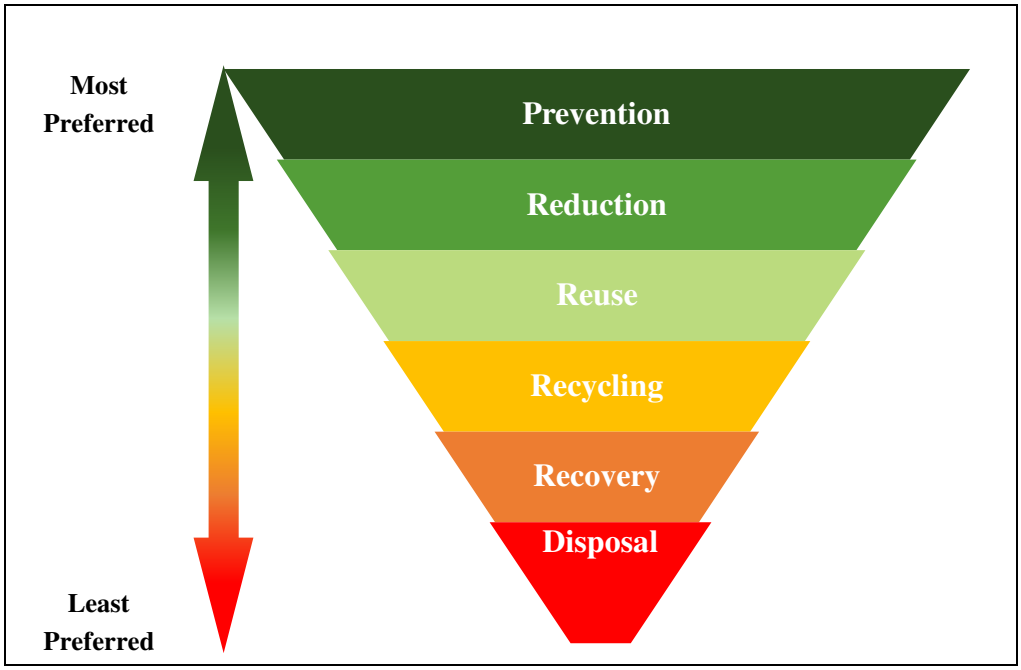
(iii) ***Plastic waste*****:** consists of plastic carry bags, pouches, or multi-layered packaging which have been discarded after use or after their intended life is over.

(iv) ***e-Waste*****:** consists of electrical and electronic equipment, whole or in part, discarded as waste by the consumers or bulk consumers as well as rejects from manufacturing, refurbishment and repair processes. Computers, televisions, video cassette recorders, stereos, copiers and fax machines are common electronic products.

1.2 Waste management process and hierarchy

The waste management process broadly involves collection of waste, its transportation, processing and its final disposal. Proper management of waste involves the adoption of two important concepts *i.e.,* prevention and reduction of waste. Waste hierarchy is the priority order in which the solid waste should be managed by giving emphasis to prevention, reduction, reuse, recycling, recovery, and disposal, with prevention being the most preferred option and disposal at the landfill, being the least preferred option. The waste management hierarchy is depicted in **Chart 1.1**.

Chart 1.1: Waste management hierarchy



Source: Chart prepared by Audit based on waste hierarchy defined in Rule 3 (57) of Solid Waste Management Rules, 2016

'Disposal' has been placed at the bottom of the hierarchy to underline that it should be the last resort among waste management strategies.

1.3 Role of Urban Local Bodies and waste generators in waste management

Solid Waste Management (SWM) is one of the eighteen subjects devolved to the Urban Local Bodies (ULBs) under Article 243 (Twelfth Schedule) of the Constitution of India. Under the 74th constitutional amendment, ULBs have an important role in planning and implementing proper and effective waste management strategies in their respective jurisdiction.

The Solid Waste Management Rules, 2016 (SWM Rules), notified by the Government of India (GoI) places certain responsibilities on the generators of waste. As per SWM Rules, waste generators are responsible for segregating and storing waste in three separate streams *viz.,* biodegradable or wet waste, non-biodegradable or dry waste and domestic hazardous waste, to be handed over to waste collectors. Waste generators are not allowed to burn, bury or throw waste on streets, in open public spaces outside their premises or in the drain or

water bodies. All gated communities and institutions with more than 5,000 square meter area, resident welfare associations and market associations are required to ensure segregation of waste at source into biodegradable and non-biodegradable and treat biodegradable waste through decentralised treatment processes within their premises. Biodegradables are to be processed through composting/bio-methanation[1], while recyclables are to be handed over separately.

Construction and Demolition Waste (C&D) was required to be stored separately and disposed of in accordance with the Construction and Demolition Waste Management Rules, 2016.

ULBs are also required to collect the segregated bio-medical waste generated in households *viz.,* used bandage and dressings, discarded gloves and masks, used needles, used syringe, contaminated cotton gauze, *etc.* Similarly, ULBs have to ensure that e-waste mixed with solid waste is properly segregated, collected and channelised to authorised dismantlers or recyclers. The ULBs are also responsible for the development and setting up of infrastructure for segregation, collection, storage, transportation, processing and disposal of plastic waste.

The disposal of solid waste and demolition waste generated in the State during 2021-22 is shown in **Table 1.1**.

Table 1.1: Disposal of waste generated in the State during 2021-22

Type of waste	Generation	Collection	Processed	Dumped
	(1)	*(2)*	*(3)*	*4=(1-3)*
	Lakh MT	***Lakh MT (percentage with respect to generation)***		
Solid waste	118.03	69.72(59.07)	55.56(47.07)	62.47(52.93)
Construction and Demolition waste	63.12	23.17(36.71)	1.48(2.34)	61.64(97.66)

Source: Information furnished by Director, Swachh Maharashtra Mission and Annual Report of Maharashtra Pollution Control Board for the year 2021-22

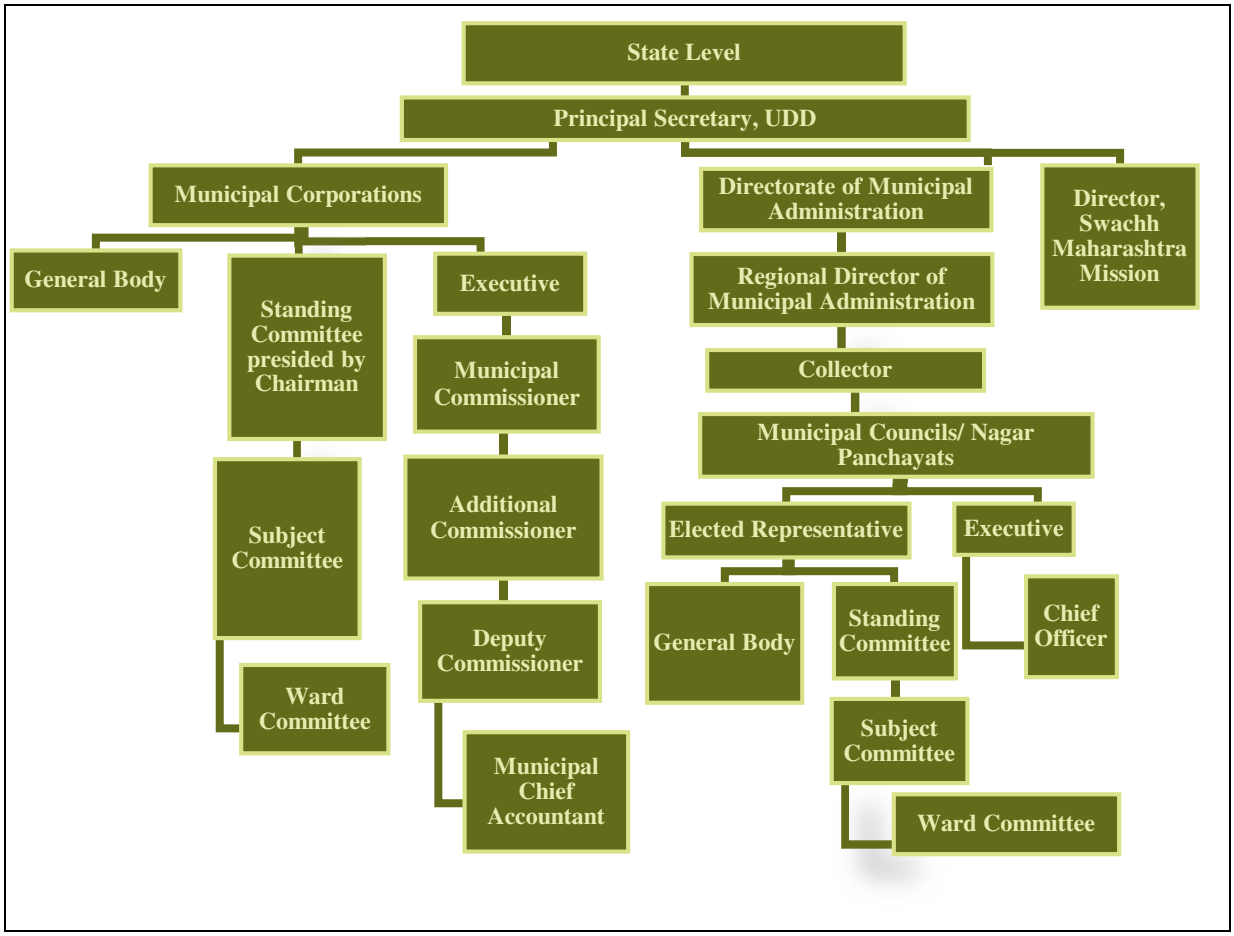
1.4 Organisational setup

The Urban Development Department, Government of Maharashtra (UDD), headed by the Principal Secretary is the nodal Department for the governance of all ULBs in the State. The Municipal Corporations, headed by the Municipal Commissioners, report functionally to the respective elected bodies and administratively to UDD. Similarly, Municipal Councils and Nagar Panchayats, headed by Chief Officers, report functionally to the respective elected bodies and administratively to the Commissioner & Director, Directorate of Municipal Administration (DMA[2]) under the administrative control of UDD. The Director, Swachh Maharashtra Mission functioning under UDD, implements the Swachh Maharashtra Mission in the State. A schematic diagram depicting the organisational structure of ULBs is shown in **Chart 1.2**.

[1] A process which entails enzymatic decomposition of the organic matter by microbial action to produce methane rich bio-gas.

[2] Directorate of Municipal Administration (DMA) was established in 1965, under the administrative control of UDD, to advise Government in making policy relating to local self-governance, monitoring general working of municipalities and assisting them in drawing budget and plans. DMA also functions as coordinator between Municipal Councils and Government. DMA is assisted by Regional Directors at the division level and Collectors at the district level.

Chart 1.2: Organisational structure of ULBs



Source: Information furnished by Deputy Commissioner, Swachha Maharashtra Mission (U), GoM.

Maharashtra Pollution Control Board (MPCB) is the principal government organisation for the implementation of the Environment (Protection) Rules, 1986 made under the Environment (Protection) Act, 1986. MPCB is also responsible for enforcing SWM Rules and monitoring environmental standards in the State.

1.5 Audit objectives

This Performance Audit was conducted to assess:

- whether the strategy and planning of waste management was commensurate with the generated waste and conforming with the prevailing legal framework;
- whether the operation and maintenance of waste management facilities by ULBs were financially sustainable;
- whether the municipal tasks performed for waste management were efficient and effective; and
- whether the monitoring mechanism in waste management was adequate and effective.

1.6 Audit criteria

Audit criteria were adopted from the following:

- The Mumbai Municipal Corporation Act, 1888;
- The Maharashtra Municipal Corporation Act, 1949 (Amended 2011);
- The Maharashtra Municipal Councils, Nagar Panchayats and Industrial Townships Act, 1965;
- Water (Prevention and Control of Pollution) Act, 1974;
- The Environment (Protection) Act, 1986;
- The Solid Waste Management Rules, 2016;
- E-Waste (Management) Rules, 2016;
- Plastic Waste Management Rules, 2016;
- Construction and Demolition Waste Management Rules, 2016;
- Bio-Medical Waste Management Rules, 2016;
- Manual of Municipal Solid Waste Management, 2016;
- Performance parameters set out in the Service Level Benchmarks promulgated by the Ministry of Urban Development, Government of India (GoI); and
- Policies, guidelines and instructions issued from time to time by GoI, Central Pollution Control Board, UDD, Environment and Climate Change Department, Government of Maharashtra and MPCB with regard to waste management.

1.7 Audit scope and methodology

The Performance Audit on Waste Management in ULBs (except sewage management) was conducted from January 2021 to March 2021 and July 2021 to August 2021 covering the period 2016-17 to 2020-21. The figures in the report have been further updated upto 2021-22. For this purpose, records in UDD, Directorate of Municipal Administration, Director, Swachh Maharashtra Mission and MPCB were test-checked. Besides, 45 ULBs (covering more than 51 *per cent* of the State population) were selected on simple random basis from each tier of the ULBs, for test check as shown in **Table 1.2**. The list of selected ULBs is shown in **Appendix 1.1**.

Table 1.2: Number of ULBs test-checked in audit

Sr. No.	Category of ULBs	Total No. of ULBs in the State	Number of ULBs selected for test-check
1	Municipal Corporations	27	07
2	Municipal Councils	241	24
3	Nagar Panchayats	128	14
Total		**396**	**45**

The audit methodology involved document review, joint physical verification with municipal staff at the dumping site/landfill site, material recovery facility, collection point and collection of photographic evidence. The data/information obtained from ULBs regarding aspects like issue of identity cards to organised waste pickers, involvement of Self Help Groups in door-to-door collection,

method of collection at household level and availability of sanitary landfill were cross-checked through test-check of records and joint physical verification.

Audit also consulted Professor (Dr.) Shyam R. Asolekar, Chair Professor at the Environmental Science and Engineering Department of the Indian Institute of Technology, Bombay in the capacity of a domain expert in the initial stage of audit for preparation of guidelines.

The audit objectives, criteria and scope were intimated (July 2021) to the Principal Secretary, UDD. The audit findings were discussed with the Principal Secretary, UDD in an exit conference held on 12 August 2022 and the responses of the department have been incorporated appropriately in the report.

The draft report was forwarded to Principal Secretary, UDD on 9 March 2022 followed by reminders at regular intervals. The updated draft Report was forwarded to the Principal Secretary, UDD on 21 November 2023 and the reply received (February 2024) has been incorporated in the Report. A modified draft Report was forwarded to Principal Secretary, UDD in August 2024 for comments of the Government, which was awaited (November 2024).

1.8 Acknowledgement

Audit is thankful for the cooperation and assistance extended by UDD, all selected ULBs, Director, Swachh Maharashtra Mission, Directorate of Municipal Administration and MPCB in providing records, information and clarifications from time to time for the smooth conduct of Audit despite the constraints induced by COVID-19 pandemic. Audit is also thankful to Professor (Dr) Shyam R Asolekar for providing valuable guidance and value additions in framing the guidelines for this audit.