Bruhat Bengaluru
Mahanagara Palike

CLEAN
Bengaluru

Bengaluru's SWM Information Manual

PART I: Overview

Bruhat Bengaluru Mahanagara Palike

Solid Waste Management

November 2017

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FOREWORD

Sri. K Sampath Raj
Worshipful Mayor

It is a historic moment for Bangalore City with the formation of the Ward Committees, while upholding the 74th amendment of the Constitution, the BBMP has recognized and institutionalized the spirit of decentralization , allowing for collaborative and participative governance at the Ward Level.

I am confident that all the Ward Committees under the able chairmanship of the Ward Corporators , will rise up to the occasion and discharge their roles and responsibilities and bring in improvements , efficiency and transparency in the civic services especially with respect to solid waste management.

With the active involvement and participation of the Ward Committee , I look forward to every Ward taking up the challenge of setting up ward level waste management facilities and bringing in visible changes in the cleanliness of the Ward.

I welcome each and every one of the Ward Committees and extend the fullest co-operation from BBMP in our joint endeavour for a Clean Bengaluru.

November 2017

Smt.Padmavathi Narashimamurty
Deputy Mayor

It is a proud moment for the City of Bangalore to see the emergence of decentralized planning and governance through the Ward Committees. I welcome the Ward Committee members who have come forward to contribute their time and effort to supporting the Ward Chairman in the development of the Ward.

I am confident that the Ward Committee members will be able to promote the importance of segregation at source amongst the citizens of the Ward. I am also confident that the functioning of the Ward committees will result in efficiency and timely payments to the various people engaged at the Block level in carrying out the daily operations. I am confident that the Ward committees will also develop the Ward facilities like Toilets, changing rooms , tools and equipments and other amenities which will benefit all the Street sweepers, Collectors, Helpers and the waste pickers who are engaged in providing solid waste management services and help in keeping the city clean.

I once again wish this Micro Plan implementation through the Ward Committees all success.

November 2017

Sri. Muzahid Pasha
Chairman - Public Health Standing Committee

Solid Waste Management is an important function that touches each and every citizen of the City. A clean and healthy City is therefore of utmost importance and will enhance the quality of life of Bangalore Citizens.

It is therefore to be recognized that role of the members of the Ward Committee in monitoring the implementation of the Ward Micro plan is an important one. Furthermore, the development of the ward facilities for processing of the solid waste generated in the ward itself will relieve the pressure on the City to search for more landfill space without causing trouble to the villages surrounding the City. Bangalore City has already seen successful piloting of various Ward processing units over the last five years and I am very sure that the Ward Committees under the leadership of the Ward Corporators will be able to enact a Ward Action Plan over the next one year and show real development in the area of solid waste management.

The BBMP is committed to support all such endeavours and provide the necessary financial support for the development of the Ward facilities.

November 2017

Sri. N. Manjunath Prasad
Commissioner

BBMP has introduced many pioneering initiatives in the area of solid waste management and the introduction of this Micro Plan is another very important milestone in delivering effective and sustainable solid waste management in the City.

Further with the setting up of the Ward Committees and under their leadership , I am very confident that the Micro Plan and the Ward Plan for SWM facilities, will get implemented effectively bringing in real and visible changes in waste management as envisioned and planned .

In order to provide all possible support in the implementation of the Micro Plan and the Ward Plan for SWM facilities, this information booklet provides all the necessary general information regarding the SWM Rules, Act, High Court directions, Government Orders and Public Notifications .
For the first time a comprehensive compilation of the Ward planning with the support of digitized GIS maps giving a total breakdown of roads , vehicles and manpower deployed at the block level has been provided. Standards and Processes that have to be followed in the daily routines of waste management have also been clearly detailed and I am confident that this will greatly assist the Ward Committees in overseeing the effective functioining of waste management by the civic officials , staff and service providers.

BBMP is committed to effective Solid Waste Management with the support of the Ward Committees.

November 2017

PRELUDE

The Solid Waste Management policy has been adopted by the BBMP , with the pioneering directions of the Honb'le HighCourt of Karnataka , guidance of the SWM Expert Committee and the enthusiastic involvement of the Citizens. Further the BBMP SWM Policy has been strengthened by the SWM Rules 2016 , again influenced by the Bangalore Model and the directions of the Honb'le High Court of Karnataka . The Central Government Swachh Bharath Mission further clearly defines the requirements of implementation . The progress of the Municipality in achieving requirements of the Policy is monitored by the Swachh Survekshan.

In the period from 2012 to 2016 the Bangalore SWM Model receiving the complete support of the State Government has to its credit a number of firsts in the area of Solid Waste Management

1) The First City to implement Segregation at Source through 3 way Segregation of Wet: Dry : Sanitary
2) The First City to have state of the art SWM Plants having a processing capacity of 2300 TPD
3) The First City to set up 198 Dry Waste Collection centres (DWCCs)
4) The First City to identify Bulk Generators and the system of Empanelled Destinations/ Service Providers
5) The First City to promote Ward Level Composting and Bio Meth, Leaf Shredder facilities with the goal of minimizing long distance secondary transportation
6) The First State to ban the Single Use Plastic
7) The First City to enumerate and issue ID cards to 7500 Waste Pickers and further integrate them into SWM by entering into a direct MOU with them for operation of the DWCCs
8) The installation of Bio Filters in the Composting Plant
9) And now, The First City to create a Ward Micro Plan and to have the Ward Committees prepare the ward level plan for SWM facilities .

HISTORIC DIRECTION BY KARNATAKA HIGH COURT TO BBMP ENSURE WARD COMMITTEES PREPARE WARD LEVEL SOLID WASTE MANAGEMENT PLAN

In a historic decision by the Division Bench of Hon'ble High Court of Karnataka consisting of Justice Mr. B.S. Patil and Justice Mrs. B. V. Nagarathna, Bruhat Bengaluru Mahanagara Palike (BBMP) has been directed to ensure that Ward Committees constituted on 31st October 2017 in all the 198 wards of the city should meet by end of November in accordance with Section 13-H of the Karnataka Municipal Corporations Act, 1976. The Court further directed that during this first meeting each and every Ward Committee shall prepare a ward level plan to "ensure proper solid waste management and sanitation work in the ward and finalise location of new public sanitation units" as per Sec 13 (I) (i) of the Act. These plans will be consolidated into an Action Taken Report (ATR) by BBMP and placed on its website, and a report of progress will be produced in Court prior to the next date of hearing i.e. 8th December 2017.

Figure 1 : Quoted directive
(Source: Environment Support Group, 2017)

HONBLE JUSTICE B.S PATIL AND B.V.NAGARATHNA

10/11/2017 | Order in WP 24739/2012

As per directions issued earlier in these writ petitions, particularly vide order dated 04.09.2017, Ward Committees have been constituted and in this regard, counsel for the respondent-Bruhat Bangalore Mahanagara Palike (BBMP) has filed the decision taken by the BBMP on 31.10.2017, which shows that Ward Committees have been put in place.

Petitioners have come up with suggestions that Ward Committees have to now discharge the twin task. Firstly of examining Ward Micro Plan prepared by the BBMP for each Ward with regard to solid waste management and secondly, to prepare a fresh plan depending on the needs of each Ward pertaining to solid waste management as per directions already issued by this Court from time-to-time (i.e. on 17.12.2015, 23.06.2016 and on other different dates).

In order to facilitate Ward Committees to effectively discharge their duties as per directions issued by this Court and in terms of obligations cast upon it under Section 13 I (h) of the Karnataka Municipal Corporations Act, 1976 so as to ensure proper solid waste management and sanitization in the respective Ward, the BBMP has to make available orders containing specific directions issued by this Court in these writ petitions from time-to-time by preparing booklets. The BBMP shall also make available the Ward Micro Plan prepared to each of the Wards. This exercise shall be completed within ten days from today. Thereafter, the BBMP shall ensure that Ward Committee Meetings are convened at ward-level on or before 30.11.2017.

We hope and trust that Ward Committees will engage themselves seriously in the task assigned to them under the provisions of the Municipal Corporations Act, 1976, particularly, Section 13 I, and also in terms of the Rules pertaining to Municipal Solid Waste Management Rules, 2016.

We also hope that respective Ward Committees will prepare action plan and submit action taken report to the BBMP in such meetings and the BBMP shall place before the Court substance of such decision taken, and action initiated, for perusal and further action by this Court prepared in a tabular form Ward-wise and the same shall also be uploaded in the BBMP website.

It is submitted by the petitioners that the BBMP has now resorted to dumping the solid waste in Quarries situated in Bagalur, Mittiganahalli, Bellahalli and other Quarries in those villages situated in the vicinity of Bengaluru City. According to the petitioners, this has resulted in serious health hazard to the residents of nearby villages located in the vicinity of said Quarries apart from resulting in several other problems.

Confronted with this, learned counsel appearing for the BBMP submits that now that Ward Committees have been constituted, the BBMP will come up with action plan to establish additional plants for managing wastes within the Wards by identifying suitable places.

We are of the view that this exercise has to be done on top priority and action plan in this regard furnishing details of additional plants to be established and its locations in different Wards has to be submitted by the BBMP by the next date of haring, after furnishing a copy of the same to the petitioners.

Re-list these matters on 08.12.2017.

A copy of this order be handed-over to learned counsel for the Corporation.

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1 INTRODUCTION :

How to use this Manual ?

1.1. ABOUT THE MANUAL AND ITS FEATURES

This information manual has been developed in order to simplify the understanding of the Solid Waste Management (SWM) System that is set in place by BBMP, for Bengaluru City. It includes:

- A quick understanding of Solid Waste Management (SWM) in the Indian context
- States the aspirations of CLEAN BENGALURU and our road map to achieve it
- Important documents that provide the larger official mandate by MoUD, Swachh Bharat Mission, Karnataka Government and the Karnataka High Court
- Detailed data and information at ward level, which will help support and guide the implementation process on ground

1.2. STRUCTURE OF THE MANUAL

The manual has the following structure and addresses different target groups in its different sections:

PART I:

This is the Introductory Manual that aims to promote an understanding of the Solid Waste Management (SWM) system along with its challenges and opportunities. It is for all stakeholders in the system, in order to help them understand Solid Waste Management, the City's CLEAN BENGALURU Program and relevant rules and regulations that govern the system. The manual will provide guidance to these stakeholders, to initiate necessary processes in aligning with achieving the City's goals. It is divided into 2 sections:

SECTION A:

An overview provides the salient features and SWM System especially for decision makers, elected office bearers, senior bureaucrats at different levels of governance, service providers and Citizen Volunteers. It provides decision makers with an understanding of Solid Waste Management, the rules and regulations governing the system and specifically explains the Strategy developed by the BBMP for setting up a Sustainable Solid Waste Management System for Bengaluru City.

SECTION B:

The Compendium, this comprises of national Rules and Guidelines, Karnataka High Court Directives, Government Orders, Council Resolutions and Notifications. This part of the manual is primarily for the BBMP officials, Ward Committees, operational staff, private operators, experts and training institutes, who need to understand in detail the different rules and mandates set forth by the Government.

PART II:

This is the ward specific manual and is primarily for the BBMP officials, Ward Committee Members, Service Providers and Shuchi Mitras working within their wards. It focusses on 3 main aspects – Ward Micro Plan, Decentralised Processing Facilities and the Action Plan relevant to the respective ward. This section provides a detailed description of the Ward Blocks, technologies for treatment and processing of waste, schematic layouts, applicability of evolving technologies, and planning frameworks to undertake concrete measures toward streamlining the system of Sustainable Municipal Solid Waste Management at the Ward Level.

SECTION A
OVERVIEW

2 UNDERSTANDING SWM

2.1. WHAT IS SOLID WASTE MANAGEMENT?[1]

Municipal Solid Waste (MSW) is the trash or garbage that is discarded day to day in a human settlement. According to the Municipal Solid Waste Management Rules (2016):

Solid waste means and includes solid or semi-solid domestic waste including sanitary waste, commercial waste, institutional waste, catering and market waste and other non-residential wastes, street sweepings, silt removed or collected from the surface drains, horticulture waste, construction and demolition waste and treated biomedical waste excluding industrial hazardous waste, biomedical waste and e-waste generated in an area under urban local body.

"Solid Waste Management (SWM) is a science associated with the management of solid waste using the best principles and practices of public health, economics, engineering, conservation, aesthetics and other environmental conditions."

An Integrated Solid Waste Management (ISWM) system is based on the waste management hierarchy (refer to Figure 2), with an aim to reduce the amount of waste being disposed, while maximising resource recovery and efficiency.

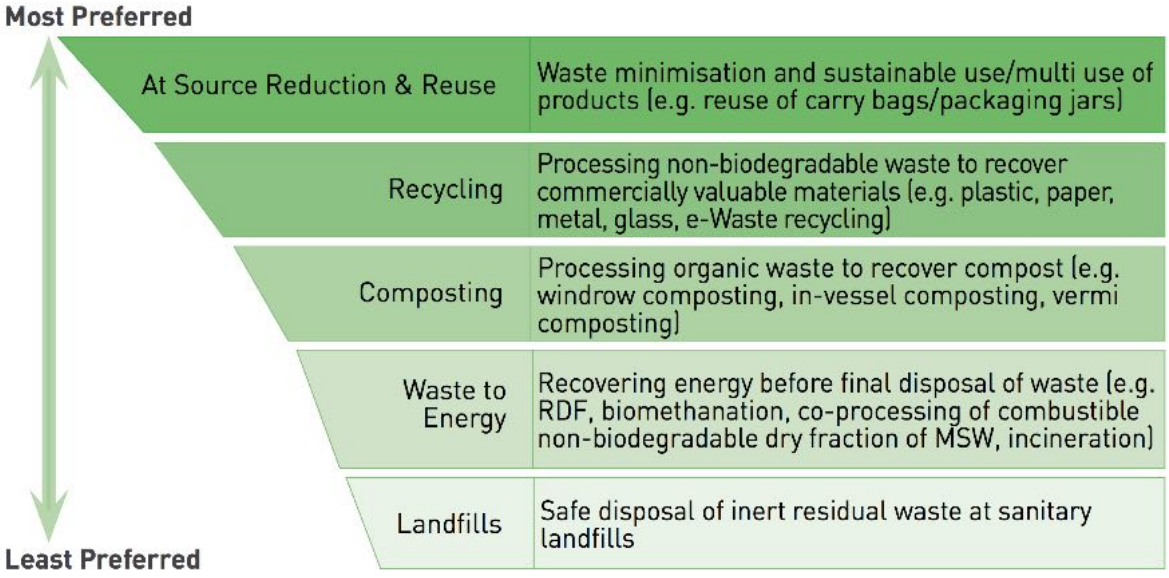


Figure 2 : ISWM Hierarchy[1]

1. Municipal solid waste management manual, 2016

2.2. THE 3 R APPROACH

The 3R Approach is aimed at optimising MSW management from all the waste-generating sectors and involving all the stakeholders (waste generators, service providers, informal sector, regulators, government, and community or neighbourhoods). The adoption of 3R minimizes the waste being handled by the ULB, minimizing public health and environment risk associated with it.

2.2.1. REDUCE

The concept of reducing what is produced and what is consumed is essential to the waste hierarchy. The logic behind it is simple to understand – if there is less waste, then there is less to recycle or reuse. The process of reducing begins with an examination of what you are using, and what it is used for.

2.2.2. REUSE

Learning to reuse items, or re-purpose them for a use different then what they are intended for is the next essential thing in the waste hierarchy. Items may be reused for one's own use or donated so that others can use them.

2.2.3. RECYCLE

The last stage of the waste hierarchy is to recycle. To recycle something means that it will be transformed again into a raw material that can be shaped into a new item. There are very few materials on the earth that cannot be recycled.

2.3. WASTE GENERATORS AND TYPES[2]

Based on the type of generator, MSW is classified into various categories, which are specified in Table 1 below:

GENERATORS	CATEGORIES/ TYPES OF WASTE
Domestic	Household Waste-Kitchen, house cleaning, old papers, packing, bottles, crockery wares, furnishing materials, garden trimmings etc.,
Commercial	Waste generated at business premises, shops, offices, markets, departmental stores(paper, packing material, spoiled, discarded goods) organic, inorganic, chemically reactive and hazardous waste
Institutional	Schools, Colleges, Hospitals, large hotels and restaurants, markets selling vegetables, fruits, fish etc., community halls, religious places, function sites etc.,
Street Sweeping	Unconcerned throwing, littering made by pedestrian traffic, vehicular traffic, stray animals, roadside tree leaves, rubbish from drain cleaning, debris etc.,
Industrial/Trade	Waste generated through manufacturing and material processing.
Debris/Construction	Comprises earth, brickbats, stones, wooden logs etc.,
Bio Medical	Animal waste such as animal tissues, organs, body parts, carcasses, bleeding parts, fluid, blood, waste generated by veterinary hospitals, colleges, discharge from hospitals, animal houses and Microbiology/ biotechnology laboratories, Waste sharps viz., needles, syringes, scalpels, blades, glass etc. that may cause puncture and cuts. This includes both used and unused sharps etc.,
Hazardous	Waste with properties that make it dangerous or potentially harmful to human health or environment. Waste listed in Hazardous waste management rules 1989 - batteries, cleaning fluids, pesticides etc.)
Sewage	Sewage is the liquid waste containing some solids produced by humans which typically consists of washing water, faeces, urine, laundry waste and other material.

Table 1 : Waste generators and types

2. Municipal solid waste management manual, 2016

2.4. WASTE STREAMS[3]

Waste streams have been identified under the SWM Rules 2016, to be segregated at source and subsequently collected, transported & processed separately. These a defined in Table 2 below:

WASTE STREAMS	DEFINITIONS
Biodegradable waste (wet)	Means any organic material that can be degraded by micro-organisms into simpler compounds
Dry waste	Means waste other than biodegradable waste and inert street sweepings and include recyclable and non-recyclable waste, and combustible waste.
Sanitary waste	Means wastes comprising of used diaper, sanitary towels, napkins, condoms, incontinence sheets and any other similar waste.
Domestic Hazardous waste	Means discarded paint drums, pesticides cans, CFL bulbs, tube lights, expired medicines, broken mercury thermometers, used batteries, used needles and syringes and contaminated gauge, etc. generated at the household level.
Inert waste	Waste which are not biodegradable, recyclable or combustible street sweeping or dust and silt removed from the surface drains;

Table 2 : Definition of waste streams

3. Municipal solid waste management manual, 2016

2.5. TECHNICAL ASPECTS

2.5.1 AT-SOURCE MINIMIZATION:

Options to reduce the amount of waste

The integrated solid waste management (ISWM) hierarchy prioritizes waste minimisation (at source reduction and reuse) because it is the most effective way to reduce the quantity of waste, the cost associated with its handling, and its environmental impacts.

Some of the ways this can be achieved are minimising use of packaging material, promoting use of refill containers, buyback of reusable or recyclable packing material, introducing a national deposit system on beverage packages, etc. and the scale at which the intervention needs to be initiated for effective implementation.

Waste minimisation strategies requiring national or state-level interventions or support are the following:

- Extended producer responsibility
- Promotion of voluntary action
- Frame rules and bye-laws
- Eco-labeling standards

Waste minimisation initiatives usually requiring ULB support or action are the following:

- Awareness and education programmes
- Developing and promoting at-source reduction programmes
- Bans within local authorities' jurisdiction
- Product stewardship and green procurement implementing programs
- Consumer reward
- Business assistance programs
- Supermarkets and retail stores
- Promoting material exchange and reuse programs
- "Pay as you throw"

2.5.2. COLLECTION, TRANSPORTATION AND PROCESSING SYSTEM

MSW should be stored at the source of waste generation until it is collected for disposal by ULB staff or appointed contractors/agencies/ organisations. It is essential to segregate waste into different fractions, commonly referred to as primary segregation.

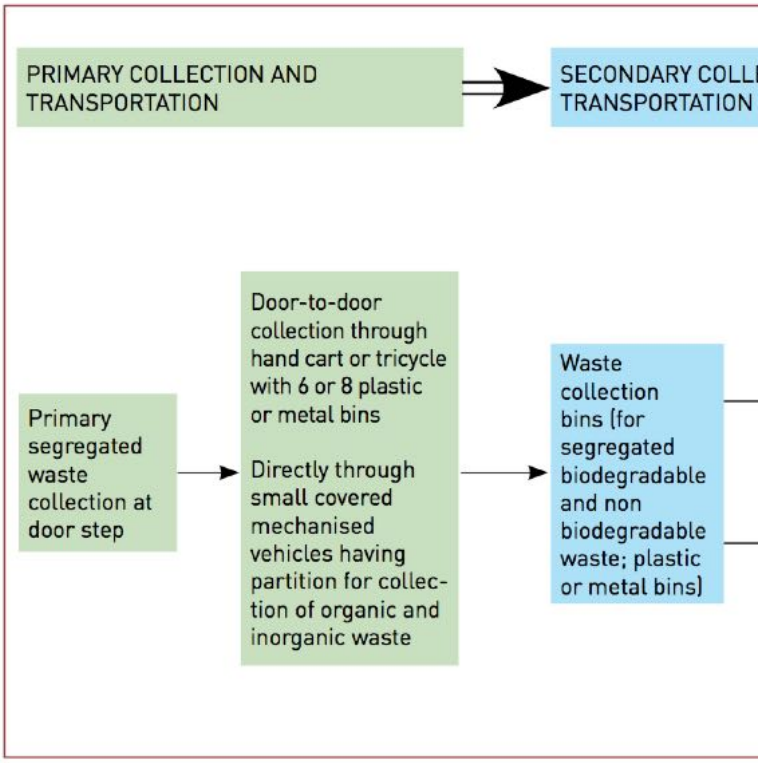


Figure 3: Flowchart of household waste collection, transportation and disposal

2.5.2.1. SEGREGATION AT SOURCE

Segregated collection of wet and dry waste enhances the potential of cost-effective treatment of such waste and of deriving optimum advantage from the recyclable material fed into the system.

At a minimum level, indicated as the basic segregation, waste should be segregated by waste generators into three fractions:

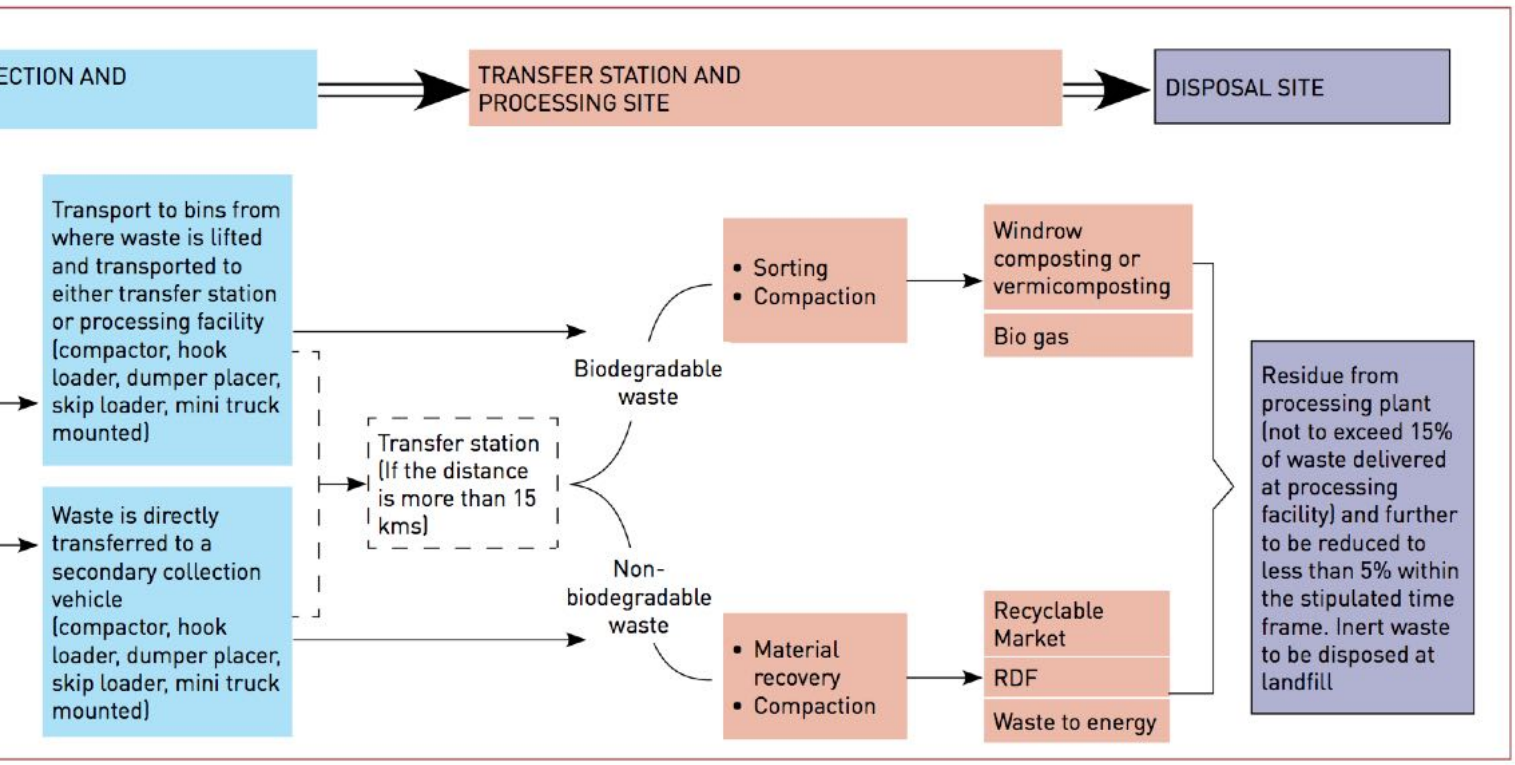
- **wet** (green container),
- **dry** (white container), and
- **domestic hazardous waste.**

This is referred to as the three-way segregation system.

2.5.2.2.COLLECTION AND TRANSPORTATION

Primary collection refers to the process of collecting waste from households, markets, institutions, and other commercial establishments and taking the waste to a storage depot or transfer station or directly to the disposal site, depending on the size of the city and the prevalent waste management system.

Secondary collection includes picking up waste from community bins, waste storage depots, or transfer stations and transporting it to waste processing sites or to the final disposal site.



2.5.2.3. STREET SWEEPING

Street cleaning is an age-old fundamental service rendered by municipal authorities in India to ensure clean and hygienic urban conditions. A wide variety of tools and equipment are available for manual and mechanical sweeping.

It is very important to ensure that street sweeping and drain cleaning material are not allowed to be mixed with the waste collected from households and commercial establishments, as it can seriously hamper treatment and recycling options for the household and commercial waste and add to the cost of processing of waste.

2.5.2.4. PROCESSING AND DISPOSAL

The selection and adoption of MSW processing technologies is based on defined selection criteria and subject to a detailed due diligence study, which ascertains the appropriateness of the technology to the prevailing conditions of the respective ULB. Some of the facilities are

- Windrow compositing
- Vermicomposting
- Biomethanation
- RDF
- Incineration
- Integrated system
- Sanitary landfill

2.6. ROLE OF CENTRAL, STATE & LOCAL GOVERNMENTS

While the onus of providing MSWM services in urban areas lies with the ULBs, central and state governments have a significant role to play in defining the framework within which service provision can be planned and executed by ULBs. The following are prescribed authorities and their roles in relation to ensuring the implementation of the provisions of the SWM Rules, 2016.

2.6.1. CENTRAL GOVERNMENT

- Ministry of Environment, Forest & Climate Change (Reviewing SLBs)
- Ministry of Urban Development (Reviewing SLBs)

Department of Fertilisers, Ministry of Chemicals and Fertilisers (Market linkage - subsidy)

- Ministry of Agriculture(Market linkage-subsidy)
- Ministry of Power(Market linkage - subsidy)
- Ministry of New and Renewable Energy Sources (Market linkage - subsidy)
- Central Pollution Control Board (Monitoring and buffers)

2.6.2. STATE GOVERNMENT

- Secretary–in-charge, Urban Development in the States and Union territories (Reviewing SLBs)
- State Pollution Control Board or Pollution Control Committee (Monitoring and buffers)

2.6.3. DISTRICT OR REGION

- District Magistrate or District Collector or Deputy Commissioner (Reviewing SLBs)

2.6.4. MUNICIPAL AUTHORITIES

- Local authorities and village Panchayats (Plan and execution)

3 BENGALURU'S SYSTEM

3.1 BACKGROUND

Spanning an area of 709 sq.km., divided into 198 wards and with a population of over 10 million, Bengaluru stands as the third most populous city in India. It has seen rapid urbanisation with its population doubling in a span of just 20 years, from 4.13 million in 1991 to a whopping 8.42 million in 2011 (Census, 2011). Though the city grew to embrace a successful and thriving IT economy, it led to an urban chaos, pushing the waste system close to its breaking point.

The closure of the Mavallipura landfill by the Karnataka State Pollution Control Board (KSPCB) in 2012, following the protest by the villagers of Mandur, the directives issued by the Hon'ble High Court of Karnataka and on the recommendations and guidance of the Expert Committee, has led towards the setting up of a Sustainable Solid Waste Management Plan by the BBMP. The new approach has therefore been focused on setting forth a plan that inverts the pyramid (refer Figure 4) and shifts towards 'A Future with No Landfills'.

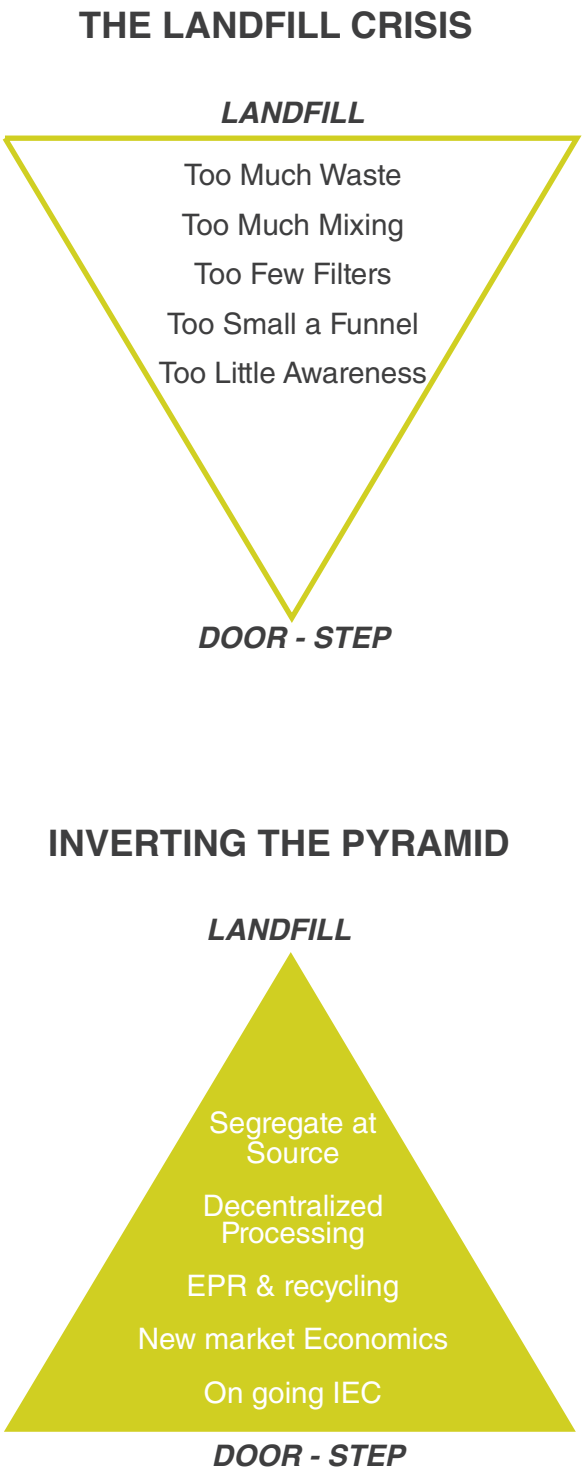


Figure 4: The Landfil Crisis

3.2 WASTE GENERATION

As per the assessment and quantification of municipal solid waste generation carried out by BBMP in the year 2016, the waste generation rate in BBMP area is approximately 564 grams/capita/day (refer Table 3). The cities generation of approximately 5760 TPD includes 64% wet waste, 28% dry waste, 3% domestic hazardous waste and 6% inert waste (refer Table 4).

BBMP Population (2016)*	10,207,063
Per capita generation (G/CAPITA/DAY)	0.564
Total Waste Generation (TPD) (APPROX.)	5760

Table 3: Waste generation in Bengaluru City
* BDA Masterplan 2031

STREAMS	TOTAL	WET	DRY	DOMESTIC HAZARD-OUS	REJECT/ INERT
Waste generation *(Small residential, commercial and street sweeping)*	4278.12	2669.04	1175.87	149.03	284.18
Waste generation *(Bulk generators)**	1480.05	1018.15	423.03	12.07	66.82
TOTAL WASTE GENERATION	5758.17	3687.19	1598.90	161.10	351.00
Percentage of waste stream-wise		64%	28%	3%	6%

Table 4: Stream and generator-wise break up of Waste Generation in Bengaluru
* As defined and classified by the HC Directive and BBMP notification

Note: this break-up is based on the Time and Motion Study (2015) and the overall quanta has been ratified by data received through on-ground collection and transportation of waste.

3.3 THE CITY STRATEGY

The city has adopted a 3 part strategy for its Solid Waste Management System:

Strategy 1:
Decentralised Processing of Waste by Stream

Strategy 2:
Bulk generators to manage their own waste

Strategy 3:
Creating a Ward Micro Plan for management and execution of SWM Services

These strategies are further elaborated on below:

3.3.1. DECENTRALISED PROCESSING OF WASTE BY STREAM

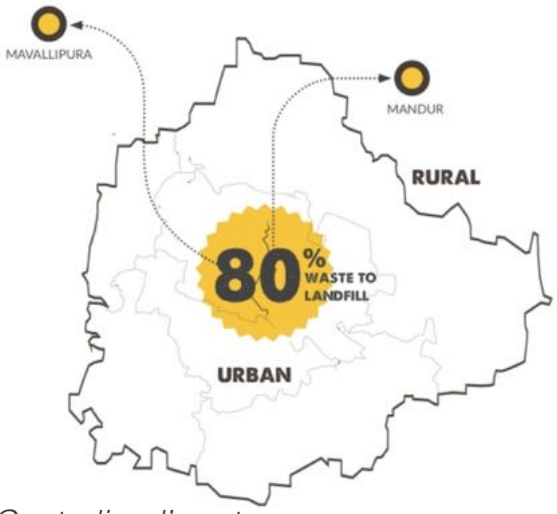
In order to reduce the burden of unscientific handling of large volumes of MSW, the city has opted to shift from a centralised 'single stream' collection and 'Landfill dis¬posal' system to a decentralised 'mul-tiple stream' collection and scientific 'Processing' system.

Based on the stream of waste and its generation, the appropriate method of treatment/technology and the scale of locating the units (Ward/Division/Zone/City level) are selected. The different types of units set up by BBMP with respect to various streams and the scales are listed in Table 5 and a figurative illustration of the same is shown in Figure 5. (refer Table 5).

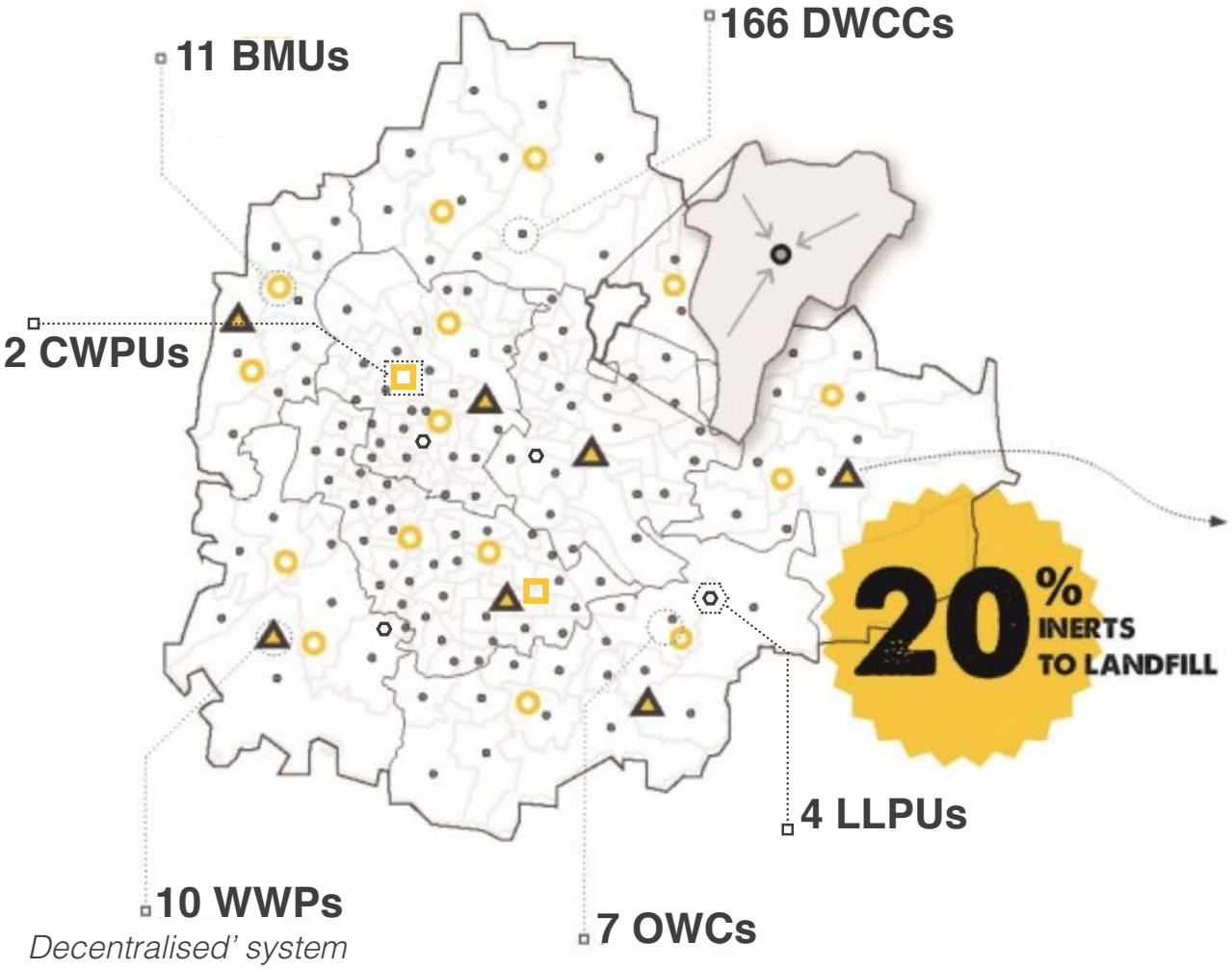
UNIT TYPE	DESCRIPTION
Dry Waste Collection Centres *(DWCC)*	DWCCs facili¬tate the stream lining of the entire process of waste manage-ment in the city, by concentrat¬ing exclusively on dry waste. They are equipped with appropriate infrastructure capable of pur-chasing, collecting, aggregating and processing both high value and low value dry waste such as plastics, paper, glass, tetra-packs, etc.
Aggregators	An aggregator is a storage facility which is equipped to receive low value waste from dry waste collection centre.
Bio-Methanan-tion Unit *(BMU)*	Bio-methanation is the anaerobic digestion of organic waste in an enclosed space under con¬trolled conditions of temperature, moisture, pH, etc. The overall performance of the unit is greatly influenced by the input feed specification, and the plant requires segregated wet waste (exam-ple hotel waste and market waste). The process converts the waste into bio-gas that can be used as fuel for households, automobiles and lighting
Organic Waste Converted *(OWC)*	OWC plant works on the principle of Aerobic Microbial de¬composition of solid waste into compost. This is a Bio Mechanical process which produces a homogeneous odour free output.
Leaf Litter Processing Unit *(LLPU)*	Leaf litter from parks and nearby streets are composted naturally in pits through aerobic mi¬crobial decomposition. Shredding of branches & twigs, along with a mulching process to decompose leaves, collected separate-ly in neighbourhoods is gaining momentum. This compost is then filtered through the sieving machine to result in fine compost. The compost is used as manure for gardening and agriculture.
Coconut Waste Processing Unit *(CWPU)*	Coconut waste processing unit receives coco¬nut and sugarcane waste. The waste received is shredded, dried and compact¬ed to create bri-quettes and pellets of superior quality, that are being used as alternate fuel to fossil fuels.
Sanitary Waste Processing Units	The segregated domestic hazardous waste (in¬cluding Sanitary Waste) will be collected from DWCCs and processed by existing biomedical waste processing agencies. The facilities include incinerators, Autoclaves, Shredders and Effluent Treatment Plants to scientifically dispose this waste.
Waste Processing Plants *(WPP)*	These Integrated waste processing plants sepa¬rate the municipal solid waste into very specific remainder fractions, allowing optimal recycling and/ or energy recovery of each specific waste stream. The organic fraction of the waste is sent to an aerobic or anaerobic process for recycling through composting. The non- organic frac¬tion that can further be recycled (re-ceived after mechanical and manual sorting) is sent to the aggregator yard for sorting and bailing. The re¬maining coarse rejects from composting is then proposed to be landfilled scientifically.
Sanitary landfills	The final and safe disposal of residual solid waste and inert wastes on land in a facility designed with protective measures against pollution of ground water, surface water and fugitive air dust, wind-blown litter, bad odour, fire hazard, animal menace, bird menace, pests or rodents, greenhouse gas emissions, persistent organic pollutants slope instability and erosion.

Table 5: Stream-wise Processing Units & their detials

	WASTE STREAM	SCALE	EXISTING NO. OF UNITS	PROPOSED NO. OF UNITS
	Dry Waste	Ward-wise 10 TPD capacity planned	166	32
	Dry Waste	Zone-wise	1	17
	Wet Waste	Division-wise, primary identified for market waste	11	5
	Wet Waste	Sub-division wise	7	57
	Leaf / Garden Waste	1 per Ward, located in parks	4	194
	Coconut Waste	Zone-wise	2	6
	Domestic Hazardous Waste	City-wise	3	NA
	All Waste	Zone/City-wise	9	5
	Reject & Inert Waste	City-wise	3	NA



Centralised' system



Decentralised' system

Figure 5: Decentralised processing by stream - shift from from centralised landfills

Figure 6: Dry Waste Collection centre

Ward no.: 44

Figure 7: Bio-methanation unit

Ward no.: 139

Figure 8: Organic Waste Converter
Ward no.: 168

Figure 9: Leaf Litter Processing Unit
Ward no.: 151

Figure 10: Coconut Processing Unit
Ward no.: 168

Figure 11: Waste Processing Unit (windrow composting)

3.3.2. BULK GENERATORS MANAGING THEIR OWN WASTE

Bulk Generators contribute to 25% of the city's waste (refer Figure 12) and have been separated from the regular collection cycle. They include domestic genera¬tors - apartment complexes with more than 50 units and Commercial bulk generators viz hotel/ restaurant, clubs, factory, choultry, mall, shop¬ping complex, marriage halls, convention hall, place of worship, institution, office establish¬ment, railway stations, bus stand or any other commercial or public entity which accumulates MSW of a quantity not less than 10 kg per day.

As per BBMP notification of 25/07/2013, BBMP mandates Bulk Generators to segregate waste into different categories and manage their waste either in-situ or to utilize the services of BBMP Empanelled Service Providers.

To enable and support the same, the BBMP has set up a portal for the Bulk Generator Network Service and a Vendor Empanelment, under the program name 'KASA VILAVAARI SEVADARARU'.

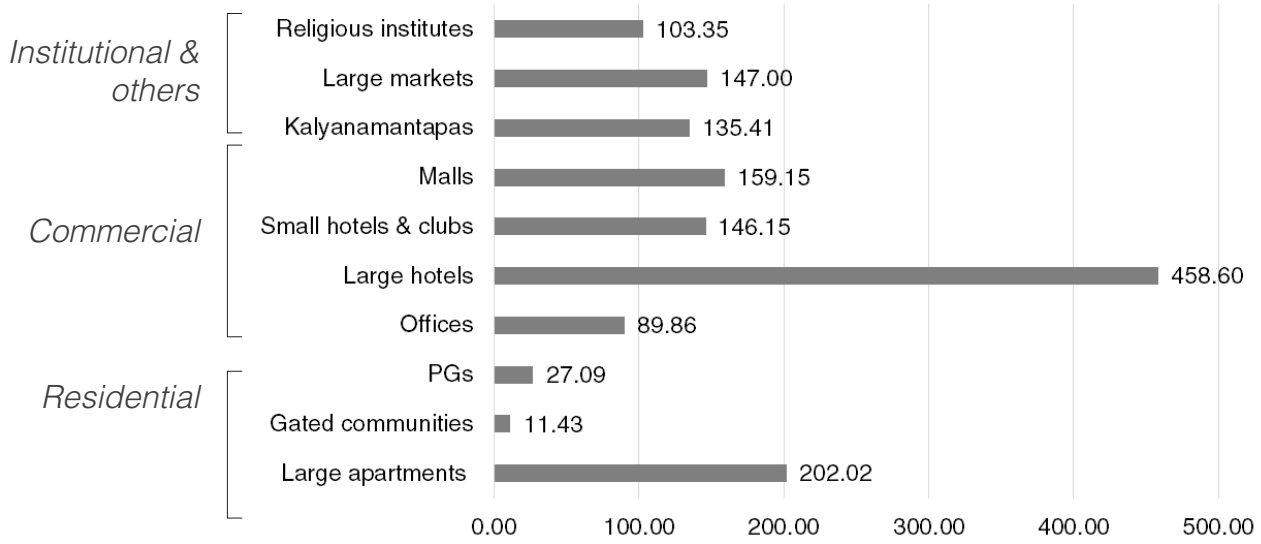


Figure 12: Bulk Waste Generators and their contribution to the city's waste

3.3.3. CREATING THE WARD MICRO PLAN

The Micro-plan was first piloted and tested in Yelahanka Zone and is now been scaled up to the city level. A Micro Plan is a process of creating a solid waste management plan for the smallest unit of management, by splitting the Ward into Blocks (750 Households + small commercial est.). The process includes:

- Provision of Ward wise Block map provid¬ed by BBMP and made available via the BBMP website
- Identification of willing block residents (two per block) to volunteer as Shuchimithras, to create door to door awareness and im-¬prove the quality of segregation at source
- Allotment of one Auto Tipper for the block with the details of the Vehicle and driver given to the block residents Geo fencing the block and tracking the Auto tipper to ensure reliable and timely collection
- Scheduling Block wise pick up of Dry waste twice a week by the Ward Dry Waste Collection Centre
- Proper street sweeping
- Empowering the Shuchi Mithras to monitor the collection through phone apps and report non-compliance in their block The Micro-Plan has been launched City-wide on February, 1st, 2017.

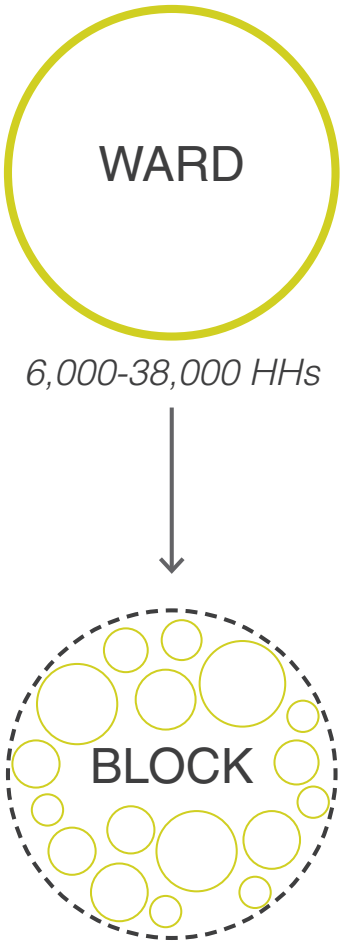


Figure 13 : Scale of the block- smallest unit of waste management

3.4. ORGANIZATIONAL STRUCTURE

3.4.1. BBMP SWM CELL

In order the streamline the planning, operations and management of the SWM System, BBMP has developed a Solid Waste Management Cell. The intent of setting up the Cell is to continually strive to protect public and environmental health of our city by providing quality waste management serviceswhich are integrated, inclusive and efficient. The SWM Cell (Figure 14) has a two level structure- At the Head Office and at the Zonal Level.

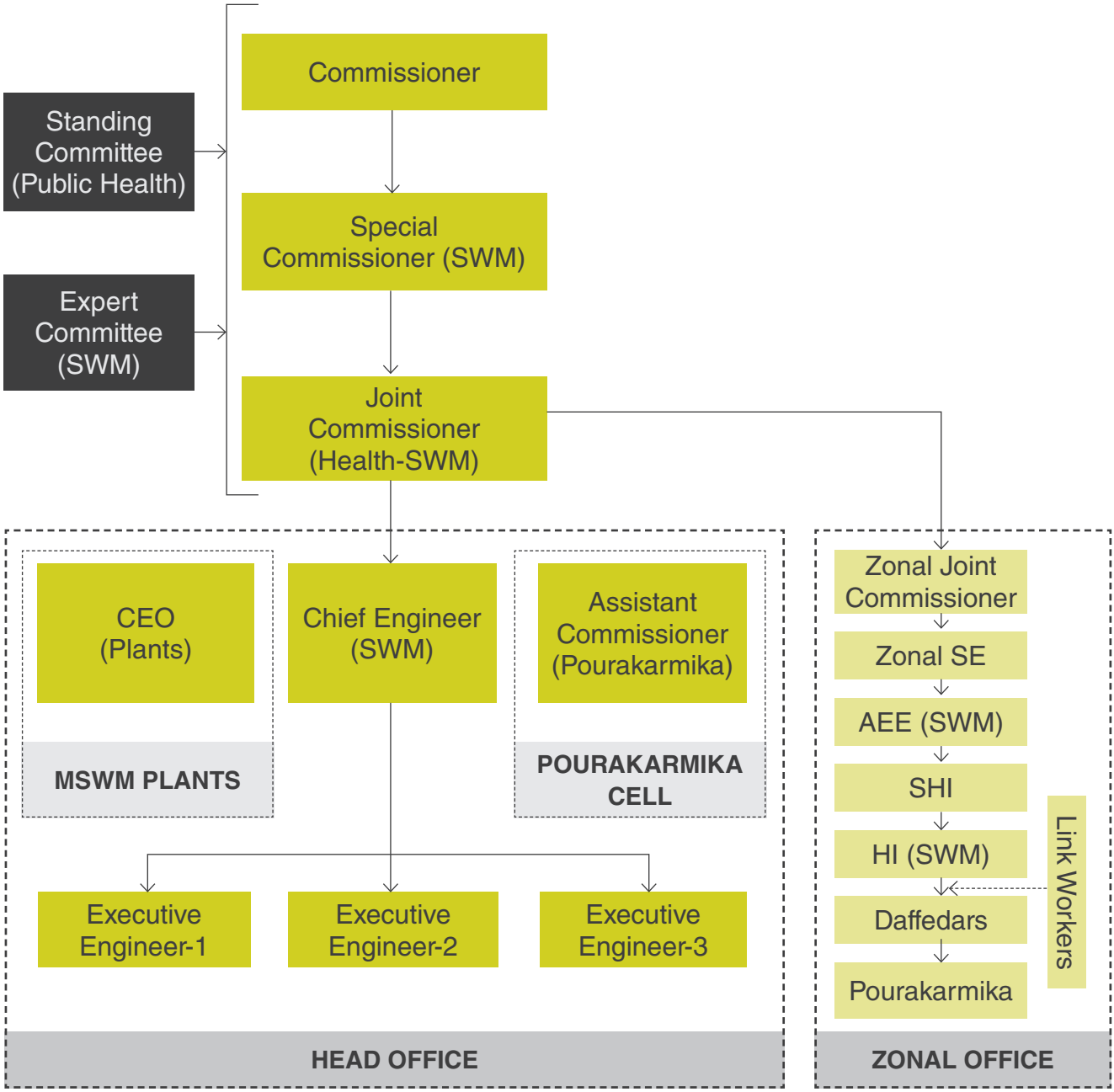


Figure 14: BBMP SWM Cell structure

3.4.2. WARD COMMITTEES

As per the Karnataka ACT No. 3 of 2011, KMC (Amendment) Act, 2011; there shall be Ward Committees constituted for each ward in the corporation. The structure of the Ward Committee is as shown in Figure 15, the mentioned act (Refer 4.3) and rules (Refer 4.1) are attached in Section B (Refer 4.3) and the Rules.

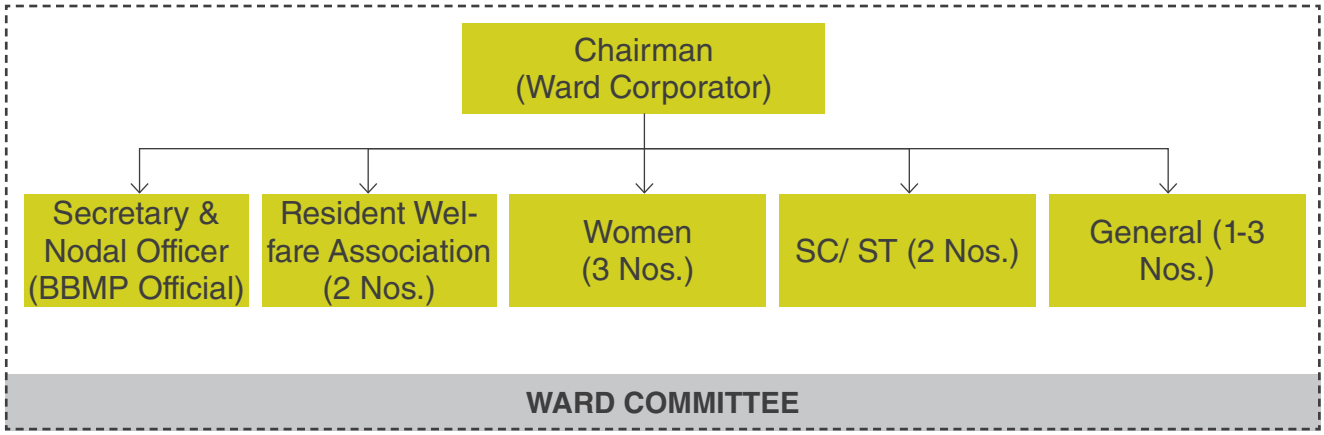


Figure 15: Ward committee structure

3.4.3. CITIZEN PARTICIPATION PROGRAM

Creating Citizen Participative Structures for Effective Micro /Macro SWM Planning and implementation through Citizen Participation at every Level through Civic Wardens (Master Trainers, Zone Co-ordinators, Ward Co-ordinators and Shuchimithras)

Figure 16: Citizen Participation program structure

SECTION B
COMPENDIUM

4 THE SWM MANDATE

4.1. RULES AND REGULATIONS

These include all the Rules and Regulations that have been established at the National and State Level. These are listed below and subsequently attached with in this section:

4.1.1. Ward Committee Rules
4.1.2. Solid Waste Management Rules, 2016
4.1.3. Plastic Waste (Management and Handling) Rules, 2011
4.1.4. Construction & Demolition Waste Management Rules, 2016
4.1.5. E-waste (Management) Rules, 2015

4.1.1. WARD COMMITTEE RULES

4.1.2. SOLID WASTE MANAGEMENT RULES, 2016

4.1.3. PLASTIC WASTE (MANAGEMENT AND HANDLING) RULES, 2011

4.1.4. CONSTRUCTION & DEMOLITION WASTE MANAGEMENT RULES, 2016

4.1.5. E-WASTE (MANAGEMENT) RULES, 2015

4.2. HIGH COURT DIRECTIONS

This section includes only the key Directives from the High Court of Karnataka in the SWM PIL (WP 24739/2012), as of 10th November 2017. All the additional directions can be accessed via the high court portal (http://karnatakajudiciary.kar.nic.in/caseStatus_CaseNumber.aspx) by entering the case number (WP 24739/2012). These include the following:

4.2.1. Segregation at Source a Fundamental Duty (Order dt.: 10 Sep 2012)
4.2.2. Decentralised Waste Management (Order dt.: 22 Nov 2012)
4.2.3. Allocation and allotment of land for solid waste management by BDA (Order dt.: 8 Jan 2013)
4.2.4. Ward Committees (Order dt.: 8 Jan 2013, 10 Jan 2013)
4.2.5. Comprehensive order on Duties of Waste Generators and Collection of Solid Waste and other points (Order dt.: 17 Dec 2015)
4.2.6. Comprehensive Overview of requirements for effective waste management (Order dt.: 23 June 2016)

4.2.1. SEGREGATION AT SOURCE A FUNDAMENTAL DUTY

(ORDER DT.: 10 SEP 2012)

4.2.1. SEGREGATION AT SOURCE A FUNDAMENTAL DUTY (ORDER DT.: 10 SEP 2012)

Highlights:

1. Every Citizen needs to be reminded that he/she has Fundamental Duties as contained in Part IV-A of the Constitution of India and in this regard , to keep the Environment clean by ensuring that waste is segregated in each household so as to enable the Corporation to collect the same for further treatment or disposal as the case may be.

2. Appointment of Executive Magistrates invested with powers under Sec 20 and 21 of the Cr. P.C. w.r.t powers under Sec 431 for he Karnataka Municipal Corporations Act, 1976 for imposition of fines on households which are failing to segregate garbage into dry and wet garbage. At present, we are informed that the fine is Rs. 10/- only, which we think may not be sufficient to prevent violation of segregation norms. The powers could be invested either with the Health Inspector or the Environmental Engineer in each ward.

4.2.2. DECENTRALISED WASTE MANAGEMENT

(ORDER DT.: 22 NOV 2012)

4.2.2. DECENTRALISED WASTE MANAGEMENT (ORDER DT.: 22 NOV 2012)

Highlights:

1. The State Affidavit filed , contains details of several other locations which are being considered for the purpose of establishing Waste Management Units in Bangalore Urban District. It is agreed by all concerned, that merely receiving MSW is not a permanent solution and that the ideal situation would be for processing the MSW by establishing plants for receiving and processing the MSW. So steps shall be taken in right earnest so that the Waste management Units could be set up at the earliest. The Authorities concerned to co ordinate with each other in this regard.

2. The BBMP states that Segregation and Wet waste processing stations shall be located and made operational in the 28 Assembly Constituencies within two months from today.

3. BBMP shall seek the assistance of NGOs or other private agencies for segregation of waste and disposal of dry waste while wet waste has to be transported to the composting sites identified by BBMP. We see this as the first step to be followed immediately by similar Segregation and Wet waste Processing Stations ineach of the 198 wards in Bangalore. This exercise to be completed within 4 months from today.

4. Ideally every should have at least 3 such stations in each ward. We think that Decentralization in the system of MSW management would lend efficacy and prevent bottlenecks impacting the entire City at a given point in time.

4.2.3. ALLOCATION & ALLOTMENT OF LAND FOR SOLID WASTE MANAGEMENT BY BDA

(ORDER DT.: 8 JAN 2013)

4.2.3. ALLOCATION & ALLOTMENT OF LAND FOR SOLID WASTE MANAGEMENT BY BDA (ORDER DT.: 8 JAN 2013)

Highlights:

1. The BDA has also placed on record their statement. They have stated that in the Revised Master Plan 2015, areas are reserved and earmarked for public utilities, such as power, water, garbage facility, treatment plants , in addition to other public utilities.

2. The Government exercising power conferred under sub clause (vi) of clause (bb) of Sec 2 of the BDA act 1976, notified areas for 'dumping city garbage', as a civic amenity.

3. They have also produced an extract showing lands identified and reserved for public utilities which includes power, water , garbage facility, treatment plant in the Master Plan 2015, approved by the Government on 25.6.2007 Hobli/ Village wise. They have produced an extract showing the civic amenity site available for allotment at different divisions such as South, North, East and West Division. However CA site no. 5 situated at Banashankari VI stage, V Block measuring an extent of 39,086 sq mtrs has been allotted to BBMP vide allotment dated 15.1.2009.

4. They state that the BBMP can make use of the sites as Landfill site whenever needed. In view of the said offer made by the BDA, now it is upto the BBMP to take decision in respect of all those sites which the BDA has earmarked for garbage facility and utilize the same if necessary Ward wise or Division wise within the city.

5. From the aforesaid statement, it is clear that few private layouts have been sanctioned. The BDA is going to insist for setting apart land for garbage facility/treatment plant, but insofar as layouts for which already sanctions have been accorded, such a reservation is made.

6. In view of the amendment to the BDA act as set out above, the Civic amenity includes areas for dumping city garbage. While dealing with Civic amenity sites, BDA shall reserve land earmarked for Civic Amenity for the purpose of garbage facility /treatment plant . Thereafter, transfer the same to the Corporation for its maintenance. It would also solve the problem in respect of those layouts for which sanction has already been accorded, but yet to be completed. Under any (read No) circumstance, the BDA shall permit those Civil Amenity Sites for the purpose other than garbage facilities / treatment plant.

4.2.4. WARD COMMITTEES

(ORDER DT.: 8 JAN 2013, 10 JAN 2013)

4.2.5. COMPREHENSIVEORDER ON DUTIES OF WASTE GENERATORS & COLLECTION OF SOLID WASTE & OTHER POINTS (ORDER DT.: 17 DEC 2015)

4.2.6. COMPREHENSIVE OVERVIEW OF REQUIREMENTS FOR EFFECTIVE WASTE MANAGEMENT

(ORDER DT.: 23 JUNE 2016)

4.3. GOVERNMENT ORDERS & ACTS

This includes only the key Directives from the High Court of Karnataka in the SWM PIL (WP 24739/2012), for the information of the Ward Committees, as of 10th November 2017. These include the following:

4.3.1. Karnataka Act No. 03 of 2011 (Ward Committees)
4.3.2. Forest, Ecology & Environment Secretariat, Notification: No. FEE 17 EPC 2012, Bangalore, dtd: 11/03/2016 (Plastic Ban)
4.3.3. Government Order: No. UDD 126 TMS 2016 dtd: 7/8/2017 (Direct payment of PKs)
4.3.4. Labour Secretariat, Notification: No. LD 92 LWA 2017, Bengaluru, dtd: 27/10/2017(Direct Employment of PKs)

4.3.1. KARNATAKA ACT: NO. 03 OF 2011 (WARD COMMITTEES)

4.3.2. FOREST, ECOLOGY & ENVIRONMENT SECRETARIAT, NOTIFICATION: NO. FEE 17 EPC 2012, BANGALORE, DTD: 11/03/2016 (PLASTIC BAN)

4.3.3. GOVERNMENT ORDER: NO. UDD 126 TMS 2016 DTD: 7/8/2017

(DIRECT PAYMENT OF PKS)

4.3.4. LABOUR SECRETARIAT, NOTIFICATION: NO. LD 92 LWA 2017, BENGALURU, DTD: 27/10/2017 (DIRECT EMPLOYMENT OF PKS)

CLEAN BENGALURU

'Namma Kasa Namma Javabdhari'