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**URBAN DEVELOPMENT & HOUSING DEPARTMENT  
GOVERNMENT OF BIHAR**

**COMPREHENSIVE SOLID WASTE  
MANAGEMENT POLICY AND STRATEGY  
FOR URBAN LOCAL BODIES OF BIHAR**



**BIHAR, 2018**

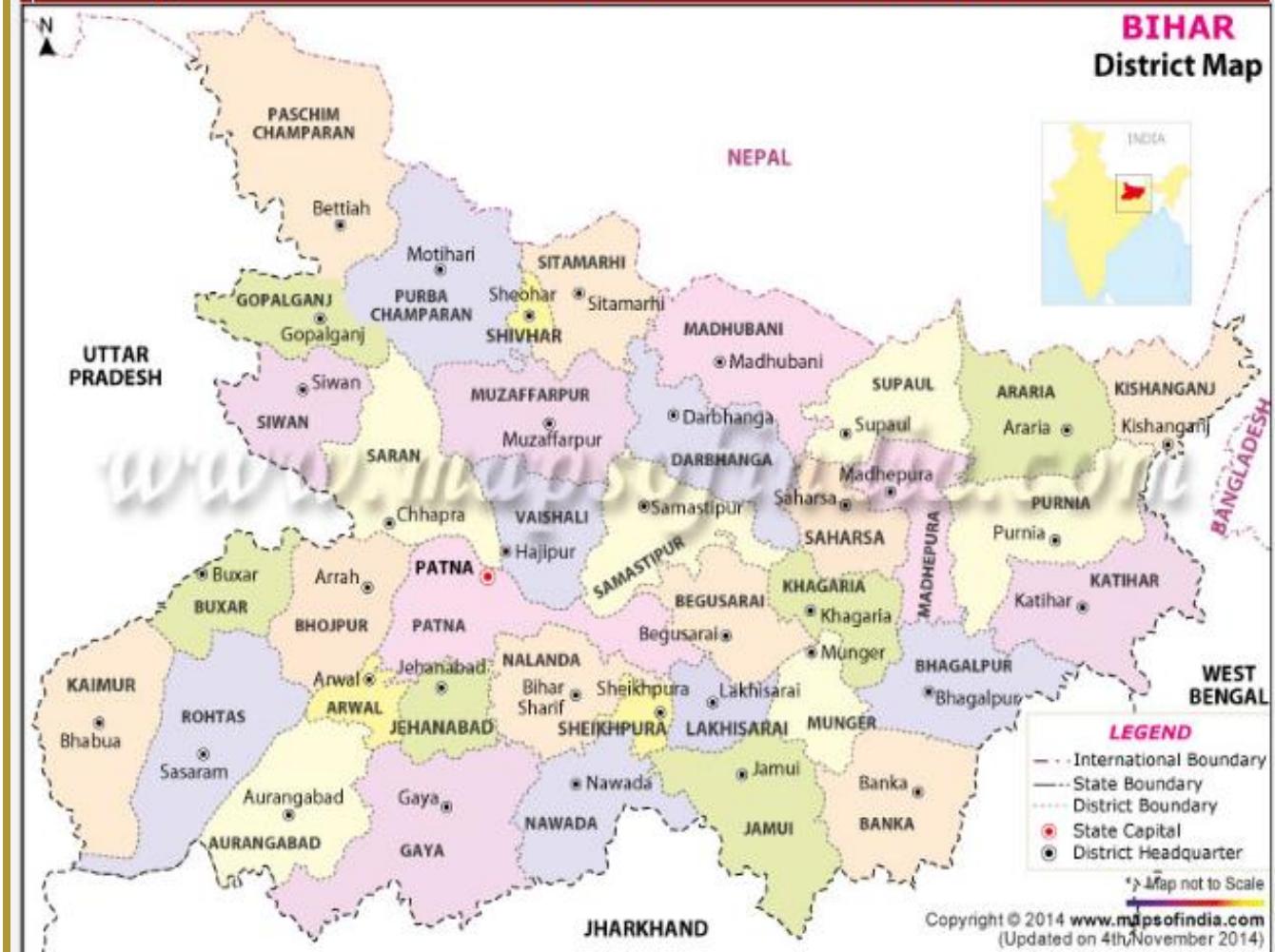
## District Map of Bihar

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## BIHAR District Map



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## **Part-1: Introduction & Current Scenario of Solid Waste Management in Bihar**

### **1. Introduction**

Solid waste management is one of the most essential services for maintaining the quality of life in the urban areas and for ensuring better standards of health and sanitation. In India, this service falls short of the desired level as the systems adopted are outdated and inefficient. Institutional weakness, shortage of human and financial resources, improper choice of technology, inadequate coverage and lack of short and long term planning are responsible for the inadequacy of services.

For maximizing efficiency and effectiveness of this service, it is necessary to tackle this problem systematically by going into all aspects of the “Solid Waste Management” (SWM) and devise cost effective system which may ensure adequate level of SWM services to all class of citizens along with collection, transportation and disposal of waste in an environmentally acceptable manner in terms of the new Municipal Solid Waste (Management & Handling) Rules 2016.

A comprehensive study of the existing collection, transportation, processing and disposal system of solid waste management, waste quantification and quality surveys & consultations with different stakeholders have been carried out to suggest an appropriate study for optimal service delivery keeping in view the economic, environmental, social and institutional dimensions to prepare a broad and integrated solid waste management system for the local bodies.

#### **1.1 Scenario of Solid Waste Management in India**

Currently of the estimated 62 Million tonnes of MSW generated annually by 377 million people in the urban areas, more than 80% is disposed of indiscriminately at dump yards in an unhygienic manner by the municipal authorities leading to problems of health and environmental degradation. The untapped waste has a potential of generating 439 MW of power from 32,890 TPD of combustibles wastes including Refuse Derived Fuel (RDF), 1.3 Million cubic meter of biogas per day or 72 MW of electricity from biogas and 5.4 million metric tonnes of compost annually to support agriculture. The existing, policies, programmes and management structure do not adequately address the imminent challenge of managing this waste which is projected to be 165 million tonnes by 2031 and 436 million tonnes by 2050.

Further, if the current 62 million tonnes annual generation of MSW continues to be dumped without treatment, it will need 3,40,000 cubic meter of landfill space everyday (1240 hectares per year). Considering the projected waste generation of 165 million tonnes by 2031, the requirement of land for setting up landfill for 20 years (considering 10 meter high waste pile) could be high as 66 thousand hectares of precious land, which our country cannot afford to waste. The Task Force (TF) has taken a serious view and considers it imperative to minimize the wastes going to landfill by at least 75% through processing of MSW using appropriate technologies.

India still has an enormous gap between the rich and poor masses. Over the years, there has been a continuous migration of people from rural and semi-urban areas to towns and cities. The number of class I cities has been increased from 212 to 300 during 1981-1991, while class II cities have increased from 270-345 during the same period. The increase in the population in class I cities is very high as compared

to that in class II cities. The uncontrolled growth in urban areas has left many cities deficient in infrastructure services such as water supply, sewerage and municipal solid waste management.

In general all Indian cities face similar problems with their solid waste management. Amounts and contents of the generated solid waste may differ among different cities but problems related to collection, transport and disposal are the same. Generated solid waste is not fully collected and sizable quantity of waste remains uncollected at the streets, road sides, open places etc., which pollute the environment and cause health problems. Solid waste is collected and transported in an inefficient way using outdated equipment and techniques. Generally the collected municipal solid waste is disposed by uncontrolled land filling at the outskirt of the city. Personnel from sweeper to manager share a lack of motivation, working in an unpopular public sector with a dirty image.

Most urban areas in the country are plagued by acute problems related to solid waste. Due to lack of serious efforts by city/town authorities, solid waste and its management has become a serious problem and due to this the largest part of municipal expenditure is allocated to it. It is estimated that 20% -30% of the total budget of Urban Local Bodies (ULBs) is allocated to solid waste management. Despite this, there has been a progressive decline in the standards of services with respect to collection and disposal of municipal solid waste including bio-medical waste and industrial wastes, as well as measures for ensuring adequacy of environmental, sanitation and public hygiene. In many cities 20% to 40% of generated solid waste remains unattended, giving rise to insanitary conditions.

## **1.2 Problems faced by Urban Local Bodies of Bihar**

Urban local bodies lack in managerial, administrative, financial and institutional management and also the technical knowhow of managing urban solid waste. Availability of land in urban areas for establishing SWM facility is also another major constraint. It is therefore, very essential to provide proper guidance and training to the personnel in the Urban Local Bodies to make them efficient in managing the solid waste generated in their respective areas/cities/towns.

## **1.3 Salient Features of SWM Rules, 2016**

- The rules are now applicable beyond the Municipal areas and extend to urban agglomerations, census towns, notified industrial townships, areas under the control of Indian Railways, airports, airbase, port and harbors, defense establishments, special economic zones, State and Central Government organizations, places of pilgrims, religious and historical importance
- The source segregation of waste has been mandated to channelize the waste to wealth by recovery, reuse and recycle
- Responsibilities of Generators have been introduced to segregate waste into three streams- Wet (biodegradable waste), Dry (Plastic, Paper, Metal, Wood) and domestic hazardous waste (diapers, napkins, empty containers of cleaning agents, mosquito repellents, etc.,) and handover segregated wastes to authorized rag-pickers or waste collectors or local bodies
- Integration of waste pickers/ rag pickers and waste dealers/kabadiwalas in the formal system should be done by State Governments, and Self Help Groups, or any other group to be formed.
- No person should throw, burn or bury the solid waste generated by him, on streets, open public spaces outside his premises, or in open premises or water bodies
- Generator will have to pay user fees to waste collectors and for “Spot Fine” for littering and Non-Segregation.

- Used sanitary waste like diapers, sanitary pads should be wrapped securely in pouches provided by manufacturers or brand owners of these products or in a suitable wrapping material and shall place the same in the bin meant for dry waste/ non-biodegradable waste.
- The concept of partnership in Swachh Bharat has been introduced. Bulk and institutional generators, market associations, event organizers and hotels and restaurants have been made directly responsible for segregation and sorting the waste and manage in partnership with local bodies.
- All hotels and restaurants should segregate biodegradable waste and set up a system of collection or follow the system of collection set up by local body to ensure that such food waste is utilized for composting/biomethanization.
- All Resident Welfare and market associations, Gated communities and institution with an area > 5,000 sq. m should segregate waste at source-in to valuable dry waste like plastic, tin, glass, paper etc., and handover recyclable material to either the authorized waste pickers or authorized recyclers, or to the urban body.
- The biodegradable waste should be processed, treated and disposed of through composting or bio-methanization within the premises as far as possible. The residual waste shall be given to the waste collectors or agency as directed by the local authority
- New township and Group Housing Societies have been made responsible to develop in house waste handling, and processing arrangements for bio-degradable waste
- Every street vendor should keep suitable containers for storage of waste generated during the course of his activity such as food waste, disposable plates, cups, cans, wrappers, coconut shells, leftover food, vegetables, fruits etc. and deposit such waste at waste storage depot or container or vehicle as notified by the local authority
- The developers of Special Economic Zone, industrial estate, industrial park to earmark at least 5% of the total area of the plot or minimum 5 plots/sheds for recovery and recycling facility
- All manufacturers of disposable products such as tin, glass, plastics packaging etc. or brand owners who introduce such products in the market shall provide necessary financial assistance to local authorities for the establishment of waste management system.
- All such brand owners who sell or market products in such packaging material which are non-biodegradable should put in place a system to collect back the packaging waste generated due to their production
- Manufacturers or Brand Owners or marketing companies of sanitary napkins and diapers should explore the possibility of using all recyclable materials in their products or they shall provide a pouch or wrapper for disposal of each napkin or diapers along with the packet of their sanitary products
- All such manufacturers, brand owners or marketing companies should educate the masses for wrapping and disposal of their products
- All industrial units using fuel and located within 100 Km from a solid waste based RDF plants shall make arrangements within six months from the date of notification of these rules to replace at least 5% of their fuel requirement by RDF so produced
- Non-recyclable waste having calorific value of 1500 K/Cal/Kg or more shall not be disposed on landfills and shall only be utilized for generating energy either or through refuse derived fuel or by giving away as feedstock for preparing refuse derived fuel
- High calorific waste shall be used for co-processing in cement or thermal power plants

- Construction and demolition waste should be stored, separately disposed of, as per the Construction and Demolition Waste Management Rules, 2016
- Horticulture waste and garden waste generated from his premises should be disposed as per directions of local authority
- An event, or gathering organizer of more than 100 persons at any licensed/unlicensed place, should ensure segregation of waste at source and handing over of segregated waste to waste collector or agency, as specified by the local authority
- Special provision for management of solid waste in hilly areas: - construction of landfill on the hill shall be avoided. A transfer station at a suitable enclosed location shall be set up to collect residual waste from the processing facility and inert waste. Suitable land shall be identified in the plain areas, down the hill, within 25 kilometers for setting up sanitary landfill. The residual waste from the transfer station shall be disposed of at this sanitary landfill.
- In case of non-availability of such land, efforts shall be made to set up regional sanitary landfill for the inert and residual waste.

## 2. State Profile

Bihar is ranked among the least urbanized States in India with less than 10% of the State population residing in urban areas. Urban centres in Bihar present a myriad development challenges. Some of the key challenges include lack of basic urban services, issues in local governance and high incidence of urban poverty. A recent study by the National Sample Survey Organization reports a lower decrease in poverty ratios in urban Bihar in comparison to rural areas. States across the country have witnessed urban development as an important anchor to accelerate the pace of development. The scenario in Bihar suggests that urban development is critical for the State to achieve overall development goals. The current status of urban Bihar, presents a significant opportunity to develop urban centres as engines of economic growth and enable a pivotal role in the overall development of the state.



### 2.1 Location

The Bihar state is located between 21°58'10"N - 27°31'15"N Latitude and between 82°19'50"E- 88°17'40"E Longitude with an average elevation above the sea level is 53m. The total area covered by the state of Bihar is 94,163 sq. km

### 2.2 Geography

It is mainly a vast stretch of very fertile flat land. It is drained by the Ganges River, including northern tributaries Gandak and Koshi originating in the Nepal Himalayas and the Bagmati originating in the Kathmandu Valley that regularly flood parts of the Bihar Plains. The Bihar plain is divided into two unequal halves by the river Ganga which flows through the middle from west to east. The Ganga tributaries are the Sone, Budhi Gandhak, Chandan, Orhani and Falgu.

### 2.3 Climate

Bihar is mildly cold in the winter the lowest temperatures being around 5 to 10 degrees Celsius. Winter months are December and January. It is hot in the summer (with average highs around 35-40 Celsius). April to mid-June is the hot period. The monsoon months of June, July, August, and September experience good rainfall. October & November and February & March have pleasant climate.

### 2.4 Geology

There are three major types of soil in Bihar:

- Piedmont swamp soil:

This type of soil is found in north western part of west Champaran district.

b) **Terai soil:**

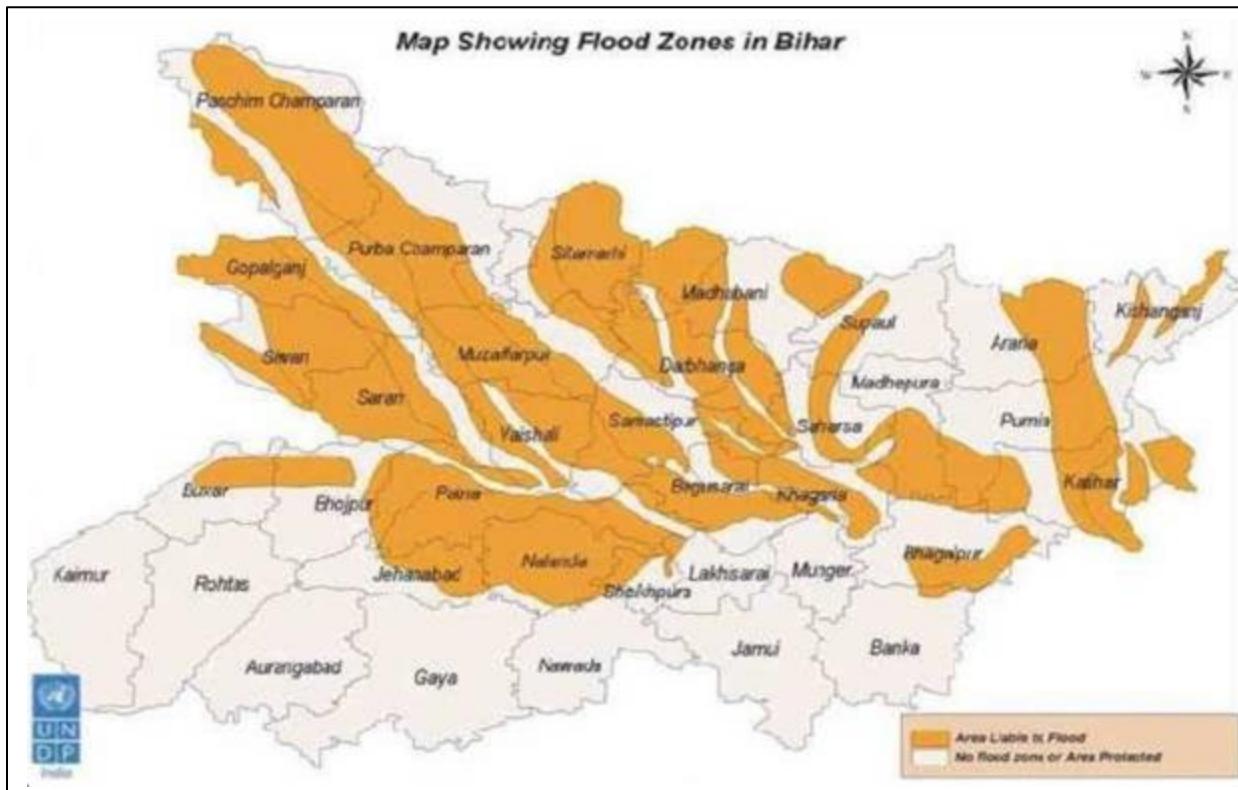
This type of soil is found in northern part of the state along the border of Nepal.

c) **The Gangetic Alluvium:**

The plain of Bihar is covered by Gangetic Alluvium.

## 2.5 Flood Zones in Bihar

A map showing flood zone in Bihar is shown below. It indicated that Bhojpur district does not come under flood zones. Some part of Bhojpur district which is at the bank of Ganga River come under flood zone.



## 2.6 State at a Glance

As per census 2011, the total population of India is 1,210,193,422 and Bihar is 3<sup>rd</sup> most populous state in India. Bihar State at a glance as given below:

Census Data of Bihar State (2011)	
Particulars	Value
Area in sq. km	91,163
Total Population	103,804,637
Males	54,185,347
Females	49,619,290

Decadal Population Growth 2001-2011	
Absolute	20806128
Percentage	25.07%
Population Density	1102
Sex Ratio	916
Number of Divisions	9
Number of Districts	38
Number of Sub Divisions	101
Number of CD Blocks	534
Number of Urban Agglomerations	14
Number of Towns	
Statutory Towns	139
Census Towns	60

### 3. Strategic Goal & Objectives

The overall goal of this State solid waste management strategy (SWMS) is to develop, implement, and maintain a system of integrated solid waste management that deals with the solid waste stream and minimizes the negative impacts on the health of the population and environment.

This will be developed through three broad strategic objectives:

- Develop and implement policies, plans, legislation, regulations, and institutional arrangements, which set the right environment to encourage sustainable solid waste management (SWM)
- Develop, implement and operate facilities and programs for solid waste management, which are sustainable and which protect public health and the environment
- Teach, train, and educate the public to facilitate efficient implementation of systems and programs and enable compliance with these systems and programs.

## **4. Current Practices of SWM**

Rapid increase in urbanization and per capita income lead to high rate of municipal solid waste generation. In recent times, E-waste and plastic waste also contribute considerably to total waste stream due to utilization of electronic and other items. These wastes may cause a potential hazard to human health or environment if any of the aspects of solid waste management is not managed effectively. In India, approach towards Solid waste management is still unscientific. Solid Waste collection efficiency in India is around 70%, while same is almost 100% in the developed countries. Even today, large portion of solid waste is dumped indiscriminately on outskirts of towns or cities without any prior treatment. This leads to groundwater contamination and increase in air pollution due to leachate percolation and release of gases respectively. Various studies reveal that out of total solid waste, 80% can be utilized again either by recycling or reusing. Improper waste segregation and other factors lead recycling sector to work on outdated technology. However, plastic and paper recycling have been especially growing due to continuous increasing consumption of both the commodities.

The scenario in Bihar is no different from the rest of the country. Bihar has a total population of 104,099,452 crore of which male and female are 54,278,157 and 49,821,295 respectively (as per Census 2011). There are 143 Urban Local Bodies in Bihar comprising of 12 Municipal Corporations, 45 Municipal Councils and 86 Nagar Panchayats in the state. The details of ULBs with households and population are given below.

### **4.1 List of Urban Local Bodies, Bihar**

List of ULBs with Households and Population			
Sl. No	ULBs	Households	Population
	Municipal Corporation	HHs as per survey	
1	Arah (Nagar Nigam)	35189	261,430
2	Begusarai (Nagar Nigam)	50202	252,008
3	Bhagalpur (Nagar Nigam)	58361	400,146
4	Biharsharif (Nagar Nigam)	44054	297,268
5	Chhapra (Nagar Nigam)	32585	202,352
6	Darbhanga (Nagar Nigam)	55265	296,039
7	Gaya (Nagar Nigam)	69616	474,093
8	Katihar (Nagar Nigam)	35333	240,838
9	Munger (Nagar Nigam)	32891	213,303
10	Muzaffarpur (Nagar Nigam)	69051	354,462
11	Patna (Nagar Nigam)	223088	1,684,297
12	Purnia (Nagar Nigam)	55003	282,248
	Municipal Council	HHs as per survey	

13	Araria (Nagar Parishad)	15881	79,021
14	Arwal (Nagar Parishad)	8685	51,849
15	Aurangabad (Nagar Parishad)	13305	102,244
16	Bagaha (Nagar Parishad)	21484	112,634
17	Bakhtiyarpur (Nagar Parishad)	7786	47,897
18	Banka (Nagar Parishad)	8002	45,977
19	Barbigha (Nagar Parishad)	8359	46,075
20	Barh (Nagar Parishad)	10278	61,470
21	Benipur (Nagar Parishad)	19620	75,317
22	Bettiah (Nagar Parishad)	21162	132,209
23	Bhabhua (Nagar Parishad)	8010	50,179
24	Bihat (Nagar Parishad)	8989	67,952
25	Buxar (Nagar Parishad)	14010	102,861
26	D.Dalmiyanagar (Nagar Parishad)	20334	
27	Danapur (Nagar Parishad)	27486	182,429
28	Dumraon (Nagar Parishad)	7862	53,618
29	Farbisganj (Nagar Parishad)	10672	50,961
30	Fatuha (Nagar Parishad)	8182	50,475
31	Gopalganj (Nagar Parishad)	9649	67,339
32	Hajipur (Nagar Parishad)	18081	147,688
33	Hilsa (Nagar Parishad)	8874	51,052
34	Jamalpur (Nagar Parishad)	14670	105,434
35	Jamui (Nagar Parishad)	18443	87,357
36	Jehanabad (Nagar Parishad)	20236	103,202
37	Khagariya (Nagar Parishad)	10186	49,406
38	Khagaul (Nagar Parishad)	7146	44,364
39	Kishanganj (Nagar Parishad)	21235	105,782
40	Lakhisarai (Nagar Parishad)	20661	99,979
41	Madhepura (Nagar Parishad)	13238	54,472
42	Madhubani (Nagar Parishad)	16201	75,736
43	Masaurahi (Nagar Parishad)	9810	59,803
44	Mokama (Nagar Parishad)	9384	60,678
45	Mothiari (Nagar Parishad)	22532	126,158
46	Narkatiyaganj (Nagar Parishad)	7883	49,507
47	Nawada (Nagar Parishad)	18481	98,029
48	Phulwarisharif (Nagar Parishad)	10493	81,740
49	Raxaul (Nagar Parishad)	8794	55,536
50	Saharsa (Nagar Parishad)	33229	156,540
51	Samstipur (Nagar Parishad)	11530	67,925
52	Sasaram (Nagar Parishad)	21255	147,408
53	Sheikhpura (Nagar Parishad)	11599	62,927
54	Sitamarhi (Nagar Parishad)	15505	67,818

55	Siwan (Nagar Parishad)	22472	135,066
56	Sultanganj (Nagar Parishad)	12157	52,892
57	Supaul (Nagar Parishad)	14260	65,437
	<b>Nagar Panchayat</b>	<b>HHs as per survey</b>	
58	Amarpur (Nagar Panchayat)	4822	25,336
59	Areraj (Nagar Panchayat)	5050	26,014
60	Bahadurganj (Nagar Panchayat)	8028	36,993
61	Bairginiya (Nagar Panchayat)	8379	42,895
62	Bakhri (Nagar Panchayat)	8792	40,043
63	Balia (Nagar Panchayat)	9089	47,550
64	Banmankhi (Nagar Panchayat)	6617	30,336
65	Barahiya (Nagar Panchayat)	7798	43,032
66	Barauli (Nagar Panchayat)	7450	41,877
67	Barsoi (Nagar Panchayat)		
68	Belsand (Nagar Panchayat)	4951	20,566
69	Bihyan (Nagar Panchayat)	4424	26,707
70	Bikramganj (Nagar Panchayat)	7724	48,465
71	Birpur (Nagar Panchayat)	3659	19,932
72	Bodhgaya (Nagar Panchayat)	6885	38,439
73	Chakiya (Nagar Panchayat)	4294	20,686
74	Chapatiya (Nagar Panchayat)	6332	27,095
75	Dalsinghsarai (Nagar Panchayat)	4927	23,862
76	Daudnagar (Nagar Panchayat)	9523	52,364
77	Dhaka (Nagar Panchayat)	5622	42,063
78	Dighwara (Nagar Panchayat)	6169	32,741
79	Dumra (Nagar Panchayat)	3746	15,674
80	Ekmabazar (Nagar Panchayat)	6451	
81	Ghoghardiha (Nagar Panchayat)	4257	18,257
82	Gogri Jamalpur (Nagar Panchayat)	8240	37,753
83	H. kharagpur (Nagar Panchayat)	7117	31,385
84	Harnaut (Nagar Panchayat)		
85	Hisua (Nagar Panchayat)	5412	32,585
86	Islampur (Nagar Panchayat)	6445	35,641
87	Jagdishpur (Nagar Panchayat)	5679	32,447
88	Jainagar (Nagar Panchayat)	4368	21,782
89	Janakpur Road (Nagar Panchayat)	3669	15,129
90	Jhajha (Nagar Panchayat)	7109	40,646
91	Jhanjharpur (Nagar Panchayat)	5940	30,590
92	Jogbani (Nagar Panchayat)	7616	39,281
93	Kahalgaon (Nagar Panchayat)	6160	33,700
94	Kanti (Nagar Panchayat)	5713	25,051

95	Kasba (Nagar Panchayat)	7077	30,421
96	Kataiya (Nagar Panchayat)	3911	20,193
97	Kesariya (Nagar Panchayat)	3453	18,984
98	Khushrupur (Nagar Panchayat)	3010	15,731
99	Koath (Nagar Panchayat)	3580	18,890
100	Kochas (Nagar Panchayat)	4999	
101	Koilawar (Nagar Panchayat)	2984	17,725
102	Lalganj (Nagar Panchayat)	5969	37,098
103	Maharajganj (Nagar Panchayat)	4668	24,282
104	Mahnar (Nagar Panchayat)	7526	48,293
105	Mahua (Nagar Panchayat)	4631	
106	Mairwan (Nagar Panchayat)	3693	23,565
107	Makhdumpur (Nagar Panchayat)	6672	31,994
108	Maner (Nagar Panchayat)	6562	40,068
109	Manihari (Nagar Panchayat)	6042	26,629
110	Marhaura (Nagar Panchayat)	5808	29,932
111	Mehsi (Nagar Panchayat)	5608	25,995
112	Mirganj (Nagar Panchayat)	4737	26,240
113	Mohaniya (Nagar Panchayat)	5414	
114	Motipur (Nagar Panchayat)	5313	28,572
115	Murliganj (Nagar Panchayat)	7681	28,691
116	Nasriganj (Nagar Panchayat)	4242	23,819
117	Naubatpur (Nagar Panchayat)	4928	25,011
118	Naugachiya (Nagar Panchayat)	10772	49,069
119	Navinagar (Nagar Panchayat)	4502	23,984
120	Nirmali (Nagar Panchayat)	4690	20,189
121	Nokha (Nagar Panchayat)	5013	27,302
122	Pakaridayal (Nagar Panchayat)	6411	29,582
123	Parsabazar (Nagar Panchayat)	8562	
124	Piro (Nagar Panchayat)	5732	33,785
125	Rafiganj (Nagar Panchayat)	6265	35,536
126	Rajgir (Nagar Panchayat)	6850	41,587
127	Ramnagar (Nagar Panchayat)	10587	48,411
128	Rivilganj (Nagar Panchayat)	6754	39,039
129	Rosera (Nagar Panchayat)	6691	31,155
130	S. Bakhtiyarpur (Nagar Panchayat)	6878	
131	Shahebganj (Nagar Panchayat)	4455	23,224
132	Shahpur (Nagar Panchayat)	3044	17,767
133	Sheohar (Nagar Panchayat)	6344	28,116
134	Sherghati (Nagar Panchayat)	6695	40,666
135	Silao (Nagar Panchayat)	4755	25,674
136	Sonpur (Nagar Panchayat)	5626	37,776

137	Sugauli (Nagar Panchayat)	7625	38,815
138	Sursand (nagar panchayat)		
139	Teghra (Nagar Panchayat)	10602	56,234
140	Tekari (Nagar Panchayat)	3523	
141	Thakurganj (Nagar Panchayat)	4306	18,348
142	Bikram (Nagar Panchayat)	4171	22,486
143	Warsaliganj (Nagar Panchayat)	7350	34,056
<b>Total</b>		<b>19,03,917</b>	<b>10,912,778</b>

## 4.2 Solid Waste Generation in Bihar

The generation of Municipal Solid Waste in Bihar State is from different sources such as: institutional, industrial, commercial, residential, construction and demolition waste and waste generated from municipal services. For efficient Management of Solid Waste each Municipal authority will have to ensure 100% collection of waste from households. The effective and integrated solid waste management system includes:

- a) segregation of waste at source (at household level)
- b) 100% collection of segregated waste from each household
- c) transfer of reusable and recyclable waste to the depot for reuse
- d) transfer of biodegradable waste to the compost plant for composting
- e) transfer of animal waste and slaughter house waste to the compost plant for composting
- f) identification of bulk generators and insist them to start composting in their own premises.
- g) identification and integration of rag pickers in the solid waste management system.
- h) encourage marketing and sale of enriched bio fertilizer to the bulk consumers i.e. farmers
- i) establish a scientific Sanitary Land Fill for each town within easy reach either at town level or regional level
- j) disposal of rejects of compost plant and inert material from recyclable waste depot to the sanitary land fill in a scientific manner.

There is no such formal study has been conducted in the state to identify the quality and quantity of waste generated in the state. However on an average the per capita waste generation in the Municipal Corporation is taken as 0.3 kg/capita/day, Patna Municipal Corporation 0.4 kg/capita/day, Municipal Councils 0.2 kg/capita/day and for Nagar Panchayats it is taken as 0.15 kg/capita/day. Considering the above per capita rate of generation of municipal solid waste the total solid waste generation in the state is given in the below table:

Waste Generation in TPD & TPA					
Sl. No	Type of ULBs	Total No. of Households	Waste generation in kg/capita/day	Waste Generation in TPD	Waste Generation in TPA
1	Municipal Corporation	537550	0.3 kg	806	294309
2	Patna Municipal Corporation	223088	0.4 kg	446	162854
3	Municipal Council	648111	0.2 kg	648	236561
4	Nagar Panchayat	495168	0.15 kg	371	135552
<b>Total</b>		<b>1903917</b>		<b>2272</b>	<b>829276</b>

CPCB reported the physical characteristics of MSW in different cities of India, which is shown in the below Table (CPCB, 2000).

#### Physical Characteristics of MSW in Indian Cities (CPCB, 2000)

City	Paper	Textile	Leather	Plastic	Metal	Glass	Ash, fine earth, others	Compostable matter
Patna City	4	5	2	6	1	2	35	45

### 4.3 Door to door collection of MSW and segregation at source

Door to door collection is proposed for collection of solid wastes of general households and commercial establishments. In this system, the households deliver the wastes separately for organic and inorganic parts of the wastes (two bins system) to the vehicle at the time of collection. Collector sounds horn or rings bell and waits at door step for residents to bring wastes to the collection vehicle.

Following primary collection vehicles are proposed:

- 4- Containers carrier Pushcart
- 8 -Containers carrier Tricycle/Tricycle with compartments for dry and wet waste.
- Auto Tipper/Smaller Tipper- 1 MT Capacity

All residents shall be encouraged through information and education campaign to;

- keep the food waste, kitchen waste and other bio-degradable waste as and when generated, in the domestic waste container as prescribed and made available by the ULBs for the purpose and
- keep recyclable and non-biodegradable waste in the waste container prescribed and supplied by the ULBs for the said purpose.

Households bins of Green and Blue colour of capacity 10-12 ltr for a family of five members is supplied by the ULBs free of cost at the first instance only. The life cycle of bins is considered as 3 years.



The door to door collection activity has been carried out in 2623 wards and source segregation in 437 wards out of 3377 wards. The list of ULBs with door to door collection status is given in the below table :

Details of ULBs with 100 % Door to Door collection			
Sl. No.	Name of the ULBs	Total No. of wards	No. of wards with 100 % Door to Door collection
<b>Municipal Corporation</b>			
1	Ara Municipal Corporation	45	45
2	Begusarai Municipal Corporation	45	15
3	Bhagalpur Municipal Corporation	51	51
4	Biharsharif Municipal Corporation	46	46
5	Chhapara Municipal Corporation	45	44
6	Darbhanga Municipal Corporation	48	48
7	Gaya Municipal Corporation	53	53

8	Katihar Municipal Corporation	45	9
9	Munger Municipal Corporation	45	45
10	Muzaffarpur Municipal Corporation	49	49
11	Patna Municipal Corporation	75	60
12	Purnea Municipal Corporation	46	3
	<b>Total (A)</b>	<b>593</b>	<b>468</b>

**Municipal Council**

13	Araria Municipal Council	29	20
14	Arwal Municipal Council	25	18
15	Aurangabad Municipal Council	33	33
16	Bagaha Municipal Council	35	20
17	Bakhtiyarpur Municipal Council	27	20
63	Banka Municipal Council	22	22
18	Barh Municipal Council	27	27
19	Barbigha Municipal Council	26	23
20	Benipur Municipal Council	29	29
21	Bettiah Municipal Council	39	23
22	Bhabhua Municipal Council	25	2
23	Bihat Municipal Council	30	30
24	Buxar Municipal Council	34	34
25	D.Dalmiya Nagar Municipal Council	39	39
26	Danapur Municipal Council	40	0
27	Dumraon Municipal Council	26	26
28	Farbisganj Municipal Council	25	5
29	Fatuha Municipal Council	27	23
30	Gopalganj Municipal Council	28	13
31	Hazipur Municipal Council	39	20
32	Hilsa Municipal Council	26	17
33	Jamalpur Municipal Council	36	25
34	Jamui Municipal Council	30	30
35	Jehanabad Municipal Council	33	33
36	Khagaria Municipal Council	26	26
37	Khagaul Municipal Council	27	13
38	Kishanganj Municipal Council	34	13
39	Lakhisarai Municipal Council	33	31
40	Madhepura Municipal Council	26	15
41	Madhubani Municipal Council	30	30
42	Masaurhi Municipal Council	26	26
43	Mokama Municipal Council	28	28
44	Motihari Municipal Council	38	38
45	Narkatiyaganj Municipal Council	25	8
46	Nawada Municipal Council	33	0

47	Phulwarisariff Municipal Council	28	28
48	Raxaul Municipal Council	25	25
49	Samastipur Municipal Council	29	3
50	Sasaram Municipal Council	40	15
51	Shaharsa Municipal Council	40	20
52	Seikhpura Municipal Council	27	27
53	Sitamarhi Municipal Council	28	28
54	Siwan Municipal Council	38	38
55	Sultanganj Municipal Council	25	17
56	Supaul Municipal Council	28	28
	<b>Total (B)</b>	<b>1364</b>	<b>989</b>
<b>Nagar Panchayat</b>			
57	Amarpur Nagar Panchayat	14	14
58	Areraj Nagar Panchayat	14	14
59	Bahadurganj Nagar Panchayat	18	18
60	Bairgania Nagar Panchayat	21	21
61	Bakhri Nagar Panchayat	20	20
62	Ballia Nagar Panchayat	24	24
64	Banmankhi Nagar Panchayat	17	8
65	Barahiya Nagar Panchayat	24	15
66	Barauli Nagar Panchayat	21	14
67	Barsoi Nagar Panchayat	17	
68	Belsand Nagar Panchayat	13	8
69	Bihyan Nagar Panchayat	14	14
70	Bikramganj Nagar Panchayat	23	23
71	Birpur Nagar Panchayat	13	13
72	Bodhgaya Nagar Panchayat	19	19
73	Chakiya Nagar Panchayat	12	12
74	Chapatiya Nagar Panchayat	15	15
75	Dalsingh Sarai Nagar Panchayat	14	14
76	Daudnagar Nagar Panchayat	23	23
77	Dhaka Nagar Panchayat	20	12
78	Dighwara Nagar Panchayat	18	18
79	Dumra Nagar Panchayat	11	11
80	Ekmabazar Nagar Panchayat	19	19
81	Ghoghardiha Nagar Panchayat	11	4
82	Gogri jamalpur Nagar Panchayat	20	20
83	Haweli Kharagpur Nagar Panchayat	18	18
84	Hisua Nagar Panchayat	17	17
85	Sursand Nagar Panchayat	-	-
86	Harnaut Nagar Panchayat	19	
87	Islampur Nagar Panchayat	19	19

88	Jagdishpur Nagar Panchayat	18	18
89	Jainagar Nagar Panchayat	14	14
90	Janakpur Road Nagar Panchayat	11	7
91	Jhajha Nagar Panchayat	22	22
92	Jhanjharpur Nagar Panchayat	16	16
93	Jogbani Nagar Panchayat	19	19
94	Kahalgaon Nagar Panchayat	17	17
95	Kanti Nagar Panchayat	14	14
96	Kasba Nagar Panchayat	17	0
97	Kataiya Nagar Panchayat	13	13
98	Kesaria Nagar Panchayat	11	11
99	Khushrupur Nagar Panchayat	10	0
100	Koath Nagar Panchayat	12	12
101	Kochas Nagar Panchayat	16	8
102	Koilwar Nagar Panchayat	14	14
103	Lalganj Nagar Panchayat	19	19
104	Maharajganj Nagar Panchayat	14	14
105	Mahnar Nagar Panchayat	23	15
106	Mahua Nagar Panchayat	16	16
107	Mairwan Nagar Panchayat	13	13
108	Makhdumpur Nagar Panchayat	19	19
109	Maner Nagar Panchayat	19	18
110	Manihari Nagar Panchayat	15	15
111	Mehsi Nagar Panchayat	15	15
112	Mirganj Nagar Panchayat	16	16
113	Mohaniya Nagar Panchayat	16	16
114	Motipur Nagar Panchayat	15	5
115	Mraura Nagar Panchayat	16	4
116	Murliganj Nagar Panchayat	15	15
117	Nasriganj Nagar Panchayat	14	14
118	Naubatpur Nagar Panchayat	15	15
119	Naugachhiya Nagar Panchayat	23	6
120	Navinagar Nagar Panchayat	14	5
121	Nirmali Nagar Panchayat	12	12
122	Nokha Nagar Panchayat	15	15
123	Pakaridayal Nagar Panchayat	15	10
124	Parsabazar Nagar Panchayat	22	11
125	Piro Nagar Panchayat	17	0
126	Rafiganj Nagar Panchayat	16	16
127	Rajgir Nagar Panchayat	19	19
128	Ramnagar Nagar Panchayat	23	16
129	Rivilganj Nagar Panchayat	21	21

130	Rosera Nagar Panchayat	18	18
131	Sahebganj Nagar Panchayat	13	13
132	Shahpur Nagar Panchayat	11	11
133	Sheohar Nagar Panchayat	15	4
134	Sherghati Nagar Panchayat	20	13
135	Silao Nagar Panchayat	14	7
136	S. Bakhtiyarpur Nagar Panchayat	15	15
137	Sonpur Nagar Panchayat	21	21
138	Sugauli Nagar Panchayat	20	17
139	Teghra Nagar Panchayat	25	25
140	Tekari Nagar Panchayat	13	4
141	Thakurganj Nagar Panchayat	12	12
142	Vikram Nagar Panchayat	14	14
143	Warssliganj Nagar Panchayat	20	20
<b>Total (C )</b>		<b>1420</b>	<b>1166</b>
<b>Grand Total (A+B+C )</b>		<b>3377</b>	<b>2623</b>

#### **4.4 Secondary Collection and Transportation:**

The main objective of the secondary collection system is to store the waste temporarily and transport it as early as possible. Waste is temporarily stored in the secondary collection points prior to its transportation to disposal site. At present there is no provision for waste storage and there are open collection points in the city, ULBs vehicles directly attend to these points and transport the waste to dump location. At present in most of the ULBs open dumping of Municipal Solid Waste has been practiced.

##### **4.4.1 Community Collection System**

Various sizes of community containers (From 1.1 cum to 4.5 cum) are available with the ULBs for collection of Municipal Solid Waste. The waste collected from the residential and commercial areas temporarily stored in these community containers and transported to centralized waste processing site in case of availability of processing facility or directly sent to the dumping site for open dumping. In few ULBs decentralized waste processing has been practiced where the waste collected from door to door and residential areas has been directly bring to the decentralized site for further processing of biodegradable waste for composting and the dry waste has been directly sold to the Kabadiwallas through Rag Pickers. The smaller sized bins (1.1 cum) are compatible with Refuse Compactors. In other cases, it requires manual handling to tip the wastes. The Community Container can be used in various ways:

- As Primary Storage point for transfer: wastes collected from houses and shops by small collection vehicles.
- From markets:

In few Municipal Corporations with having population more than one lakh, to reduce the number of picking / trips, uses of 4.5 Cum Containers are being practiced.

#### **4.4.2 Available Vehicles for Secondary Transportation**

Vehicles available with ULBs for secondary transportation are: compactor, dumper placer, tipper, truck and tractor. Compactor and dumper placers are available with Municipal Corporation and few of the Municipal Councils. The tractors are mainly available with the Nagar Panchayats for transportation of municipal solid waste.

### **4.5 Processing of Municipal Solid Waste**

In the state centralized and decentralized waste processing facility has been adopted taking into consideration the availability of land and waste generation. After receiving of segregated waste from households and commercial establishments the waste has been segregated again if required. The wet waste processed further for composting and the dry recyclable waste sold to the kabadiwallas directly or through the rag pickers. The wet waste has been processed through pit composting method. Model estimation for construction of pits along with shed has been developed by the Urban Development & Housing Department and circulated to all the Municipal Council and Nagar Panchayats for construction of the same.

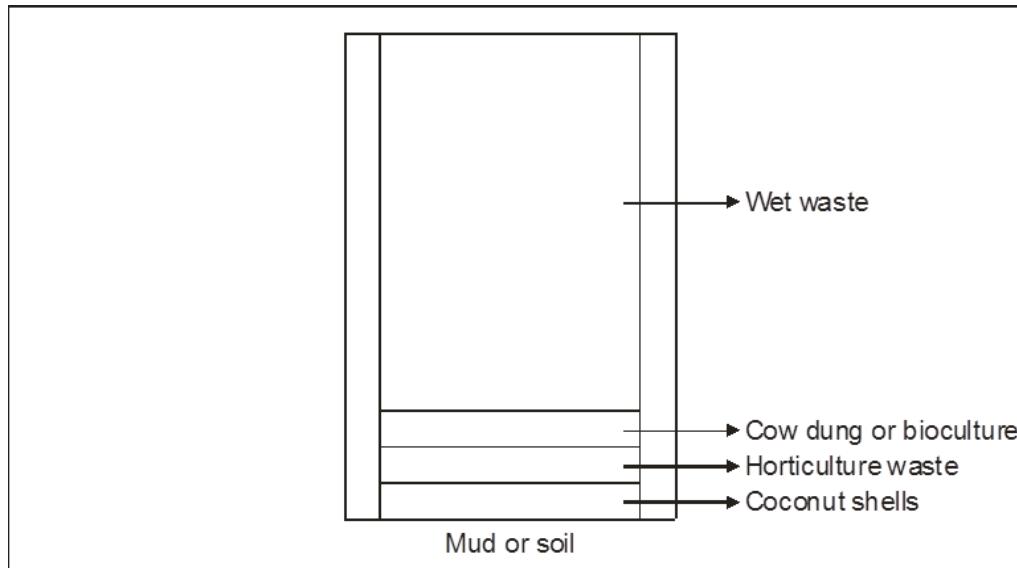
#### **4.5.1 Pit Composting Process**

##### **a) Construction of composting pits**

The pit composting model should have three equal-sized cubical pits of size 4 feet × 4 feet × 3 feet. The sides of the pits are made using basic construction material such as bricks and cement. They are designed leaving gaps in between so that the decomposing waste receives sufficient oxygen from all sides—this is very important in order to speed up the rate of decomposition. Preferably, pits should not have a concrete or brick-lined base, to allow microbes and worms to enter the wet waste directly and facilitate faster composting. This will also help in easy absorption of leachate, making the soil adjacent to the pit healthy and fertile. Pits are provided with wide opening in the front for the convenience of workers hauling the compost out.

##### **b) Process of wet waste composting**

Segregated wet waste can be composted aerobically. To set up the composting pits, a layer of discarded green coconut shells is arranged upside down at the bottom of the pit, to let the leachate flow out of the heap efficiently and to improve the ventilation of the heap. Over this, a layer of husk or horticultural waste such as dry leaves or grass is placed and on top of that a layer of cow dung is spread. This is done in order to facilitate the growth of micro-organisms which in turn increases the rate of decomposition of waste. Above this, wet waste is placed. After dumping the waste in the cubical pits, it is mixed manually after every two–five days using a shovel or a diamond fork.



**Figure: Composting pit layers**

Wet waste is taken to the composting setup, and the pits are filled with it one by one. Once a pit is full, it is left undisturbed for decomposition. Depending on the weather, it takes around 45–60 days for the compost to get ready. Once ready, the mixture is sieved to obtain homogeneous and fine compost. The decomposition process can be enhanced by utilizing cow dung or cow urine. Cow dung helps to maintain the nitrogen balance of the mixture. Similarly, dry leaves can be mixed in to maintain the carbon level. Maintaining both carbon and nitrogen level is important for achieving optimum decomposition and obtaining good quality compost. To speed up the decomposition process, bioculture can be added to the mixture. This product also helps in reducing the smell from the decomposing waste.

The detail list of ULBs with having operational solid waste processing facility and under construction plants is given below:

Operational Plants		
Sl. No	Name of the ULBs	Technology Adopted
1	Muzaffarpur Municipal Corporation	Waste to Compost (Decentralised Composting)
2	Munger Municipal Corporation	Waste to Compost (Decentralised Composting)
3	Bodhgaya Nagar Panchayat	Waste to Compost (Decentralised Composting)
Under Construction Plants		
4	Ara Municipal Corporation	Waste to Compost (Decentralised Composting)
5	Gaya Municipal Corporation	Waste to Compost (Decentralised Composting)
6	Barh Municipal Council	Waste to Compost (Decentralised Composting)
7	Motihari Municipal Council	Waste to Compost & Pyrolysis (dry waste)
8	Patna Municipal Corporation	Waste to Energy



Composting Plant at Muzaffarpur



Composting plant at Bodhgaya



Composting Plant at Munger



Composting & Pyrolysis Plant at Motihari

## **4.6 Disposal of Municipal Solid Waste**

At present there is no such scientific disposal practice followed by ULBs. Most of the ULBs followed open dumping method in low lying areas or in vacant land for dumping of municipal solid waste.

## **4.7 Deficiencies in the existing SWM system**

- Most of the ULBs have not defined the working norms for the staff. Route chart for vehicle movement is also not available. There is no system of sending the attendance to the senior officers on daily basis, thus ensuring the presence and taking the work from the sanitation workers is left entirely on to the supervisors.
- Solid waste equipment's (hand trolleys, push carts) found lying on the road side giving unpleasant smell and creating unhealthy condition.
- Irregularity by the waste collectors in door to door collection of waste and also regular changing of sanitation staff which create problem for a new staff to know the define route for collection of waste.
- Number of major collection points in wards usually fixed by the supervisors in an unplanned manner according to practice and convenience.
- Most of the ULBs have no tracking system for garbage transport vehicles.
- There is no action plan for solid waste management activity.
- Present method of disposal of solid waste is crude and unscientific.
- Disposal of MSW is not practiced in sanitary land-fill / secured land-fill site.

## **4.8 Issues and Constraints faced by ULBs**

- Insufficient dedicated engineering staff to monitor the entire solid waste management activity.
- Motivational level of field staff is very low. There is no such capacity building activity for sanitary workers.
- Availability of land is a major constraint. In most of the ULBs land is not available for development of solid waste processing and sanitary landfill facility.
- State Bye-Laws on Solid Waste Management as mandate under SWM Rules, 2016 is not formulated.
- Lack of clear policy on plastic waste management. ULBs have not formulated the plastic waste Bye-laws as mandate under PWM Rule, 2016.

## **Part-2: State Policy & Approach for Solid Waste Management**

### **5. Duties of Waste Generators**

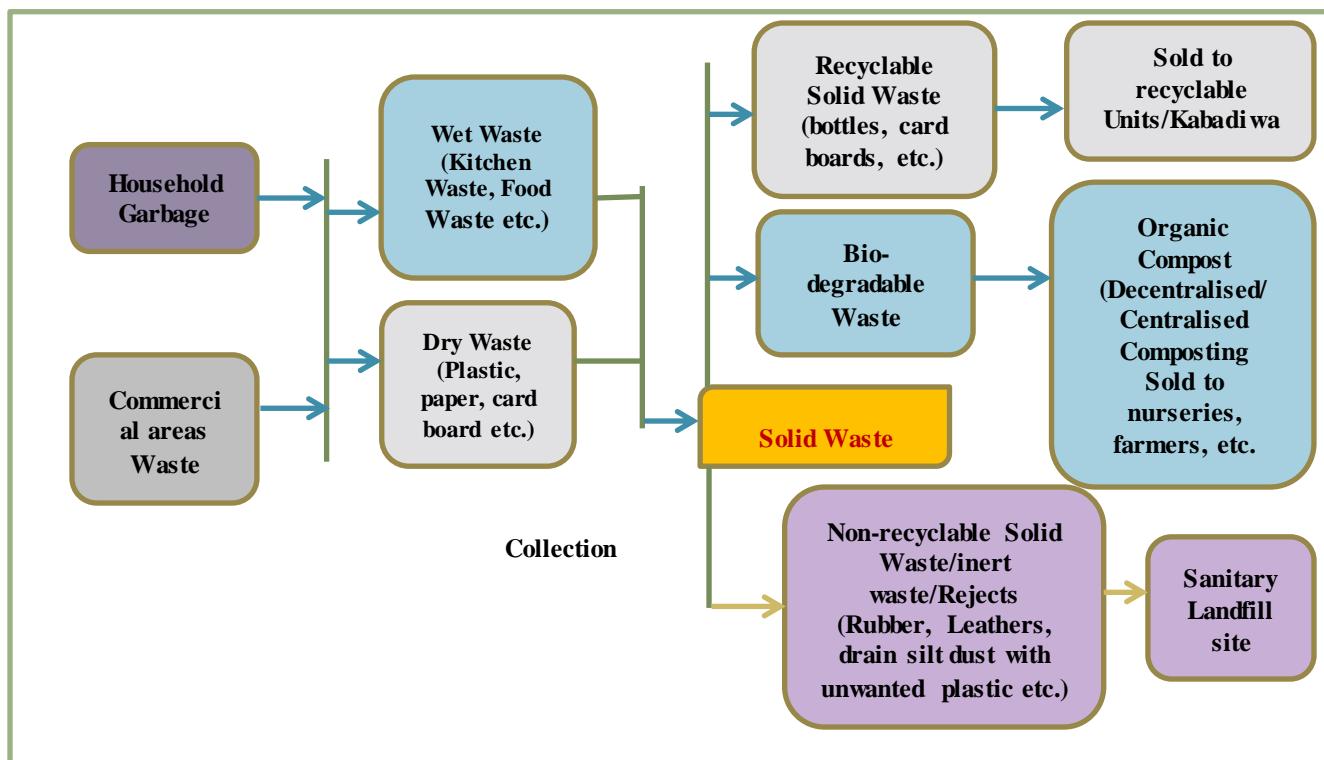
- Every waste generator shall,
  - (a) Segregate and store the waste generated by them in three separate streams namely bio-degradable, non bio-degradable and domestic hazardous wastes in suitable bins and handover segregated wastes to authorized waste pickers or waste collectors as per the direction or notification by the local authorities from time to time;
  - (b) Wrap securely the used sanitary waste like diapers, sanitary pads etc., in the pouches provided by the manufacturers or brand owners of these products or in a suitable wrapping material as instructed by the local authorities and shall place the same in the bin meant for dry waste or non- bio-degradable waste;
  - (c) Store separately construction and demolition waste, as and when generated, in his own premises and shall dispose off as per the Construction and Demolition Waste Management Rules, 2016; and
  - d) Store horticulture waste and garden waste generated from his premises separately in his own premises and dispose of as per the directions of the local body from time to time.
- No waste generator shall throw, burn or bury the solid waste generated by him, on streets, open public spaces outside his premises or in the drain or water bodies.
- All waste generators shall pay such user fee for solid waste management, as specified in the bye-laws of the local bodies.
- No person shall organize an event or gathering of more than one hundred persons at any unlicensed place without intimating the local body, at least three working days in advance and such person or the organizer of such event shall ensure segregation of waste at source and handing over of segregated waste to waste collector or agency as specified by the local body.
- Every street vendor shall keep suitable containers for storage of waste generated during the course of his activity such as food waste, disposable plates, cups, cans, wrappers, coconut shells, leftover food, vegetables, fruits, etc., and shall deposit such waste at waste storage depot or container or vehicle as notified by the local body.
- All resident welfare and market associations shall, within one year from the date of notification of these rules and in partnership with the local body ensure segregation of waste at source by the generators as prescribed in these rules, facilitate collection of segregated waste in separate streams, handover recyclable material to either the authorized waste pickers or the authorized recyclers. The bio-degradable waste shall be processed, treated and disposed off through composting or bio-methanation within the premises as far as possible. The residual waste shall be given to the waste collectors or agency as directed by the local body.

- All gated communities and institutions with more than 5,000 sqm area shall, within one year from the date of notification of these rules and in partnership with the local body, ensure segregation of waste at source by the generators as prescribed in these rules, facilitate collection of segregated waste in separate streams, handover recyclable material to either the authorised waste pickers or the authorized recyclers. The bio-degradable waste shall be processed, treated and disposed off through composting or bio-methanation within the premises as far as possible. The residual waste shall be given to the waste collectors or agency as directed by the local body.
- All hotels and restaurants shall, within one year from the date of notification of these rules and in partnership with the local body ensure segregation of waste at source as prescribed in these rules, facilitate collection of segregated waste in separate streams, handover recyclable material to either the authorised waste pickers or the authorised recyclers. The bio-degradable waste shall be processed, treated and disposed off through composting or bio-methanation within the premises as far as possible. The residual waste shall be given to the waste collectors or agency as directed by the local body.

## 6. State Approaches for Solid Waste Management

### 6.1 SWM Model (State Approach)

The components of Solid Waste Management System and the flow chart for understanding the process of Solid Waste Management System is illustrated below:



The state has planned to start decentralized composting in all the Municipal Corporations and Nagar Panchayats. The major advantages of decentralized composting are:

- Reduced dependence on land for disposal of waste. The space required for the landfills is reduced by 90 per cent.
- Reduced cost of collection and transportation. Up to 40–50 per cent of municipal funds allocated for solid waste management are spent on salary of staff and contractual workers, 20–40 per cent on collection and transportation, and only 5 per cent on disposal. By adopting this model, the cost of collection and transportation will be reduced by at least 50 per cent, as waste will be treated much closer to the source.
- Additional resources will be generated from composting and recycling, as more than 90 per cent of waste can be recycled and reused. This means an additional income for a large set of people (such as waste collectors, informal workers and recyclers) in the chain
- The environmental costs incurred due to pollution of land, water and air from unsanitary landfills will also reduce drastically.

The strategy for handling municipal solid waste can be broadly described under the following heads:

- Door to door collection and source segregation
- Collection and transportation of solid waste
- Processing of solid waste

## 6.2 Door to door Collection and Source Segregation

To ensure 100% door to door collection in all the ULBs following things need to be done:

- a) **Base Line Study:** A baseline study involves inventorization and gathering relevant background data of the city. This information helps in the preparation of an effective solid waste management plan.

**The following information is required:**

- What is the population of the city?
- How is the city's administration organized—ward-, circle- or sector-wise?
- How many households, commercial establishments, schools, institutions (government and private), industrial areas etc. does the city have?
- How much municipal solid waste (MSW) does the city generate—overall and per capita?
- What is the composition of the generated MSW? What are the percentages of wet, recyclable, domestic hazardous and inert wastes?

- What are the existing processing and disposal mechanisms for MSW?
- Does the city have bye-laws on solid waste management? If yes, what is the implementation status of the bye-laws?
- What is the existing infrastructure and manpower capacity for solid waste management?

b) **Ward mapping:** A city is usually divided into zones or circles, which are further divided into wards. For the execution of a decentralized waste management plan, mapping of wards is imperative. Mapping of a single ward is done based on the following parameters

- Approximate total area
- Number of households, and commercial and industrial entities
- Number of waste collectors
- Number of collection vehicles—tipper, pushcarts and tricycles
- Routes of each collection vehicle moving within the ward with details of number of households covered per tipper, pushcart or tricycle
- Number of scrap vendors
- Availability of space for decentralized treatment such as composting or bio-methanization
- Number of litter spots in each ward

In the state currently door to door collection started in 2623 wards out of 3377 wards with an achievement of 77%. Registration of rag pickers will also be done by ULBs and effort shall be made to engage these rag pickers in the main stream of solid waste management. All ULBs have been instructed to conduct meeting with bulk waste generators and ensure source segregation and processing of wet waste inside their own premises.

In the state currently source segregation started in 467 wards out of 3377 wards with an achievement of 14%. To ensure source segregation ULBs have been directed to supply two colour (green & blue) dust bins to each household. ULBs are also creating mass awareness and propagation through engagement of volunteers, NGOs and school children's to start source segregation.

### **6.3 Collection and Transportation**

The transportation of waste as collected through door to door or through the commercial areas shall be done in segregated manner only. Only the covered vehicles shall be used for transportation of garbage so as to prevent spillage on the roads while transportation. Of the total population of a city 60% of the household will be covered by tricycle and 40% of the household will be covered by auto tippers. In

Nagar Panchayats and small towns having population below one lakh decentralized processing of waste will be preferred and there is no requirement of secondary collection vehicles.

## **6.4 Processing of Solid Waste**

The status of processing of municipal solid waste in the state is as follows:

- Operational plants: 3 nos.
- Under construction plant: 5 nos.

The wet waste has been processed through pit composting method and the dry recyclable waste sold out to the kabadiwallas either directly or through the rag pickers. Bulk waste generators are also insisted to start source segregation and composting in their own premises.

## **7. Recommended Technology for Processing of MSW**

Composting Process has least environmental problems amongst waste treatment technologies. Composting process has least environmental problems amongst the waste management technologies. Compost is considered as a slow release fertilizer where nutrients are released slowly and over the years. The chemical fertilizers, on the other hand are fast acting and therefore give better crop yields. However, soils undergo stress and degradation due to prolonged fertilizer use. Compost is a good soil amendment agent and helps to enrich the soil quality by increasing the oxygenation rates and organic content. It also improves the texture of the soil. In non-harvesting agricultural practices like plantations, the compost is most useful and the benefits can be maximized by dual application of chemical fertilizer and compost.

Furthermore, the rejects of the compost plant will have to be disposed in scientific manner and therefore, sanitary landfill will form a necessary and integral part of the holistic solid waste management solution.

## 7.1 Composting Options

### 7.1.1.1 Windrow Composting



Windrow Composting Process

#### Windrow Composting:

Windrow composting is the production of compost by piling biodegradable waste, in long rows (windrows). This method is suited to producing large volumes of compost. These rows are regularly turned over to improve porosity/voids and oxygen content, mix in or remove moisture, and redistribute cooler and hotter portions of the pile. Windrow composting is a commonly used composting method.

### 7.1.1.2 Vermi-Composting



Worms active during Vermi-Composting

#### Vermi-Composting (Worm Composting):

Vermi compost (or vermin-compost) is the product of the composting process using various species of worms, usually red wiggler, white worms, and other earthworms, which feed in mixture of decomposing vegetable or food waste, and release droppings called vermi cast (also called worm castings, worm humus or worm manure) is the end-product of the breakdown of organic matter by an earthworm.

### 7.1.1.3 Aerated Static Pile Composting



Aerated Static Pile Composting Method

#### Aerated Static Pile Composting:

Aerated Static Pile (ASP) composting, refers to the system used to biodegrade organic material without physical manipulation (turning) during composting. The blended waste is usually placed on perforated piping, providing air circulation for controlled aeration . It may be in windrows, open or covered, or in closed containers. With regard to complexity and cost, aerated systems are most commonly used by larger, professionally managed composting facilities, although the technique may range from very small, simple systems to very large, capital intensive, industrial installations.

Aerated static piles offer process control for rapid biodegradation, and works well for processing saturated wet waste and large volumes. ASP facilities can be under roof or outdoor windrow composting operations, or totally enclosed in-vessel composting, sometimes referred to tunnel composting

### 7.1.1.4 In Vessel Composting



In Vessel Composting Methods

#### In Vessel Composting:

In-vessel composting generally is a method that confines the composting materials within a building, container, or vessel.

In-vessel composting systems can consist of metal or plastic tanks or concrete bunkers in which air flow and temperature can be controlled, using the principles of a "bioreactor". Generally the air circulation is metered in via buried tubes that allow fresh air to be injected under pressure, with the exhaust being extracted through a bio-filter, with temperature and moisture conditions monitored using probes in the mass to allow maintenance of optimum aerobic decomposition conditions.

This technique is generally used for municipal scale organic waste processing, including final treatment of sewage bio-solids. It can also refer to aerated static pile composting with the addition of removable covers that enclose the piles.

### **7.1.1.5 Mechanized Organic Waste Composter**



Mechanized Organic Waste Composter

#### **Mechanized Organic Waste Composter:**

Mechanized Organic Waste Composter are designed to make composting easy and convenient. Mechanized OWC's are fully automatic and have very compact and aesthetic design.

OWCs are equipped with intuitive technology which maintains the right temperature, air flow and moisture. A special bacteria which is heat, salt and acid resistant is used. Once the bacteria are introduced in machine they reproduce at a rapid pace under ideal internal conditions.

### **7.1.1.6 Material Recovery Facility**

- A typical MRF is sited within a warehouse-type building with concrete flooring and enclosed by a perimeter fence for security.
- It should have the following components:
  - (i) receiving or tipping area,
  - (ii) sorting/processing area,
  - (iii) storage area for recyclables,
  - (iv) residuals storage area,
  - (v) equipment area,
  - (vi) space for an office, and
  - (vii) loading area for residuals and processed recyclables.
- It should also be provided with the basic connections for water and electricity and adequate space for the entry and exit of waste trucks.
- Receiving areas should have the capacity to receive at least 2 days' worth of the MRF's processing capacity in anticipation of equipment breakdown and to provide materials for the second-shift operation where required.

- For waste processing facilities receiving more than 25 tonnes per day of waste, semi-mechanized and mechanized pre-sorting is recommended.

Semi-mechanized sorting operations comprise of

- (a) unloading of waste (mechanized)
- (b) loading of waste on conveyor belts (mechanized)
- (c) hand picking of visually identifiable waste off the belt for reuse (manual)
- (d) collecting, stocking and reloading the remaining waste (mechanized)

- If a MRF facility is receiving predominantly mixed waste in large quantities (in excess of 100 tonnes per day), the pre-sorting facility at such a site should be akin to a central sorting facility having semi-mechanized systems capable of sorting the waste into various waste streams. Fully mechanized sorting operations comprise of

- (a) unloading of waste
- (b) size reduction of waste through shredders and crushers
- (c) size separation of waste using screening devices
- (d) density separation (air classification) of waste
- (e) magnetic separation of waste
- (f) compaction of waste through balers/crushers
- (g) reloading of waste

## 7.2 Closure and Rehabilitation of Old Dumps

As per clause (J) Schedule-I of Solid Waste Management Rules, 2016 closure and rehabilitation of old dumps or solid waste dumps which have reached their full capacity or those which will not receive additional waste after setting up of new and properly designed landfills should be closed and rehabilitated by examining the following options:

- (i) Reduction of waste by bio mining and waste processing followed by placement of residues in new landfills or capping as in (ii) below.
- (ii) Capping with solid waste cover or solid waste cover enhanced with geo-membrane to enable collection and flaring / utilisation of greenhouse gases.
- (iii) Capping as in (ii) above with additional measures (in alluvial and other coarse grained soils) such as cut-off walls and extraction wells for pumping and treating contaminated ground water.
- (iv) Any other method suitable for reducing environmental impact to acceptable level.

The urban local bodies shall ensure bio-mining or landfill capping of legacy waste as per requirement and local conditions. The bio-mining and landfill capping shall be ensured by following means:

### **7.2.1 Bio-Mining/Bio-remediation of old dumps**

#### **Introduction**

Open dumping of Municipal Solid Waste (MSW) quite often in scattered heaps has not only occupied larger space, but also become a breeding ground for pathogens, flies, create odours and generation of leachate which leads to surface and ground water contamination.

As per SWM Rules 2016 formulated by MOEF & CC Govt. of India, the existing garbage dumping sites were required to be upgraded. The process involved for treatment and processing of old garbage and predation of dumpsite requires bioremediation. Bioremediation treatment is combination of biological acceleration and mechanical stirring up of MSW heaps aimed at volume reduction and recovery of stabilized bio- earth. Bioremediation with respect to MSW landfills can be defined as a “clean-up” technology employing biological options, generally bacteria to stabilize landfilled organic wastes through aerobic decomposition.

Bioremediation is the use of biological methods to degrade, disintegrate, transform and/or eliminate contaminants from soil and water. Bioremediation is a waste management technique that uses naturally occurring organisms to break down hazardous substances into less toxic or non-toxic substances. Metabolic processes of these organisms are able to use target contaminants as an energy source, making the contaminants benign or less toxic in many instances.

The factors which are involved in control and optimization of bioremediation process include:

- The existence of a microbial population capable of degrading the pollutants;
- The availability of contaminants to the microbial population;
- The environment factors (type of soil, temperature, and pH, the presence of oxygen or other electron acceptors, and nutrients).

#### **Major Issue to be addressed**

- Efficient utilization of space
- Control of dusty particulate matters
- Acceleration of biological degradation mechanism
- Sanitization treatment against flies, mosquitos and pathogens

- Odor control & neutralization
- Tapping and utilization of leachate for bio- oxidative reactions by windrow fermentation method.
- Compaction of waste and daily soil covers using recovered bio-earth
- Improvement of aesthetic look at & around the site.

#### **Processing and treatment of accumulated waste**

- Bioremediation treatment shall be done by dividing the site into suitable blocks of 1000 to 2000 sqm
- The work of bioremediation shall be carried out layer by layer. Each layer shall be of 10 to 20cm thickness.
- Usually the top layer is dusty and has several materials in the active biological state. This is to be stabilized through herbal / biological sanitizers and water (for dust control). Resident period of 7 to 10 days is necessary after spray treatment.
- Ranking of garbage layer through long spike barrow in cross direction shall be done regularly to pull out rags, plastic, rubber, textiles etc. The settled heavier biomass shall be formed into open windrows of 4 to 5 meter wide, 2 to 2.5 meter height and 20 meter long as per site conditions. Before formation of windrows, suitable additives like bicultural, mineral mixture, and raw compost or cattle dung shall be added as desirable microbial substrate for speedy fermentation of waste and achieving of hemophilic temperature range of 55 to 65 °C.
- The waste in windrows shall be allowed for 21 to 28 days with weekly turning to ensure destruction of pathogenic microorganism and promotion of agriculturally useful bacteria, fungi & actinomycetes.
- This treatment will result in bio- conversion of cellulosic, hemicellulose, proteins and fatty materials into earth like material with volume reduction of 30 to 45 % caused by loss of moisture and bio-oxidative reductions.
- Coarsely filtered material through rotary screens shall be recovered and use for landscaping/gardening. Inert material which shall be approximately 25% of the total garbage can also be sent for landfilling. Complete bioremediation of old waste to reclaim land followed by development of proposed waste to energy plant or can be used for any other purpose as found suitable by the municipality.

#### **Advantages of Bioremediation**

- It is a safe, cost-effective method for remediating the waste. After being placed in a ventilated bio-pile, waste is treated with microorganisms that naturally break the toxins down into less harmful compounds.

- Equipment requirements are minimal compared to other remediation technologies.
- Can be carried out on site, often without causing a major disruption of normal activities.
- Bioremediation is perceived positively by the public because it is a natural process.
- Complete breakdown of pollutants into non-toxic compounds is possible because the process does not involve transferring of contaminants to another environmental medium.

The physical characterization of the waste lying at the dumping site should be done to identify the suitable technologies for undertaking clearing of site in a scientific way. After characterization of waste in the existing dump site the following methods may be adopted for safe disposal of waste:

- i) The biodegradable waste should be remediated with the help of inoculant/microbial culture by forming windrows or any other composting technology.
- ii) The recyclable waste can be directly handed over to the kabadiwallas.
- iii) The combustible waste can be recovered and utilized in the waste to energy plant or can also be sent to the cement kiln for burning.
- iv) The rest wastes which are inert in nature can be stored and disposed off through sanitary landfilling.

### **7.2.2 Landfill Capping**

#### **Capping**

- Capping involves placing a cover over contaminated material such as landfill waste or contaminated soil. Such covers are called “caps.” Caps do not destroy or remove contaminants. Instead, they isolate them and keep them in place to avoid the spread of contamination. Caps prevent people and wildlife from coming in contact with contaminants.
- Capping is a process used to cover buried waste materials to prevent their contact with the land surface and groundwater.

#### **Capping Design**

- There are a variety of cap design and capping materials available. Most cap designs are multi layered to conform the design standards. However, single-layered designs are also used for special purposes.
- The selection of capping materials and a cap design is influenced by specific factors such as local availability and costs of cover materials, desired functions of cover materials, and the nature of the waste being covered, local climate and hydrogeology and projected future use of the site in question.
- The design of landfill caps is site specific and depends on the intended functions of the system. Landfill Caps can range from a one-layer system of vegetated soil to a complex multi-layer system

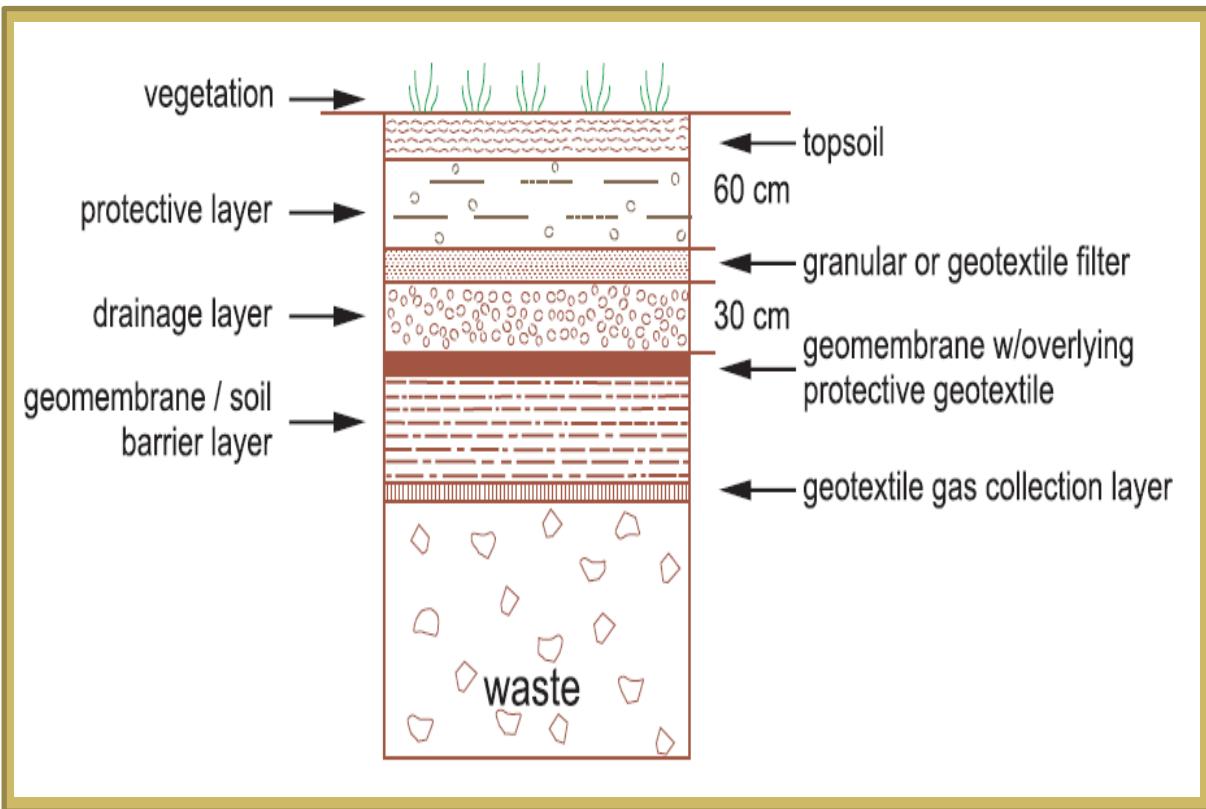
of soils and geosynthetics. In general, less complex systems are required in dry climates and more complex systems are required in wet climates or areas with high water tables.

### **Material used in designing of landfill cap**

- The materials used in the construction of landfill caps include low-permeability and high permeability soils and low-permeability geosynthetic products. The low-permeability materials divert water and prevent its passage into the waste. The high permeability materials carry water away that percolates into the cap. Other materials may be used to increase slope stability.

### **Different layers involved in capping design**

- The most critical components of a landfill cap are the barrier layer and the drainage layer. The barrier layer can be low-permeability soil (clay) and/or geo synthetic clay liners (GCLs). A flexible geo membrane liner is placed on top of the barrier layer.
- Geo-membranes are usually supplied in large rolls and are available in several thicknesses.
- The list of polymers commonly used includes polyvinyl chloride (PVC), polyethylenes of various densities, reinforced chlorosulfonated polyethylene (CSPE-R), polypropylene, ethylene interpolymer alloy (EIA), and many new materials.
- Soils used as barrier materials generally are clays that are compacted. A composite barrier uses both soil and a geo-membrane, taking advantage of the properties of each. The geo-membrane is essentially impermeable, but, if it develops a leak, the soil component prevents significant leakage into the underlying waste.
- Some landfill covers, such as those for municipal landfills, may also include collection and venting systems for methane and other gases that could build up underground.



### Methodology: How it works

Sometimes digging up and removing contaminated material can be difficult or expensive. Instead, a cap will be placed over it to keep it in place. A cap works in three main ways:

- It stops rainwater from seeping through the hazardous material and carrying the pollution into the groundwater, lakes or rivers.
- It stops wind from blowing away the hazardous material.
- It keeps people and animals from coming into contact with the contaminated material and tracking it off the site.

### Landfill gas recovery

- Landfill gas (LFG) is the natural by-product of the decomposition of solid waste in landfills and is composed primarily of carbon dioxide and methane. Instead of allowing LFG to escape into the air, it can be captured, converted, and used as an energy source. Using LFG helps to reduce odors and other hazards associated with LFG emissions, and it helps in protecting the environment and builds a sustainable future. The LFG recovery can be accomplished only when the dump site is capped well and a provision is created to tap the gas.

### **Monitoring of capping sites**

Capping is necessary whenever contaminated materials are to be buried or left in place at a site. In general, capping is performed when extensive subsurface contamination at a site precludes excavation and removal of wastes because of potential hazards and/or unrealistic costs.

Capping required long term maintenance and post closure monitoring.

- Any caps will need to be periodically inspected for settlement, ponding of liquids, erosion, and naturally occurring invasion by deep-rooted vegetation.
- In addition the groundwater monitoring wells, often associated with caps; need to be periodically sampled and maintained.
- However, these long-term maintenance requirements usually are considerably more economical than excavation and removal of the wastes.

### **Building a cap**

Building a capping site can take few days up to several months. Construction may take longer when:

- The contaminated area is large.
- The design of the cap is thick or complex.
- Supplies of clean topsoil, clay, or other cap materials are not available locally.
- Caps can be effective for many years when they are properly maintained. They are maintained for as long as the contaminated materials remain in place.

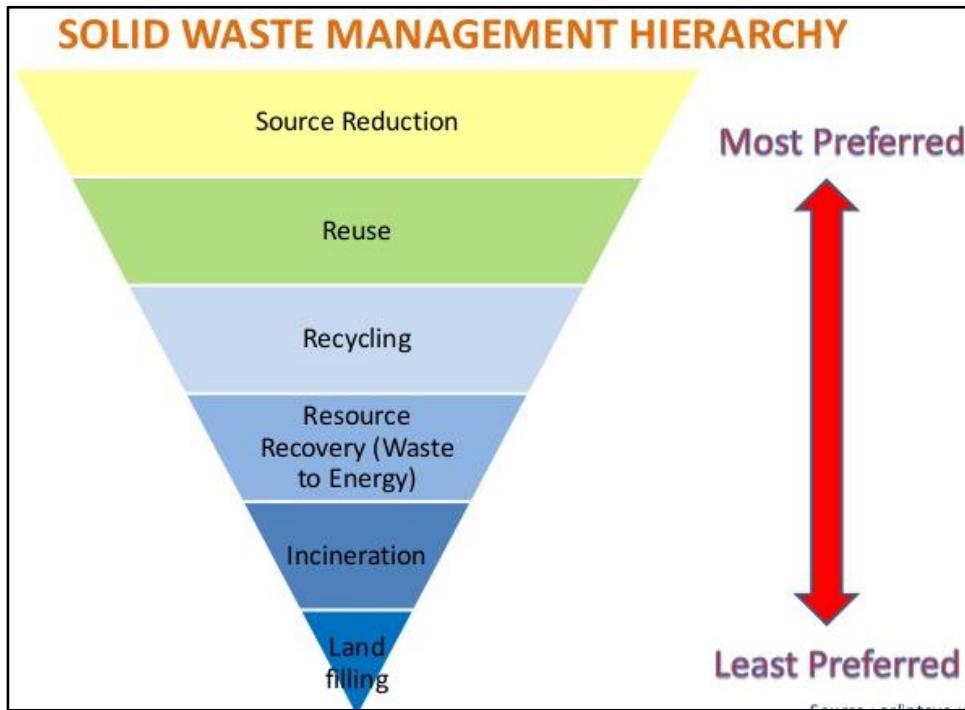
## **7.3 Polythene/Paper and other dry materials**

There is ample plastic waste that is generated due to sale of several items packed in the plastic. This waste when mixed with bio-degradable waste creates problem for composting. Also these waste caused clogging of drains, nallahs etc. So there is a need to collect this waste in segregated form. This plastic waste could be recycled or used in road construction or it can be destroyed in kiln of cement factories established in the state. The ULBs have been directed to form task force to confiscate the polythene bags below 50 micron and which don't have the proper leveling as mandate in the PWM Rules, 2016. The recyclables will be channelized to the kabadiwallas through the waste pickers.

## **7.4 To promote principle of 3 R's**

One of the goals behind IEC is to make principle of 3 R's as a part of life at every stage of waste management. The 3-R's (Reduce, Reuse and Recycle) have produced demonstrative cost effective methods in handling of urban waste and also in conservation of resources.

The solid waste management hierarchy has been globally recognized as per the following illustrative diagram.



Enhancing Reuse & recycling and minimization of generation with source segregation are essential to the success of any Solid waste management program. It hinges on voluntary participation from the members of community (waste generators) and requires a robust awareness programme on continual basis.

MSW has got a direct relationship with pollution of air, water, soil and sanitation, hence it is extremely essential to impart a need based education and awareness to various levels of society.

## 7.5 Inert waste/domestic hazardous waste

The inert waste, domestic hazardous waste and the rejects emanating from the processing plants shall be disposed of in Sanitary landfills. The landfill site shall be selected and developed in accordance with the SWM Rules, 2016.

## 7.6 Fund allocation for the project

The Financing would be met out under the flagship programme of the Government of India, Swachh Bharat Mission (SBM-Urban), wherein the SWM projects would be eligible to avail 35% Viability Gap

Funding (VGF). The state share will be 23.3 % of the project cost and the ULBs will generate 41.7 % through private sector participation, Additional Resources from State Govt./ULBs, User Charges, Innovative revenue streams, Corporate Social responsibility etc.

### **7.6.1 Swachhta Annudan**

To ensure proper sanitation in the municipalities Swachhta Anudan of Rs. 100/household/month is being provided by the UD & HD.

## **7.7 IEC and BCC activity**

It would be important for the SWM projects to make the community aware of such projects so as to make the projects successful.

### **Launch of door-to-door propagation in each ward**

- Local authorities to conduct an inaugural programme to launch door-to-door propagation in each ward with the participation of the elected board (such as mayor or deputy mayor), municipal commissioner, ward councilor etc.
- Local authority to put up hoardings in the city requesting citizens to join the cleanliness initiative being undertaken in the city.
- Volunteers to conduct street plays to generate further awareness and motivation amongst residents to participate in making their city cleaner.
- Use of local media (newspaper, local news channel or city cable) to spread awareness about the programme.

### **Door-to-door propagation through volunteers**

- After the launch of the segregation programme in a ward, volunteers to distribute a pair of bins to each household, along with a pamphlet explaining how to segregate at source.
- Volunteers to fill up household record-keeping forms for each household and obtain ID proof of the householder, tax receipts, etc.
- A sticker to be put on the entrance of every house as a mark that the household has received bins and has committed to source segregation.

## **Training of waste collectors for collection of segregated waste**

- Waste collectors to be trained by local NGO or authority to collect and transport segregated waste in collection vehicles.
- Collectors to be given personal protective equipment (PPE) such as gloves and appropriate tools for ensuring their safety while handling MSW.
- Incentives to be given to collectors for collection of segregated waste by allowing them additional income from selling the segregated dry waste to the nearest scrap dealers/kabadi wallas.

Besides this mass scale awareness can be created through:

- Rallies by school and college children
- Slogan writing and painting competitions in schools and colleges
- Partnership by the media
- Nukkad natak
- Posters/banners/hoardings
- Any activity that MC/EO feels necessary for the project. MC/EO would be provided with required funds for the purpose.

### **7.7.1 Identification and Orientation of Resident's Welfare Committees**

Management of solid waste and its effectiveness is primarily dependent on the attitude, co-operation and participation of the local community. People in all walks of their day-to-day activities generate waste, which however can be only once or maximum twice in a day. The other critical aspect of waste management is the location of waste management facilities such as dumper bins or the disposal site. There have been number of cases where in the community has objected to the location of these facilities in their neighborhood. Popularly known as ‘Not in My Back Yard (NIMBY) Syndrome’, it is the general perception of the public that location of any of these solid waste facilities will create the problem of health and hygiene. In light of the above facts, it becomes imperative that a successful implementation of any solid waste management system will need effective cooperation and coordination of the local community in various aspects of waste collection, transportation and disposal.

The steps involved in implementing and ensuring community participation will comprise of the following activities;

1. Identification of Resident Welfare Associations (RWAs) whose members can contribute expertise or resources and can share the responsibilities of planning and implementing the program.
2. Identification and mobilization of Non-Governmental Organizations or other social welfare groups in the city
3. Identification of areas of SWM where community participation is elicited like schools, institutions, offices, commercial areas, common community areas (parks), etc.
4. Orient the citizens, key personalities, social activists, politicians and local corporators towards environmental education and solid waste management
5. Conduct sanitation campaigns in various parts of the city emphasizing on areas where their co-operation / participation is sought
6. Carry out mass media campaigns on various aspects of solid waste management
7. It is also important to identify areas where the active involvement of community participation is elicited and work out the modalities of the same. Some of the areas that have emerged from experience elsewhere in the country, in which the community can contribute to waste management, are,
  - a) Avoid indiscriminate throwing of waste by residents, shop keepers, etc., on the streets
  - b) Segregate and store the waste at source
  - c) Hand over the waste to the sanitary workers
  - d) Understanding the importance of dumper bins at various localities of the city and their criticality in the efficient management of waste and therefore co-operating while the shifting of dumper bins
  - e) Understanding the importance of Reduce, Reuse, Recycle and Recovering of various recyclables in the waste and their utility.
  - f) Once the above is explained to conveyed to the representatives of RWA's the same will be conveyed to the community directly or through various means of technology, so that a sense of community ‘ownership’ is developed. People involved in planning and implementing a project will feel that the program belongs to them. Community ownership helps to ensure greater participation on collection day as well as community pride about the outcome of the program.

### **7.7.2 Identification and Mobilization of NGO's or Social Welfare Groups (Involvement of NGOs)**

The success of IEC is largely depending on the voluntary participation of the community at large. The local government, the developer and Non-Governmental Organizations (NGO's) etc have a large role to play in this regard. In recent years it can be observed that NGOs have taken up initiatives to work with

the local residents to improve sanitation. They have been playing an active role in organizing surveys and studies in specified disciplines of social and technological sciences. In the field of garbage management, such studies are useful in identifying areas of commercial potentials to attract private entrepreneurs. They can play an important role in segregation of waste, its collection and handling over to local authorities.

Many NGOs are committed to improve SWM practices to protect the environment and have been very active in this field, hence are successful in creating awareness among the citizens about their rights and responsibilities towards solid waste and the cleanliness of their city. These organizations promote environmental education and awareness in schools and involve communities in the management of solid waste. They may be persuaded to actively support the new strategies recommended in this report and associate in public awareness campaigns. Any organization willing to perform independently in conducting programs for sections of public on the new SWM strategies should be encouraged to do so through direct support or through use of the corporation resources / facilities.

The Corporation can involve NGO's as 'pressure groups' which can bridge the gap between government and civic society in waste management. The NGO programmes can be tailor made to suit the requirement of the city, so as it serves the purpose of Creating mass awareness, ensuring public participation in segregation of recyclable material and storage of waste at source. The awareness programs should be suitably designed to take the concept of SWM and source segregation into the community through audio-video means and through folklore methods so that the message percolates deep down into the society

- Provide employment through organizing door to door collection of waste
- Ensure public participation in community based primary collection system
- Encourage minimization of waste through in-house backyard composting, vermi-composting and biomethanization
- Most of the slum pockets can be covered by staging street plays to educate the slum dwellers and general public.

### **7.7.3 IEC plan to create awareness among the bulk waste generators for source segregation of waste and onsite composting**

The Government of India has launched the Swachh Bharat Mission on 2nd October, 2014 with the target to make the country clean by 2nd October, 2019. Solid Waste Management is an important component of the Mission and is to be implemented in all notified Urban Local Bodies.

### **Bulk Waste Generators:**

As per Solid Waste Management Rules 2016, “Bulk Waste Generator” means and includes buildings occupied by the Central Government Departments or Undertakings, State Government Departments or Undertakings, Local Bodies, Public Sector Undertakings or Private Companies, Hospitals, Nursing Homes, Schools, Colleges, Universities, other Educational Institutions, Hostels, Hotels, Commercial Establishments, Markets, Places of Worship, Stadia and Sports Complexes etc having an average waste generation rate exceeding 100kg per day (of all waste streams put together).

### Course of Action by ULBs:

#### 1. Identification of Bulk Waste generators in respective ULB:

1st ULB have to identify Individual bulk waste generators in their ULB and issue notices to them to instructing to comply with SWM Rules.

#### 2. Awareness Generation:

After identification of Bulk waste generator, the awareness campaign should be placed in ULB to generate the awareness on bulk waste generator and onsite composting.

<b>Sl. No</b>	<b>Type of IEC Activities</b>	<b>Sub activities</b>
1	Identification of a Brand Ambassador to aware the masses on bulk waste generator and onsite composting	A. ULB can choose an Ambassador from local opinion leader/ religious leader / Swachhata worker to promote bulk waste generator and onsite composting.
2.	Meeting with RWAs, MAs Hostel/Schools, Colleges, Universities, Educational & Training Institutions, Restaurant(s) with more than 200 seating capacity, All 4 and 5 Star Hotel(s), Shopping Complex (es)/ Mall(s), Clubs, Marriage halls,	A. Fixed a Meeting for various stake holders to motivate them on bulk waste generator and onsite composting. B. Finalization the list and action plan of bulk waste generator as per discussion with state holders.

	hospitals etc to create awareness and guide them for bulk waste generator and onsite composting.	
3.	Displaying hoarding / banners/posters in public places to create awareness on bulk waste generator and onsite composting.	<p>A. Develop the hoarding / poster for various stakeholders to create awareness on bulk waste generator and onsite composting.</p> <p>B. Displaying the hoardings in public places including market, school, collages, hospitals etc.</p> <p>C. Rally / awareness camp may be organized in presence of Brand Ambassador to aware the masses / stakeholders on bulk waste generator and onsite composting.</p>

#### 7.7.4 Conduct Sanitation Campaigns

People's attitudes influence not only the characteristics of waste generation, but also the effective demand for waste collection services. Attitudes may be positively influenced through awareness building campaigns and educational measures on the negative impacts of littering, improper segregation at source, inadequate waste collection with regard to public health and environmental conditions, and the value of effective disposal. While many current initiatives lead to visually cleaner areas, it does not encourage sustainable practices that reduce littering and illegal dumping in the long run. More emphasis is required on awareness creation relating to the implementation of the waste hierarchy. As such, waste minimization and waste separation at source needs to be encouraged to enhance reuse and recycling activities. Willingness to pay for waste services will also improve with increased awareness as a result in increased insight into the benefits of waste services, as well as the actual cost thereof.

Such campaigns should also inform people of their responsibilities as waste generators and of their rights as citizens to waste management services. Corporation should undertake massive public awareness campaigns on sanitation and establishing its link to public health, hygiene and the environment through various means including- radio, social media, documentaries, plays, workshop, etc. For this purpose a dedicated environmental awareness section is required which can function with the Medical and Health section in the corporation whose prime responsibilities is to continuously undertake awareness campaigns and drive home the point like

1. Clean-up campaigns in schools
2. Printing of pamphlets on different topics
3. A waste message in the municipal newsletter/ newspaper

4. Celebration of environmental days/events
5. Training and workshops for generators of waste
6. An hour slot per month on the local radio station to discuss different environmental issues and answer queries
7. Display slogans on transport vehicles and containers to encourage the public to keep their town/city clean
8. Door to door education: This involves the deployment of some of the community members (who were given training themselves before going out) to go to people's houses talking to them about environmental issues, including waste management, especially illegal dumping.
9. Introduce innovative ways of attracting the involvement of stakeholders, where there is incentive people will participate. However, the focus should be on preventing littering and not incentives for cleaning after littering. The latter might drive a wrong behavior.
10. Promote Reuse and Recycling techniques by instructing operators producing domestic and non-domestic products, food as well as non-food to seriously endeavor to use re-usable packaging materials so that after the delivery of goods, the packaging materials could be collected back and used over and reused again.
11. Direct operators to promote incentive and product discount to consumers for the return of packaging or bottling materials in good condition, to the waste producers or retailers to promote re-use. The cost of packed articles and article without packaging material could be kept different with a choice to the consumers to take the article without the packaging material at low cost.
12. Should suggest manufacturers to introduce the multi-use bottling practices. Hard-to-recycle packaging like PET bottles metalized plastic films and multi-film packs must be phased out unless producers take responsibility for their recall and recycling or re-use.
13. Promotion of viewing the waste as a resource, thereby encouraging economic competitiveness through resource efficiency. Efforts should be made to encourage collection of such re-usable material through waste collectors, waste producers, NGOs and private sector instead of allowing reusable waste to land up at the disposal sites. Bottles, cans, tins, drums, cartons can be reused and excess packaging materials can be recycled.

### **7.7.5 Media Campaigning and Environmental Awareness**

#### **Use of Cable TV and Cable channels:**

This is a very powerful medium and can be used to advise citizens not to litter and instead keep two bins for the storage of waste at source, one for biodegradable waste and another for recyclable waste. Citizens may also be advised to cooperate in handing over their waste to the waste collector on a day to day basis as per the collection arrangements and timings prescribed by the municipality. This network can also

publicize the contact numbers of the officials for addressing their grievances on Solid Waste Management.

### **Use of Hoardings/banners**

Special Hoardings/banners may be put in the town covering messages seeking public participation. Alternatively, all Municipal-licensed Hoardings should have a space reserved for civic messages. This will add a "socially-aware" image to the advertisers and will not reduce the usefulness of the hoarding to them at all. The messages can be those developed by advertising agents to promote any of the recommendations of this new waste management policy. The Hoardings should also publicize the hot-line numbers etc.

### **Advertisements in Newspapers:**

Advertisements may be given in local newspapers from time to time to create public awareness. Local newspapers can also be requested to start a regular Suggestion Box on the city page to improve Solid Waste Management services in the town. They may also be requested to give coverage to successful initiatives that have overcome such problems in a constructive way.

## **PART-3: Solid Waste Management Strategy & Action Plan**

The Proposed Strategy for implementation of solid waste management as per the provisions of SWM Rule, 2016 includes following main elements:

### **8. Strategic Interventions**

#### **8.1 Formulation of Policy and Regulations**

The state is in the process of formulating the state bye-laws on solid waste management as mandate under solid waste management rules, 2016. This has been incorporated with the requirement of vehicles, equipments and guideline to carry out solid waste management activity. Each and every component of solid waste management activity has been described with provision of administrative charges and user fees to make the entire process self-sustainable. To provide proper sanitation and SWM activity the involvement of manpower has been identified and a guideline for Municipal Corporations, Municipal Councils & Nagar Panchayats has been formulated and circulated to engage the required manpower through out sourcing. Besides this a Model guideline on primary collection & transportation, secondary collection & transportation and processing of wet waste for composting along with a model estimation for construction of pits (pit composting) with shed has been developed by the Urban Development & Housing Department and circulated to all the Municipal Council and Nagar Panchayats for construction of the same and start processing of waste. State Level Advisory Body formed to review and advice on solid waste management activity in the state. District Level Review & Monitoring Committee set up to review the progress of MSW management in ULBs across the state on regular basis and provide necessary advice in up scaling. Encourage ULBs to perform better in all aspects of planning, coordination, and implementation,

#### **8.2 Preparation of Detail Project Report (DPR)**

To carry out the solid waste management activity in a proper way, assessment of infrastructure and cost of the project is most essential. To ascertain the proper implementation of solid waste management a detail project report needs to be prepare which includes the requirement of primary collection vehicles, secondary collection vehicles, involvement of manpower, processing and disposal activity with the implementation schedule and also define the capital cost and operational cost of the project. The state has taken initiative to prepare the DPR for all the 143 ULBs with the technical support from MoHUA, GoI, New Delhi. This will ensure allocation of funds and proper implementation of solid waste management.

### **8.3 Engaging Stakeholders in Implementation:**

- Encourage sound contracting practice begins with setting operational goals, defining performance or service benchmark standards and specifications and producing a document that communicates these to private, semi-private, NGO, CBO or other economic actors who would like to participate as service providers.
- Awareness among stakeholders on SWM is important and continuous process. There need to intensify extension activities so as to continuously motivate and educate the stakeholders through effective IEC programs. ULBs to raise the awareness of city stakeholders through regular meetings with (households, establishments, industries, elected representatives municipal functionaries, media, etc) since improved sanitation can ensure improved public health and environmental outcomes only if considerable changes in behavior and practice take place across the spectrum of the society.
- ULBs may formulate strategy to organize and strengthen CSOs (Civil Society Organizations-RWAs) in Non-Slum Areas for effective democratic and participatory functioning devising methodologies on the lines of CBOs like SHGs/SLF/TLF in the Slum Areas to ensure Community participation and ownership of Solid Waste Management on sustainable mode.
- ULBs to disseminate relevant information on waste quantities and characteristics; waste treatment, recovery and disposal; the costs of providing the waste management services; the sources of funding used to finance the services in public domain.
- Publication of reports on Annual report of the Service Levels. ULBs to constitute City Sanitation Task Force involving the stakeholders in Planning, Implementation and Monitoring of the City Sanitation Plans.

### **8.4 Waste minimization and promotion of recycling of waste:**

- Municipal Solid waste to be managed in accordance with the SWM Rules, 2016
- Promotion of biodegradable and recyclable substitutes for non-biodegradable materials like plastics and develop systems for their recycle, reuse, through promotion of relevant technologies, and use of incentive based instrument, and developing and implementation of measures for reduce and remove of non-biodegradables through participatory approaches.
- Municipal Solid Waste to be segregated at source into groups of organic, inorganic, recyclables and hazardous waste. MSWM constituents like metal, plastics, glass and paper wastes are to be segregated and recycled.
- Each ULB to identify land to establish Dry Waste Sorting facilities (Material Recovery Facilities) wherever possible through social entrepreneurs, common interest groups of informal sector like

waste pickers associations and cooperatives, CBOs like Women Self Help Groups(SHGs), Apartment Societies, Resident Welfare Associations (RWA) and NGOs to be involved.

- Encourage individual households/ apartment complexes for setting ‘source composting options’ like vermin composting/ composting at households level, portable new age small scale bio gas units for kitchen waste, and Small scale decentralized units for treating of organic waste fraction to the places like community level, large hotels, marriage halls, hostels, organized colonies.
- ULBs to set up community-based composting yards on suitable institutional campuses and public parks for horticulture waste or leaf litter and encourage interested sweeper groups, apartment societies, resident welfare associations or CBOs to maintain them and use the proceeds from the sale of manure produced by them.
- Landfill sites to be used sparingly and only as a last resort in waste management hierarchy and shall not exceed 10% of the total municipal solid waste generated.
- Organic material and recyclables to be recovered fully prior to land filling of only inerts.

## **8.5 Strengthening the Capacity of ULBs:**

- State Government to guide ULBs to draft model byelaws and legislations to facilitate levying user charges, penalties for violators and explore revenue options like revenues from sale of waste and by products, to achieve financial sustainability.
- Set out operational guidelines for the procurement of equipment and services based on the size of the town and population. Emphasis to mechanization for segregated collection, segregated transportation, processing, treatment and scientific disposal to reduce the manual and multiple handling of garbage.
- Provide incentives and market linkages for the byproducts like compost and other recyclables. Ex. Creation of market avenues through involvement of the Department of Agriculture, Horticulture, Forests and Fertilizer companies as well as other agencies in the farm sector to ensure effective marketing of the compost as well as its by-products.
- Formulate and implement state and ULB level capacity building programs on SWM topics based on contract management & monitoring, environmental compliance and complaint redressal & monitoring systems including attitude and behavior change and creation of platforms for field based interactive learning and exposure visits.
- Formulate and implement state and ULB level for capacity building programs to the field staff, supervisory staff, contract employees, officers, civil society organizations, Community Based Organizations, on SWM topics based on the responsibilities including attitude and behavior change and creation of platforms for field based interactive learning and exposure visits.

## 8.6 The Solid Waste Management strategy for urban local bodies with time line to implement the provision of Rule 11 & Rule 15 of Solid Waste Management Rule, 2016

- To ensure Solid Waste Management in urban local bodies following activities will be followed as State Strategy to implement the provision of Rule 11 and 15 of Solid Waste Management Rules, 2016.

Sl. No	Activity as per Rule 11 and 15	Strategy	Time Line
1	Preparation of State Policy and Solid Waste Management Strategy	<p>1- State will prepare state policy and solid waste management strategy for the state in consultation with stakeholders including representative of waste pickers, self-help group and similar groups working in the field of waste management consistent with these rules, national policy on solid waste management and national urban sanitation policy of the ministry of urban development.</p> <p>2- Draft State SWM Policy have been prepared and circulated to SLAB members. After getting suggestion from all the concerned on the draft, State SWM Bye-laws &amp; SWM Policy will be notified with the vetting of Law Deptt./Environment &amp; Forest Deptt./State Pollution Control Board &amp; approval of State Cabinet.</p> <p>3-SWM action plan has been submitted by all ULBs to CPCB. Amendment will make if required in the action plan as per the State Policy and strategy.</p> <p>4- The urban local bodies should ensure implementation of the action plan as per the time line.</p>	State Policy will be finalized and approved within 3 months
2	While preparing State policy and strategy on solid waste management, emphasis should be given on waste reduction, reuse, recycling, recovery and optimum utilisation of various components of solid waste to ensure minimisation of waste going to the landfill and minimise impact of solid waste on human health and environment.	<p>1- All the ULBs should work on a concept to ensure that, enhancing Reuse &amp; recycling and minimization of waste generation with source segregation are essential to the success of any Solid waste management program. They should ensure voluntary participation from the members of community (waste generators) and requires a robust awareness programme on continual basis.</p> <p>2- ULBs will ensure to develop proposals for source segregation, composting and material recovery facility (MRF) and should require to be incorporated in the detail project report for solid waste management.</p> <p>3-ULBs should ensure involvement of SHGs/informal waste pickers/kabadiwallas in SWM activity and will make it a part of SWM DPR as per their local conditions.</p> <p>4- Each ULB will carry out massive IEC and BCC activity to create public awareness and also involvement of community for solid waste management.</p>	Incorporated in the State Policy.

3	<p>State policies and strategies should acknowledge the primary role played by the informal sector of waste pickers, waste collectors and recycling industry in reducing waste and provide broad guidelines regarding integration of waste picker or informal waste collectors in the waste management system.</p>	<p>1- Each ULB will ensure survey &amp; identification of waste pickers, recycling industry and kabadiwallas.</p> <p>2- Channelization of recyclable dry waste through Kabadiwallas.</p> <p>3-The detail guideline for implementation by urban local bodies on integration of Informal waste pickers <b>is enclosed as Annexure-1.</b></p> <p>4- The ULBs will ensure implementation of the guideline.</p>	Incorporated in the State Policy
4	<p>ensure implementation of provisions of these rules by all local authorities</p>	<p>1- ULBs will ensure implementation of the provisions of SWM Rules, 2016.</p> <p>2- The ULBs can ensure formation of District Level Review &amp; Monitoring Committees (DLRMC). This committee will be chaired by District Magistrate and Municipal Commissioners/Executive Officers will be the Member Secretary. The role of this committee is to Provide an enabling framework by facilitating for coordination between center-state and implementing agencies for smooth and effective implementation, Facilitating coordination among various agencies, Promoting citizen engagement and participation.</p>	Within 6 months.
5	<p>direct the town planning department of the State to ensure that master plan of every city in the State or Union territory provisions for setting up of solid waste processing and disposal facilities except for the cities who are members of common waste processing facility or regional sanitary landfill for a group of cities;</p>	<p>1- Town planning authority will make provisions for setting up of solid waste processing and disposal facility in the master plan of the cities. The cities will also informed to work and implement the solid waste management facility according to the master plan.</p> <p>2-It is the responsibility of every urban local body to ensure implementation of solid waste management facility in the designated area as defined in the master plan of the city.</p>	Within 3 months

6	<p>Ensure identification and allocation of suitable land to the local bodies within one year for setting up of processing and disposal facilities for solid wastes and incorporate them in the master plans (land use plan) of the State.</p>	<p>1- Every urban local body should ensure identification of suitable land in coordination with the local authority and department for setting up of solid waste processing and disposal facility.</p> <p>2-Preference should be given for decentralized processing of waste and accordingly suitable land should be identified for setting up of processing facility.</p>	Within 12 months
7	<p>direct the town planning department of the State and local bodies to ensure that a separate space for segregation, storage, decentralized processing of solid waste is demarcated in the development plan for group housing or commercial, institutional or any other non-residential complex exceeding 200 dwelling or having a plot area exceeding 5,000 square meters.</p>	<p>1- While approving the building plan the urban local bodies will ensure availability of space for segregation, storage and decentralize processing of solid waste in housing or commercial, institutional or any other non-residential complex exceeding 200 dwelling or having a plot area exceeding 5000 Sq. mtr.</p> <p>2- The town planning department will ensure incorporation of this provision in the building bye-laws.</p>	Within 3 months
8	<p>Direct the developers of Special Economic Zone, Industrial Estate, Industrial Park to earmark at least five percent of the total area of the plot or minimum five plots or sheds for recovery and recycling facility.</p>	<p>The developers of Special Economic zone, industrial estate, industrial park will ensured to earmark at least five percent of the total area of the plot or minimum five plots or sheds for recovery and recycling facility.</p>	Within 3 months
9	<p>Facilitate establishment of common regional sanitary land fill for a group of cities and towns falling within a distance of 50 km (or more) from the regional facility on a cost sharing basis and ensure professional management of such sanitary landfills.</p>	<p>1- Each ULB will ensure establishment of sanitary landfill facility. While planning for establishment of sanitary landfill facility the ULBs can consider for establishment of common regional sanitary landfill facility for a group of cities and towns within a distance of 30 km.</p> <p>2- Depending upon the availability of land ULBs are free to establish separate landfill facility as per requirement.</p>	Within 36 months

10	Arrange for capacity building of local bodies in managing solid waste, segregation and transportation or processing of such waste at source	<p>1- Regular capacity building programme will be organised for strengthening the capacity of the ULBs on different component of solid waste such as: segregation, collection &amp; transportation, processing and disposal.</p> <p>2- The urban local bodies will also ensure capacity building of waste collectors and other staffs involved in solid waste management activity.</p>	Regular activity
11	Notify buffer zone for the solid waste processing and disposal facilities of more than five tons per day in consultation with the State Pollution Control Board.	Buffer zone required for development of greenery for solid waste processing and disposal facilities of more than five TPD will be defined in consultation with the State pollution Control Board.	Within 6 months
12	Start a scheme on registration of waste pickers and waste dealers.	<p>1- ULBs will conduct survey in their respective jurisdiction to find out the no. of waste pickers and kabadiwallas.</p> <p>2- Every ULB will conduct meeting with representatives of informal sector and recycling industries and ensure registration of the waste pickers and kabadiwallas.</p> <p>3-The detail guideline for implementation by urban local bodies on integration of Informal waste pickers <b>is enclosed as Annexure-1.</b></p>	<p>1- Municipal Corporations within 6 months.</p> <p>2- Municipal Councils within 12 months.</p> <p>3- Nagar Panchayats within 12 months</p>
13	The ULBs to prepare a solid waste management plan as per state policy and strategy on solid waste management within six months from the date of notification of state policy and strategy and submit a copy to respective departments of State Government or Union territory Administration or agency authorised by the State Government or Union territory Administration;	<p>1- While preparing the solid waste management plan the ULBs have to consider the state policy and strategy on solid waste management. The solid waste management plan of ULBs should include all the activities (i.e., from source segregation to final disposal of solid waste) with time line to accomplish the work.</p> <p>2-After preparation of solid waste management action plan the urban local bodies should submit a copy to the department and State Pollution Control Board.</p>	Within 6 months of notification of State policy & SWM strategy

14	Arrange for door to door collection of segregated solid waste.	<p>1-The ULBs have to ensure collection of segregated waste from households, slums, informal settlements, commercial complexes, malls etc.</p> <p>2- Assessment of requirement of vehicles, other infrastructure and manpower to carry out door to door collection of segregated waste need to be done by every urban local body.</p> <p>3-Collection of baseline data and mapping of wards need to be done prior to start door to door collection.</p> <p>4-Massive IEC activity will be carried out by ULBs to create awareness among the stakeholders to ensure source segregation.</p> <p>5-Every urban local body should identify the waste pickers and formulate SHGs and should explore every possibilities of involvement in solid waste management activity.</p>	<p>1-all wards in Municipal Corporations to be covered for door to door collection within 6 months.</p> <p>2- all wards in Municipal Councils to be covered for door to door collection within 12 months.</p> <p>3-all wards in Nagar Panchayats to be covered for door to door collection within 12 months.</p>
15	Establish a system to recognize organisations of waste pickers or informal waste collectors and promote and establish a system for integration of these authorised waste-pickers and waste collectors to facilitate their participation in solid waste management including door to door collection of waste;	<p>1- Every urban local body should identify the waste pickers working in their jurisdiction. To identify the waste pickers the urban local bodies can conduct a survey and register the name of the waste pickers and issue an ID card to each waste picker. Similarly the Kabadiwallas can be identified and registered with the ULBs (<b>guideline enclosed as Annexure - 1</b>).</p> <p>2- ULBs should ensure that the registered waste pickers are involved in door to door collection activity or the dry waste collected from source segregation can be directly handed over to the waste pickers/Kabadiwallas to earn livelihood for them.</p>	<p>1- Municipal Corporations within 6 months.</p> <p>2- Municipal Councils Within 12 months.</p> <p>3- Nagar Panchayats Within 12 months</p>

16	Facilitate formation of Self Help Groups, provide identity cards and thereafter encourage integration in solid waste management including door to door collection of waste;	<p>1- Every urban local body should facilitate formation of self-help groups (SHGs) under National Urban Livelihood Mission (NULM) and encourage integration of SHGs members in door to door collection activity/ involvement in material recovery facility.</p> <p>2-The ULBs will use SHGs members as Swachhagrahis and involved them in IEC/BCC activity and community engagement work for solid waste management.</p>	<p>1- Municipal Corporations within 6 months.</p> <p>2- Municipal Councils and Nagar Panchayats within 12 months</p>
17	frame bye-laws incorporating the provisions of these rules within one year from the date of notification of these rules and ensure timely implementation;	Every urban local body should notify SWM bye-laws based on state level bye-laws with modification if required based on their local board approval.	Within 8 months of notification of Bihar State model SWM bye-laws.
18	Prescribe from time to time user fee as deemed appropriate and collect the fee from the waste generators on its own or through authorised agency;	<p>1-At the time of notifying SWM Bye-laws by ULBs user fee will be incorporated by the ULBs as deemed appropriate and as approved by their local board.</p> <p>2- Mechanism for collection of the fees from waste generators on its own or through authorized agency should also be framed by ULBs.</p> <p>3- They should consult state level model SWM bye-laws while framing the provisions in their local bye-laws.</p> <p>4-Before starting collection of user fees massive awareness should be created among the public regarding benefit of user fees and its requirement for maintaining a sustainable solid waste management process.</p>	Within 8 months of notification of Bihar State model SWM bye-laws.
19	Prohibition of littering and burning of waste	<p>1- ULBs should ensure prohibition of littering of waste and burning of waste in open place.</p> <p>2- Following strategy should be adopted by ULBs to ensure prohibition of littering and open burning.</p> <ul style="list-style-type: none"> <li>(i) Provision of heavy penalty in the SWM bye-laws.</li> <li>(ii) Formation of ward sanitation committee</li> <li>(iii) Constitution of task force by involving sanitary inspector, Jamadars, members from ward sanitation committee etc.</li> <li>(iv) Provision of litter bins in commercial areas and community bins in residential and other areas.</li> <li>(v) Define receipt and collection mechanism in case of violation.</li> <li>(vi) awareness through ward sanitation committee members, SHGs, school children etc.</li> </ul>	<p>1-Within 8 months the urban local bodies should ensure prohibition in littering.</p> <p>2- open burning of solid waste should stop with immediate</p>

			effect.
20	Setup material recovery facilities or secondary storage facilities	<p>1- ULBs have to ensure source segregation of waste.</p> <p>2- Till the time the source segregation reaches 100% arrangements for material recovery facility or secondary storage facility should be done by the ULBs.</p> <p>3-Material recovery facility will be ensured by ULBs manually by involving SHGs members or waste pickers.</p> <p>4- If arrangements for secondary storage facility are made, the wet and dry waste will be stored separately in green and blue bins and the waste pickers should be allowed to collect and sell the dry waste directly.</p>	<p>1- Municipal Corporations within 6 months.</p> <p>2- Municipal Councils Within 12 months.</p> <p>3- Nagar Panchayats Within 12 months</p>
21	Establish waste deposition centers for domestic hazardous waste	<p>1- Every urban local body should ensure establishment of domestic hazardous waste collection center.</p> <p>2- ULBs will establish one domestic hazardous waste collection center per area of 20 square kilometer or part thereof and also notify the time of collection of domestic hazardous waste at the collection center.</p> <p>3. ULBs will encourage the waste generators to segregate the domestic hazardous waste at household level and also insist the waste generators to submit the domestic hazardous waste at the collection center.</p> <p>4- ULBs should ensure that massive awareness is created among the waste generators about the essential of segregation of domestic hazardous waste and its impact on the environment.</p>	<p>1- Municipal Corporations within 8 months.</p> <p>2- Municipal Councils Within 12 months.</p> <p>3- Nagar Panchayats Within 12 months</p>
22	Ensure safe storage and transportation of the domestic hazardous waste to the hazardous waste disposal facility.	<p>1- ULBs should ensure safe transportation of the domestic hazardous waste to hazardous waste disposal facility. In case hazardous waste disposal facility is not available the domestic hazardous waste should be disposed off in consultation with State Pollution Control Board.</p>	<p>1- Municipal Corporations within 8 months.</p> <p>2- Municipal Councils &amp; Nagar Panchayats Within 12 months.</p>

23	Direct street sweepers not to burn tree leaves collected from street sweeping and store them separately and handover to the waste collectors or agency authorised by local body;	1- ULBs will direct the street sweepers not to burn the tree leaves collected from street sweeping and stored them separately and handover to the waste collector/authorised agency/bring it to the nearer decentralised composting site for processing.	With immediate effect
24	Provide training on solid waste management to waste-pickers and waste collectors;	1- Every urban local body should start training of waste pickers and waste collectors on solid waste management activity. 2- Every urban local body will develop training calendars and arrange such training as per the calendar to ensure capacity building of waste pickers and waste collectors.	All ULBs should ensure training of waste pickers and waste collectors within 6 Months.
25	Collect waste from vegetable, fruit, flower, meat, poultry and fish market on day to day basis and promote setting up of decentralised compost plant or bio-methanation plant at suitable locations in the markets or in the vicinity of markets ensuring hygienic conditions;	1- Every urban local body will ensure collection of waste from vegetable, fruit, flower, meat, poultry and fish market on daily basis and also ensure processing of these waste through decentralised composting. 2-In order to ensure decentralised composting department has already prepared cost estimation of pit composting method which should be followed by all ULBs. 3- ULBs will identify land and start decentralised composting at the earliest. 4- ULBs will be free to explore other viable technology of solid waste processing such as biomethanation/ other aerobic composting technology as per their local condition/suitability.	1- Municipal Corporations within 6 months. 2- Municipal Councils Within 8 months. 3- Nagar Panchayats Within 12 months
26	Collect separately waste from sweeping of streets, lanes and by-lanes daily, or on alternate days or twice a week depending on the density of population, commercial activity and local situation;	Every urban local body will ensure sweeping of streets and collection of street sweeping waste separately by wheel barrows/mechanical sweeping machine on daily basis and in commercial areas twice a day sweeping should be done and collection of street sweeping waste should be done separately.	Regular activity with immediate effect

27	<p>Set up covered secondary storage facility for temporary storage of street sweepings and silt removed from surface drains in cases where direct collection of such waste into transport vehicles is not convenient.</p> <p>Waste so collected shall be collected and disposed of at regular intervals as decided by the local body;</p>	<p>1- Every urban local body will ensure separate collection and storage of street sweeping waste and silt removed from surface drains.</p> <p>2- In case of direct transport of these wastes through transport vehicles is not possible ULBs will ensure that covered community bins are used for temporary storage of these waste.</p> <p>3- At regular intervals these waste should be disposed off by ULBs themselves or the agency appointed by the ULBs.</p>	Regular activity with immediate effect
28	<p>Collect horticulture, parks and garden waste separately and process in the parks and gardens, as far as possible;</p>	<p>1- Every urban local body will identify the no. of parks, gardens in their jurisdiction.</p> <p>2- ULBs will collect separately the horticulture, parks or garden waste and as far as possible these waste can be processed on site.</p>	<p>1- Municipal Corporations within 9 months.</p> <p>2- Municipal Councils Within 12 months.</p> <p>3- Nagar Panchayats Within 12 months</p>
29	<p>Transport segregated biodegradable waste to the processing facilities like compost plant, biomethanation plant or any such facility. Preference shall be given for onsite processing of such waste;</p>	<p>1- Every urban local body will ensure source segregation and collection of segregated waste at household level itself.</p> <p>2- The biodegradable waste thus collected should be transported to the decentralised /centralised site for composting/biomethanation or any such processing of waste which is suitable for solid waste management.</p> <p>3-Every urban local body will identify the bulk waste generators and ensure onsite processing of segregated waste.</p> <p>4- In case of non-availability of land, the bulk waste generators will hand over the segregated waste to urban local body/agency authorised by the urban local body by giving such user fees as prescribed by the Urban Local Body.</p>	<p>1- Municipal Corporations within 9 months.</p> <p>2- Municipal Councils Within 12 months.</p> <p>3- Nagar Panchayats Within 12 months</p>

30	<p>transport non-biodegradable waste to the respective processing facility or material recovery facilities or secondary storage facility;</p>	<p>1- Every urban local body will ensure transportation of non-biodegradable waste to the material recovery facility or secondary storage facility.  2- Every ULBs will directly handover the non-biodegradable waste to Kabadiwallas or may channelised it to Kabadiwallas through waste pickers.</p>	<p>1- Municipal Corporations within 9 months.  2- Municipal Councils Within 12 months.  3- Nagar Panchayats Within 12 months</p>
31	<p>Transport construction and demolition waste as per the provisions of the Construction and Demolition Waste management Rules, 2016;</p>	<p>ULBs will ensure transportation of construction and demolition waste separately and get them disposed off as per the provision of C &amp; D Waste Management Rules, 2016.</p>	<p>1- Municipal Corporations within 9 months.  2- Municipal Councils &amp; Nagar Panchayats within 12 months.</p>
32	<p>Involve communities in waste management and promotion of home composting, bio-gas generation, decentralised processing of waste at community level subject to control of odour and maintenance of hygienic conditions around the facility;</p>	<p>1- Every urban local bodies will ensure decentralised composting as per the issued guideline and model estimate on pit composting model, issued vide UD &amp; HD letter no.913 dt: 09.04.2018  <b>(Enclosed as Annexure -2).</b>  2- The urban local bodies will have to create awareness among the community to involve in door to door collection and decentralised processing activity.  3-Urban local bodies should also ensure active involvement of ward sanitation committee and SHGs members in door to door collection and composting activity.  4- To avoid odour in the decentralized facility proper aeration should be given to avoid formation of anaerobic condition, maintenance of proper moisture condition and temperature which will help in proper growth of bacteria and enhance the degradation process of waste.  5- To maintain proper hygienic condition regular sweeping and cleaning activity in the processing site and storage of material in designated place as per the standards need to be</p>	<p>1- Municipal Corporations within 9 months.  2- Municipal Councils Within 12 months.  3- Nagar Panchayats Within 12 months</p>

		done. Leachate collection pit with draining arrangement and sheds should be made for maintaining proper hygienic condition.	
33	Phase out the use of chemical fertilizer in two years and use compost in all parks, gardens maintained by the local body and wherever possible in other places under its jurisdiction. Incentives may be provided to recycling initiatives by informal waste recycling sector.	<p>1- Every urban local body will ensure phasing out of chemical fertilizer in parks and gardens maintained by them and will encourage use of compost in place of chemical fertilizer.</p> <p>2- ULBs will formulate incentives as per their local conditions to be provided to informal waste recycling sector with approval of their local board.</p>	Within 18 months
34	<p>Facilitate construction, operation and maintenance of solid waste processing facilities and associated infrastructure on their own or with private sector participation or through any agency for optimum utilisation of various components of solid waste. Preference shall be given to decentralised processing to minimize transportation cost and environmental impacts such as-</p> <p>a) bio-methanation, microbial composting, vermi-composting, anaerobic digestion or any other appropriate processing for bio-stabilization of biodegradable wastes;</p> <p>b) waste to energy processes including refused derived fuel for combustible fraction of waste or supply as</p>	<p>1- ULBs will ensure construction, operation and maintenance of solid waste processing facility.</p> <p>2- Preference should be given for decentralised processing of waste.</p> <p>3-The ULBs can construct, operate and maintain the processing facility by their own or can also execute the whole process on Public Private Partnership (PPP) mode.</p> <p>4- Every urban local bodies will ensure decentralised composting as per the issued guideline and model estimate on pit composting model, issued vide UD &amp; HD letter no.913 dt: 09.04.2018 <b>enclosed as Annexure-2.</b></p> <p>5- Department has already issued model RFP for Integrated Solid Waste Management on neutral technology basis. ULBs to refer the same for development of Integrated SWM facility as per their requirement.</p>	<p>1- Municipal Corporations within 9 months.</p> <p>2- Municipal Councils Within 12 months.</p> <p>3- Nagar Panchayats Within 12 months</p>

	feedstock to solid waste based power plants or cement kilns;		
35	Undertake on their own or through any other agency construction, operation and maintenance of sanitary landfill and associated infrastructure as per Schedule 1 for disposal of residual wastes in a manner prescribed under these rules;	1- Every urban local body will ensure construction of sanitary landfills for scientific disposal of inert waste and rejects from processing facility. 2-The development of sanitary landfill facility should be in accordance with the provisions given in Schedule-I of SWM Rules, 2016. ( <b>Enclosed as Annexure -3</b> ). 3-The urban local bodies who have already identified land for development of sanitary landfill facility will submit a compliance report on the criteria for land selection for development of landfill site to the department in the format. ( <b>Enclosed as Annexure -4</b> ).	Within 36 months
36	Make adequate provision of funds for capital investments as well as operation and maintenance of solid waste management services in the annual budget ensuring that funds for discretionary functions of the local body have been allocated only after meeting the requirement of necessary funds for solid waste management and other obligatory functions of the local body as per these rules;	1- Every Urban Local Body will ensure to make annual budgetary provision for solid waste management activity. 2- On the basis of provision made in the annual budget expenditure shall be incurred for various solid waste management activities. 3- The ULBs will have the options to leverage funds for solid waste management activity from various other sources such as: a) Private Sector Participation b) Additional Resources from State Government/ULB c) User Charges d) Land Leveraging e) Innovative revenue streams f) Corporate Social Responsibility g) Market Borrowing h) External Assistance	Provision in the Financial Year (2019-2020) budget.
37	Make an application in Form-I for grant of authorisation for setting up waste processing, treatment or disposal facility, if the volume of waste is exceeding five metric tons per day including sanitary landfills from the State Pollution Control Board or the Pollution Control Committee, as the case may be.	1- Urban Local Bodies will ensure to make an application in Form-I to State Pollution Control Board for obtaining authorisation under solid waste management rules for processing/recycling/treatment and disposal of solid waste in case the volume of waste is exceeding five metric tonnes per day including sanitary landfills facility. The Form-I is <b>Enclosed as Annexure -5</b> .	With immediate effect as per requirement

38	Submit application for renewal of authorisation at least sixty days before the expiry of the validity of authorisation.	The ULBs will have to submit an application to the State Pollution Control Board at least prior to sixty days of expiry of the validity of the authorisation.	With immediate effect as per requirement
39	Prepare and submit annual report in Form IV on or before the 30th April of the succeeding year to the Commissioner or Director, Municipal Administration or designated Officer;	1- The ULBs will ensure collection of annual report from the operator of the solid waste management facility in Form-III and will submit annual report in Form-IV to the department by 30th April of the succeeding year. <b>The Form-III &amp; Form-IV is enclosed as Annexure-6 &amp; 7 respectively.</b>	1- By 30th April every year.
40	The annual report shall then be sent to the Secretary -in-Charge of the State Urban Development Department or village panchayat or rural development department and to the respective State Pollution Control Board or Pollution Control Committee by the 31st May of every year;	The ULBs will ensure submission of annual return in Form-IV to the department and to State Pollution Control Board by 30th May every year. <b>(Enclosed as Annexure-7)</b>	By 30th May every year.
41	Educate workers including contract workers and supervisors for door to door collection of segregated waste and transporting the unmixed waste during primary and secondary transportation to processing or disposal facility;	ULBs will ensure capacity building of waste collectors including the contract workers and supervisors on source segregation, collection and transportation of segregated waste to processing site, stakeholder engagement and motivating community for participation in solid waste management activity. State level capacity building workshop will also be held from time to time.	Regular activity
42	Ensure that the operator of a facility provides personal protection equipment including uniform, fluorescent jacket, hand gloves, raincoats, appropriate foot wear and masks to all workers handling solid waste and the same are used by the workforce;	ULBs will have to ensure that the operator of a facility has implemented proper occupational health and safety standards. The operator of a facility should also provide all the personal protective equipment to the workers and also ensure use of these PPEs by the workforce while working. ULBs will enforce regular inspection mechanism for the above.	With immediate effect

43	<p>Ensure that provisions for setting up of centers for collection, segregation and storage of segregated wastes, are incorporated in building plan while granting approval of building plan of a group housing society or market complex; and</p>	<p>1- While approving the building plan the urban local bodies will ensure availability of space for segregation, storage and decentralise processing of solid waste in housing or commercial, institutional or any other non-residential complex exceeding 200 dwelling or having a plot area exceeding 5000 Sq. mtr.</p> <p>2- The town planning department will ensure incorporation of this provision in the building bye-laws.</p>	Within 8 months
44	<p>Frame bye-laws and prescribe criteria for levying of spot fine for persons who litters or fails to comply with the provisions of these rules and delegate powers to officers or local bodies to levy spot fines as per the bye laws framed.</p>	<p>1- ULBs will ensure provision of spot fines in the bye-laws in case of open littering and violation to the provisions of the rules.</p> <p>2- ULBs will have to nominate the officials and delegate powers to levy spot fines as per the provisions made in the bye-laws.</p>	Within 6 months
45	<p>Create public awareness through information, education and communication campaign and educate the waste generators.</p>	<p>1-ULBs will create awareness among the public on different components of solid waste management, duties and responsibilities of waste generators and authorities. The detail IEC plan on solid waste management activity is <b>Enclosed as Annexure-8.</b></p> <p>2-Department will also undertake state level IEC campaign from time to time.</p>	Regular activity
46	<p>Stop land filling or dumping of mixed waste soon after the timeline as specified in rule 23 for setting up and operationalization of sanitary landfill is over.</p>	<p>ULBs will stop open dumping of mixed waste once the processing and sanitary landfill facility is developed. The open dumping of waste along the highways and roads should be avoided and till the time scientific landfill facility will develop every possible measure should be taken by the ULBs to process the wet and dry waste.</p>	Within 36 months
47	<p>Allow only the non-usable, non-recyclable, non-biodegradable, non-combustible and non-reactive inert waste and pre-processing rejects and residues from waste</p>	<p>1- The ULBs should ensure processing of wet and dry waste to the maximum extent possible. Only the rejects from the processing activity and the inert waste should be allowed to go to sanitary landfill facility.</p> <p>2- Every possible measure to implement 3-R (reduce, reuse, and recycle) should be worked out to achieve the desired objective of zero waste going to landfill.</p>	Within 36 months

	processing facilities to go to sanitary landfill and the sanitary landfill sites shall meet the specifications as given in Schedule-I, however, every effort shall be made to recycle or reuse the rejects to achieve the desired objective of zero waste going to landfill;		
48	Investigate and analyses all old open dumpsites and existing operational dumpsites for their potential of bio-mining and bio-remediation and wheresoever feasible, take necessary actions to bio-mine or bio-remediate the sites.	1- ULBs shall identify the existing dump site and wheresoever feasible necessary steps to be taken for bio-mining or bio-remediation of existing dump site. 2- The ULBs will submit the data in the given Format as given in <b>annexure-9</b> and will take necessary actions to bio-mining or bio-remediation of the site as per the potential of bio-mining or bio-remediation.	Within 48 months
49	In absence of the potential of bio-mining and bio-remediation of dumpsite, it shall be scientifically capped as per landfill capping norms to prevent further damage to the environment.	1- In case of bio-mining and bio-remediation is not feasible option possibilities of scientific landfill capping should be explored and landfill capping norms to be followed by all the ULBs.	Within 48 months

# **ANNEXURES**

- |                   |   |
|-------------------|---|
| <b>Annexure-1</b> | <b>Informal Waste Pickers guideline</b>                               |
| <b>Annexure-2</b> | <b>Guideline on pit composting</b>                                    |
| <b>Annexure-3</b> | <b>Schedule-I for provisions of Sanitary Landfill facility</b>        |
| <b>Annexure-4</b> | <b>Checklist for selection of site for Sanitary Landfill Facility</b> |
| <b>Annexure-5</b> | <b>Form-I (Application for getting authorization of a facility)</b>   |
| <b>Annexure-6</b> | <b>Form-III (Annual return for operator of a facility)</b>            |
| <b>Annexure-7</b> | <b>Form-IV (Annual return by Urban Local Bodies)</b>                  |
| <b>Annexure-8</b> | <b>IEC Plan for Solid Waste Management</b>                            |
| <b>Annexure-9</b> | <b>Base Line data on Existing Dump/Legacy Waste</b>                   |

## **Guideline for Integration of Waste Pickers/Informal Waste Collectors in Solid Waste Management Activity**

### **Introduction**

Millions of people worldwide make a living collecting, sorting, recycling, and selling materials that someone else has thrown away. There is growing recognition that waste pickers contribute to the local economy, to public health and safety, and to environmental sustainability. But they often face low social status, deplorable living and working conditions, and get little support from local governments. Waste picking ranks lowest in the hierarchy of urban informal occupations and a large number of those employed in this occupation are women and children. Illiterate, unskilled persons, migrants, those lowest in the caste hierarchy and the poorest of the poor, predominantly work as waste pickers, as they are unable to find any other kind of employment. Currently, many of them collect waste from landfills and open dumping grounds.

### **Working Conditions**

Generally, there is no employer-employee relationship in this trade even though it is possible that some of the waste picking activity is organized by contractors. Waste pickers are self-employed workers with no formal legal relationship with the municipality or the recyclable traders. Waste-pickers suffer from occupation related musculo-skeletal problems, respiratory and gastro-intestinal ailments. They also face regular harassment and extortion from both the police and the municipal authorities. No social security benefits are available to workers in this sector.

### **Role of Waste Pickers/Informal Waste Collectors in Solid Waste Management:**

The role of waste-pickers in developing countries is essential for both environmental and economic reasons. It is, however, difficult to quantify their contribution due to the informal nature of this sector. There are well-recognized environmental, social, and economic benefits associated with waste pickers activity.

- Recycling of solid waste reduces air and water pollution, saves energy, reduces waste from industrial processes compared with the use of virgin materials, and in many cases reduces imports of raw materials.
- Informal waste picking reduces the cost of a city's solid waste management (SWM) program. Waste pickers help the municipalities in reducing the amount of waste that needs to be collected,

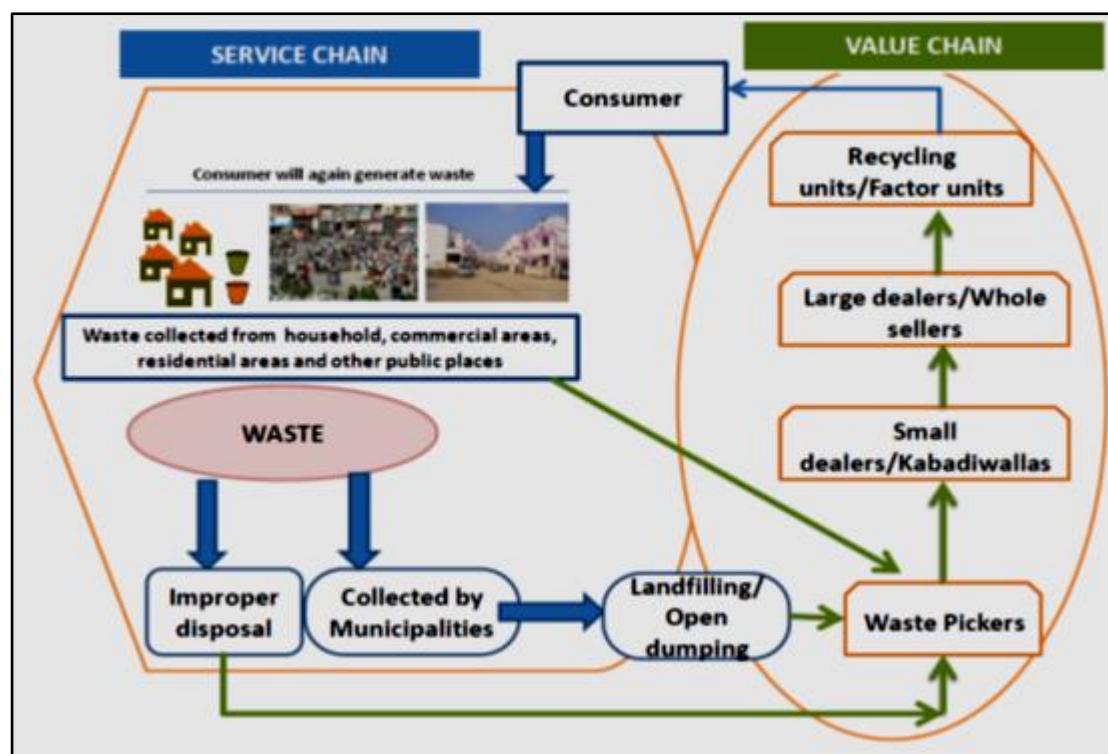
transported, and disposed of, which translates into savings to municipalities and extends the life of dumps/landfills.

- Waste picking activity represents an income-generating activity for the poorest in the developing world. Recovery of materials from solid waste, if organized properly, can generate a livelihood for unskilled workers in a developing country environment.

### **Waste Pickers/Informal Waste Collectors Value Chain in Solid Waste Management Activity:**

The waste pickers value chain in the solid waste management activity can be described as follows:

- The value chain “pulls” the materials for which there is real economic demand.
- The waste proceeds in the value chain through waste pickers, small dealers/ (Kabadiwallas), Wholesale dealer/large dealers and recycling/factory units pass materials along the value chain to the end-users.
- The municipalities are benefited by disposing of non-biodegradable waste by the waste pickers.



**Fig: The service chain and value chain in solid waste management activity.**

## **Integration of Waste Pickers/Informal Waste Collectors in Solid Waste Management**

### **Activity:**

The integration of waste pickers/Informal waste collectors in cities solid waste management activity is essential and to ensure this the ULBs can carry out following activities.

#### **A. Survey of Waste Pickers/Informal Waste Collectors**

A survey has to be conducted by all municipalities to identify the number of waste pickers/informal waste collectors working in their jurisdiction. The survey can be conducted with the help of local NGOs, SHGs groups, sanitation contractors and officials of municipalities. The objective of the survey is:

- to identify the informal waste pickers working in the municipality.
- to identify the small waste dealers/Kabadiwallas and other existing stakeholders in the value chain of solid waste management in the city.
- to integrate the informal waste pickers in to the main stream by registering the waste pickers and providing ID Cards.
- to create a social business model for collection of solid waste, plastic waste & e-waste.

The survey formats, registration formats and ID card formats required in the process is enclosed as (Format-1, Format-2 and Format-3) respectively.

#### **B. Access to the waste & integration in the main stream**

- This includes the legal right of waste pickers/informal waste collectors to collect, store, sell and recycle the dry recyclable materials in the solid waste management system.
- Direct collection of source segregated waste from domestic, bulk waste generators, small commercial generators or from any waste generation stream.
- ULBs can identify the possible ways to engage the waste pickers in door to door collection and other sanitation activity.
- Collection of waste from dumping site/landfill site and allow recycling of the same.
- In case of material recovery facility/secondary storage facility the waste pickers can be allowed to collect the waste directly from the facility and can sell it to kabadiwallas.
- In case of decentralized processing site a separate platform can be made for storage of dry waste and waste pickers can be allowed to collect dry recyclable waste from the storage point.

### **C. Recognising the role of the informal sector**

- A key issue is for the authorities to recognize the role and contribution of the informal sector. The role played by informal waste collectors has to be judged carefully and recognition of their work needs to be done by the authority.
- The ULBs can identify the role of informal sector in solid waste management by evaluating the percentage of dry waste recycled by the informal waste collectors/kabadiwallas of the total generated waste in the city.
- Deal with informal sector recyclers and collectors with ‘respectability’, for example through the issuing of uniforms and identity cards and engaging the municipalities supervisors in how they can effectively work together.

### **D. Strengthening the value chain interfaces**

- This includes both the physical interfaces, for example to allow informal collectors/recyclers to deliver waste smoothly to the city’s contractor for secondary transport to the disposal site or to allow recyclers at the transfer station or disposal site to have time and space to pick over the waste without interfering with the safe operation of the site.

### **E. Ensuring Proper Occupational Health & Safety**

- Manually separating waste is hazardous work. The risks can be alleviated, for example by providing and promoting the use of protective clothing, the availability of accessible health care, and ensuring that hazardous wastes are separated out from other wastes at source.
- Special provisions should be in place for collection/recycling activities related to the handling of waste electrical and electronic equipment.

### **F. Ensuring Financial Stability**

- The ULBs can ensure involvement of waste pickers in door to door collection, material recovery facility and processing activity of solid waste management by which they can earn their livelihood.
- The waste pickers/informal waste collectors can be engaged in solid waste management activity by making provision of daily wages/incentives.
- In case of solid waste management activity carried out by any third party agency provision can also be made to involve the waste pickers/informal waste collectors through the agency.

#### **G. Capacity Building**

- Capacity building of waste pickers is essential to carry out day to day activity in solid waste management.
- Capacity building workshop to be organized by the respective municipalities involving experts from solid waste sector, sanitary inspectors, supervisors and waste collectors.
- The role and responsibility of waste pickers/informal waste collectors in the service chain and value chain of solid waste management activity need to be conveyed.
- Training calendar and feed-back mechanism need to be devised to know the appropriateness and effectiveness of the training.

#### **H. Information Education Communication (IEC)**

- Regular IEC activity needs to be carried out by municipalities to ensure involvement of community in solid waste management activity.
- Following IEC activities can be carried out by municipalities to ensure proper solid waste management through community participation:
  - a) Meetings with Public Representatives
  - b) Training Sessions with: School and college students, Residents' Welfare Associations, Rag pickers, Private waste collectors and Community
  - c) Distribution of two colour dust bins and creates awareness on source segregation.
  - d) Awareness through distribution of pamphlets, stickers, banners and hoardings.

## **Informal Waste Pickers Survey Format**

### **Format-1**

1. Name of the ULB/City: \_\_\_\_\_
2. Name of the Waste picker/informal waste collector: \_\_\_\_\_
3. Current address in the city:  
\_\_\_\_\_
4. Gender: Male \_\_\_\_\_ Female \_\_\_\_\_ Other \_\_\_\_\_
5. Age/Date of Birth: \_\_\_\_\_
6. How many years have you been living in city? \_\_\_\_\_
7. Where is your native place? \_\_\_\_\_
8. What is your mother tongue? \_\_\_\_\_
9. Religion: \_\_\_\_\_ Caste: OBC: \_\_\_ SC: \_\_\_ ST: \_\_\_ General: \_\_\_  
Others: \_\_\_\_\_
10. Are you: single \_\_\_\_\_ married \_\_\_\_\_ widowed \_\_\_\_\_ living alone \_\_\_\_\_
11. If a migrant, are you supporting your family? Yes \_\_\_\_\_ No \_\_\_\_\_
12. What did you do before you became a waste picker? (Ask if s/he is **not** a traditional waste picker)  
\_\_\_\_\_
13. What are your reasons for waste picking? (Ask if s/he is **not** a traditional waste picker)  
\_\_\_\_\_
14. How many years have you been working as a waste picker? (please tick)  

1-3 years	3-5 years	5-8 years	8-10 years	More than 10 years
15. How many hours do you work in a day? (please tick)  

2-4 hours	4-6 hours	6-8 hours	8-10 hours	More than 10 hours
16. Type of waste material you are segregating: (Please tick)  

Types of waste material						
Plastic		Paper Products	Metal	Electronic material	Clothes	Others
PET bottles	Recyclable plastic	Other relevant plastic materials				

17. What is your income based on? (please tick)

Particulars	(please tick in the appropriate box)	Income earned (Rs.)
Fixed daily wages (in case worked for entrepreneur/ ULBs)		
Quantity / type of waste material segregated and sell to Kabadiwallas		

18. Do you have other sources of income? Yes: No: \_\_\_\_\_ (please tick)

What is the source?(kind of work)	Hours spent in a day	Income per month

19. How much do you spend on a **weekly** basis on food, recreation and other activities?

Sl. No	Particulars	Amount / week (Rs.)
1.	Food	
2.	Transport	
3.	Material related to work	
4.	Recreation	
5.	Others	

20. What is the distance you cover in a day? (please tick)

Less than 2 km	2-4 km	4-6 km	6-8 km	More than 8 km

21. Which are the areas you collect waste from? -----

22. Do you face any problems at work? (please tick)

Harassment <b>(If yes, by whom?)</b>	Delay / Irregular payment by scrap dealers	Lack of transportation	Not getting enough material to sell	Others

23. What kind of work do you want to do in the future? (please tick)

To continue working as a waste picker	Move to another profession

24. Would you be interested in working under the municipality/any other agency appointed by the municipality? (as a waste collector/sanitation worker).

Employer	Yes	No	If no, why?
Municipality			
Third party agency appointed by municipality			

**Name of the Urban Local Body**

**Informal Waste Pickers Registration Format**

**Format-2**

Sl. No	Name of the Person	Fathers Name	Address of the Person	Registration Number	Aadhar Card/voter ID No.	Name and Signature of the verifying officer/person (Municipality authority, EO/MC)	Passport Photograph of the person
1							
2							
3							

***N.B: The Urban Local bodies will conduct survey for identification of waste pickers working in the city and will also ensure registration of them in the above mentioned format.***

## Informal Waste Pickers Identity Card

### Format-3

<b>NAME OF THE ULB SWACHHAGRAHI</b>		
<b>Registration/ID card No:</b> _____	<b>INFORMAL WASTE COLLECTOR/WASTE PICKER ID CARD</b>	
<b>Name of the Person:</b> _____	<b>Signature/Thumb Impression</b>	
<b>Address:</b> _____	<b>Authorised Signatory</b>	
<b>Age/date of Birth:</b> _____		
<b>Gender:</b> Male _____ Female _____ Other _____		
<b>Blood Group:</b> _____		
<b>Contact No, If any:</b> _____		

## Annexure-2

पत्रांक-03/SBM-01-13/16 ७।३  
 बिहार सरकार  
नगर विकास एवं आवास विभाग।

/ न०विं०एवंआ०वि०

प्रेषक,  
 द्वैतन्य प्रसाद, भा०प्र०से०,  
 प्रधान सचिव,  
 नगर विकास एवं आवास विभाग।

सेवा में,  
 नगर कार्यपालक पदाधिकारी,  
 सभी नगर परिषद्/नगर पंचायत।

पटना, दिनांक ०९।४।१८

विषय:- स्वच्छ भारत मिशन के अंतर्गत निकाय स्तर पर ठोस अपशिष्ट प्रबंधन-2016 (SWM-2016) के क्रियान्वयन के संबंध में।

महाशय,  
 उपर्युक्त विषय के संबंध में कहना है कि शहरी विकास मंत्रालय, भारत सरकार द्वारा स्वच्छ भारत मिशन (शहरी) के अंतर्गत ठोस अपशिष्ट प्रबंधन-2016 का क्रियान्वयन सभी नगर परिषद्/नगर पंचायत में कराना है।

प्रारंभिक ठोस अपशिष्ट प्रबंधन के क्रियान्वयन के हेतु विभाग द्वारा तैयार किये गये मार्गदर्शिका एवं इससे संबंधित Estimate की प्रति संलग्न कर भेजी जा रही है। इस मार्गदर्शिका के आलोक में अतिशीघ्र सभी नगर परिषद्/नगर पंचायत अपने निकाय स्तर पर क्रियान्वयन करना सुनिश्चित करेंगे तदोपरान्त अधोहस्ताक्षरी को इसके प्रगति से अवगत करायेंगे।

क्रियान्वयन के दौरान तकनीकी सहायक हेतु स्वच्छ भारत मिशन के स्टेट प्रोग्राम मैनेजमेंट यूनिट, बिहार के श्री राव्यसाची साहू SWM, Expert को फोन नं. 09470557781 email : sbmpmu.bihar@gmail.com से सम्पर्क किया जा सकता है।

अनु०- SWM-2016 मार्गदर्शिका एवं Estimate की प्रति

विश्वासमाजन,  
 ५।४।२०१८

प्रधान सचिव,

नगर विकास एवं आवास विभाग।

## बिहार सरकार

### नगर एवं आवास विभाग

#### ठोस अपशिष्ट प्रबंधन के क्रियान्वयन के लिए मार्गदर्शिका

भारत सरकार के शहरी विकास मंत्रालय के दिशा-निर्देश एवं स्वच्छ भारत मिशन (शहरी) के अनुसार बिहार के सभी नगर निकायों में ठोस अपशिष्ट प्रबंधन के क्रियान्वयन के लिए मार्गदर्शिका प्रस्तुत की जा रही है। इस कार्य को पारदर्शितापूर्ण नियमानुकूल निविदा के द्वारा सम्पन्न करायेंगे।

निकाय स्तर पर ठोस अपशिष्ट प्रबंधन कराने हेतु सभी नगर निकायों को निम्नलिखित कार्यप्रणाली के अनुसार कार्य करना होगा।

1. घर-घर से कचरा संग्रहण (Door to Door Collection)
2. कचरा का संग्रहण एवं परिवहन (Collection and Transportation)
3. ठोस अपशिष्टों का प्रसंस्करण (Processing)
4. ठोस अपशिष्टों का निपटान (Disposal)

##### **1. Door to Door Waste Collection**

- 1.1 सभी नगर निकायों को घर-घर से कचरा संग्रहण (Door to Door Waste Collection) सुनिश्चित करना होगा। घर-घर से ठोस अपशिष्ट संग्रहण हेतु सभी नगर निकायों को प्रत्येक घरों में नीला एवं हरा डस्टबीन देना होगा। नीला डस्टबीन में सूखा कचरा (अजैविक), एवं हरा डस्टबीन में गिला कचरा (जैविक) रखने के लिए सारे नगर निकायों को जागरूकता अभियान चलाकर लोगों को जागरूक करना होगा।
- 1.2 घर-घर से अपशिष्ट संग्रहण हेतु ट्राई-साइकिल/कंटनरीकृत हाथ गाड़ी/ऑटो-टीपर क्षेत्र की आबादी के अनुसार उपलब्ध कराना होगा।
- 1.3 घर-घर से ठोस अपशिष्ट संग्रहण हेतु सारे नगर निकायों को निमानुसार ठोस अपशिष्ट संग्रहणकर्ता रखने का प्रबंधन कर सकते हैं। एक अपशिष्ट संग्रहणकर्ता निम्नलिखित दिए गए घरों की संख्या के सूची के अनुसार क्षेत्रवार कार्य कर सकते हैं। सभी नगर निकायों को सभी ठोस अपशिष्ट संग्रहणकर्ताओं को ट्राई-साइकिल/कंटनरीकृत हाथ गाड़ी का प्रबंध करना होगा।

क्षेत्र	घरों की संख्या	अपशिष्ट संग्रहणकर्ता की संख्या
घनी आबादी वाला क्षेत्र	250	1 अदद
मध्यम आबादी वाला क्षेत्र	200	1 अदद
कम आबादी वाला क्षेत्र/ बिखरे हुए आबादी वाला क्षेत्र	125	1 अदद

- 1.4 सभी नगर निकायों को अपने क्षेत्रान्तर्गत बसे हुए घरों का आकलन करते हुए ठोस अपशिष्ट संग्रहणकर्ता, ड्राई-साइकिल/ कंटनरीकृत हाथ गाड़ी की आवश्यकतानुसार मूल्यांकन कर वितरण करना सुनिश्चित करना होगा।
- 1.5 जहाँ ऑटो-टीपर की आवश्यकता है, वहाँ नगर निकाय को हर 1500–2000 घरों के लिए हर दिन ठोस अपशिष्ट संग्रहण हेतु एक ऑटो-टीपर के साथ एक चालक एवं एक अपशिष्ट संग्रहणकर्ता को रखना सुनिश्चित करना होगा।
- 1.6 ठोस अपशिष्ट संग्रहण का कार्य प्रत्येक दिन सुबह 06:00 से 10:00 बजे तक सभी घरों एवं सभी व्यवसायिक क्षेत्रों में 10:00 से 12:00 बजे तक करना सुनिश्चित करना होगा।
2. कचरा का संग्रहण एवं परिवहन (**Collection and Transportation**)
- 2.1 सभी नगर निकायों को घर-घर से ठोस अपशिष्ट (जैविक एवं अजैविक) संग्रहण एवं परिवहन हेतु ड्राई-साइकिल/ कंटनरीकृत हाथ गाड़ी/ऑटो-टीपर को जैविक एवं अजैविक ठोस अपशिष्ट की पहचान कर अलग-अलग संग्रहण करना सुनिश्चित करना होगा।
- 2.2 घर-घर से अलग-अलग संग्रहण किये गये ठोस अपशिष्टों (जैविक एवं अजैविक) को चिह्नित Community Bins (हरा-जैविक एवं नीला-अजैविक) में संग्रहण करना होगा।
- 2.3 सभी नगर निकायों को प्रत्येक 500 मीटर की दूरी पर Community Bins (हरा-जैविक एवं नीला-अजैविक) रखने का प्रबंधन करना सुनिश्चित करना होगा। इन संग्रहित ठोस अपशिष्टों को नगर निकाय द्वारा कार्य में लगे हुए वाहन द्वारा उठाकर उसे परिवहन द्वारा प्रसंस्करण क्षेत्र में ले जाना सुनिश्चित करना होगा।
- 2.4 सभी नगर निकायों को अपने क्षेत्र में (घर/व्यवसायिक स्थल/सड़क पर) रखे गए Community Bins की सूची वार्ड, चिह्नित स्थान एवं Community Bins की क्षमता के अनुसार तैयार करना सुनिश्चित करना होगा।

- 2.5 सभी नगर निकायों को अपशिष्ट संग्रहण में लगे गाड़ियों की मार्ग-चिन्हित करना होगा। सभी सफाई कर्मचारियों की कार्य-सूची वार्ड के अनुसार तैयार करना सुनिश्चित करना होगा।
- 2.6 सभी नगर निकायों को यह सुनिश्चित करना होगा की सभी गाड़ियों द्वारा ठोस अपशिष्ट प्रबंधन का कार्य (कितना अपशिष्ट संग्रह हुआ एवं कितना अपशिष्ट प्रसंस्करण तथा निपटान के लिए गया) प्रतिदिन दैनिक-पंजी में भरा जा रहा है या नहीं।
- 2.7 सभी नगर निकायों को अपने क्षेत्र में (घर/व्यवसायिक स्थल/सड़क पर) रखे गए Community Bins को प्रतिदिन अथवा आवश्यकतानुसार गाड़ियों (Dumper Placer, Tipper, Compactor) द्वारा उठाकर प्रसंस्करण एवं निपटान करना सुनिश्चित किया जाए।
- 3. ठोस अपशिष्टों का प्रसंस्करण (Processing)**
- 3.1 सभी नगर निकायों द्वारा अलग-अलग (जैविक एवं अजैविक अपशिष्ट) संग्रह किये गए अपशिष्ट को प्रसंस्करण स्थल पर लाना सुनिश्चित करना होगा।
- 3.2 कोई भी नगर निकाय संग्रह किए गए अपशिष्टों को यत्र-तत्र न फेंके। नगर निकाय द्वारा चिन्हित किए गए जगहों पर ही डालना सुनिश्चित करना होगा।
- 3.3 सभी नगर निकायों द्वारा यह सुनिश्चित करना होगा कि किसी भी प्रकार के अपशिष्ट को यत्र-तत्र न जलायें।
- 3.4 प्रसंस्करण स्थल पर जैविक एवं अजैविक अपशिष्ट को अलग-अलग रखने का स्थल सुनिश्चित किया जाए। आवश्यकतानुसार अगर सुखा एवं गिला अपशिष्ट एक साथ हो तो पुनः इसे अलग-अलग करने की व्यवस्था की जाए। दोबारा अपशिष्टों को अलग-अलग करने के लिए आवश्यकतानुसार PCC Platform तथा Shed का व्यवस्था कराया जा सकता है।
- 3.5 Rag Picker को Waste Collection में शामिल करने हेतु स्थानीय कबाड़ी खरीदने वालों की बैठक निकाय स्तर पर आहूत करने की कार्रवाई की जाय तत्पश्चात निकाय अन्तर्गत सभी कबाड़ी वालों चिन्हित कर सूची बनाया जाय।
- 3.6 सभी चिन्हित कचरा बिनने वालों (Rag Picker) को नगर-निकाय द्वारा पंजीकृत किया जाएगा एवं नगर-निकाय द्वारा पहचान-पत्र दिया जाएगा।
- 3.7 गीला अपशिष्ट को Compost बनाने का प्रावधान किया जाएगा एवं सुखा अपशिष्ट को कबाड़ी वाले को बेचा जाएगा।

- 3.8 नगर निकाय अपने क्षेत्र में उत्पन्न अपशिष्ट को निम्नलिखित तरीके से प्रसंस्करण करना सुनिश्चित करेंगे।
- क. केन्द्रीयकृत पद्धति (Centralised)
  - ख. विकेन्द्रीकृत पद्धति (Decentralised)
  - क. **केन्द्रीयकृत पद्धति (Centralised)** : ऐसे नगर निकाय जहाँ जमीन उपलब्ध नहीं है, वे सभी जैविक एवं अजैविक अपशिष्ट को एक जगह पर एकत्रित कर प्रसंस्करण हेतु जैविक अपशिष्ट को खाद बनाने हेतु एवं अजैविक अपशिष्ट को कचरा बिनने वाले/कबाड़ी वाले को बेचना सुनिश्चित करेंगे।
  - ख. **विकेन्द्रीकृत पद्धति (Decentralised)** : ऐसे नगर निकाय जहाँ जमीन की उपलब्धता हो, कम्पोस्टिंग कार्य के लिए वार्डों को कलस्टरिंग कर 8–10 वार्डों के लिए विकेन्द्रीकृत प्रसंस्करण हेतु स्थल चिन्हित किया जाए। प्रसंस्करण हेतु चिन्हित स्थलों पर जैविक एवं अजैविक अपशिष्ट को अलग-अलग भंडारण कर गीले अपशिष्ट को कम्पोस्टिंग प्लेटफार्म/पीट बनाकर कंपोस्टिंग कार्य कराया जाय। सुखा अपशिष्ट को कचरा बिनने वाले/कबाड़ी वाले को बेचना सुनिश्चित करते हुए प्राप्त धन राशि से उक्त कार्य में लगे हुए श्रमिक/कर्मचारियों का पारिश्रमिक/मानदेय का भुगतान करें।
- 3.9 प्रारंभिक ठोस अपशिष्ट प्रबंधन के क्रियान्वयन हेतु विभाग द्वारा तैयार किये गये मॉडल प्राक्कलन जिसमें 20 अद्द कम्पोस्ट पिट एवं उसके ऊपर सी.जी.आई. सीट का शेड के निर्माण का प्रावधान किया गया है। जिसकी प्राक्कलन प्रति इस मार्गदर्शिका के साथ संलग्न किया जा रहा है। प्राक्कलन के अनुसार कम्पोस्ट पिट की संख्या जगह की उपलब्धता एवं आवश्यकतानुसार घटायी एवं बढ़ायी जा सकती है।
- 3.10 कम्पोस्टिंग कार्य के बाद उसको खाद के रूप में परिवर्तन कर बैग में भरकर संग्रह किया जाय।
- 3.11 अंतिम रूप से बने हुए खाद को कृषि विभाग/नरसरी/किसान आदि को बेचने का प्रावधान किया जाए।
- 3.12 प्रसंस्करण के बाद निकला हुआ निष्क्रिय अपशिष्ट (Inert Waste/Rejects) को भूमिभरण हेतु भेजना सुनिश्चित किया जाए।

- 4. ठोस अपशिष्टों का निपटान (Disposal)**
- 4.1 निष्क्रिय अपशिष्ट (Inert Waste/Rejects) को नगर निकाय द्वारा चिह्नित किए गए भूमि भरण स्थल पर निपटान करना है।
- 4.2 जिन नगर निकायों के पास भूमि भरण स्थल (landfill site) उपलब्ध नहीं है, वो अपने क्षेत्र से उत्पन्न निष्क्रिय अपशिष्ट का निपटान हेतु आवश्यकतानुसार भूमि भरण को चिह्नित कर उपयोग में लावेंगे।
- 4.3 भूमि भरण स्थल (landfill) कम-से-कम 20–25 वर्षों तक चलने के लिए पर्याप्त रूप से बड़े होंगे तथा जलजमाव और दुरुपयोग को रोकने के लिए चरणब; तरीके से “भूमि भरण सेल” विकसित किए जाएंगे।
- 4.3 भूमि भरण स्थल नदी से 100 मीटर, तालाब से 200 मीटर, राजमार्ग, आवास स्थलों, सार्वजनिक उद्यानों और जल आपूर्ति कुंओं से 200 मीटर तथा विमानपत्तनों या हवाई अड्डे से 20 किमी. की दूरी पर होंगे। तथापि, विशेष मामले में, भूमि भरण स्थल को नागर विमानन प्राधिकरण/वायु सेना, जेसा भी मामला हो, से अनापत्ति प्रमाण पत्र प्राप्त कर लेने के बाद विमानपत्तन/हवाईअड्डे से 10 और 20 किमी. की दूरी के अंदर स्थापित किया जा सकता है तटीय विनियम जोन, नमभूमि, महत्वपूर्ण आवासीय क्षेत्रों, संवेदनशील पारि-भंगुर क्षेत्रों और गत 100 वर्षों से यथा दर्ज बाढ़ के मैदानों के अंदर भूमि भरण स्थल के लिए अनुमति नहीं दी जाएगी।
- 4.4 सभी नगर निकायों को निष्क्रिय अपशिष्ट को ठोस अपशिष्ट नियमावली 2016 के आलोक में निपटान का प्रबंधन किया जाना सुनिश्चित करेंगे।

## !! पीत पत्र के बदले !!

श्रीमति इंदू कुमारी,  
विशेष कार्य पदाधिकारी  
नगर विकास एवं आवास विभाग, पटना।

८००.१ २४  
१२/२/१८

कचरा से कम्पोस्ट तैयार करने हेतु 20 अद्द कम्पोस्ट पीट शेड के साथ निर्माण हेतु मॉडल प्राक्कलन तैयार किया गया है, जिस पर अनुमोदन प्राप्त कर सभी नगर निकायों को आवश्यक कार्रवाई हेतु भेजा जा सकता है।

प्राक्कलन के साथ संक्षिप्त गार्डलाइन्स संलग्न है।

अनु०:-यथोक्त।  
लोगल

कार्यपालक अभियंता  
नगर विकास एवं आवास विभाग

## Guidelines for Constructions of Compost Pit with CGI shed:-

1. स्थानीय नगर निकायों द्वारा कचरा के संबर्द्धन से कम्पोस्ट खाद का निर्माण करने हेतु एक मॉडल प्राक्कलन तैयार किया गया है। मॉडल प्राक्कलन में 20 अद्द कम्पोस्ट पिट एवं उसके ऊपर सी०जी०आई० सीट का शेड के निर्माण का प्रावधान, प्राक्कलन में किया गया है।
2. उक्त कम्पोस्ट पिट की संख्या जगह की उपलब्धता एवं आवश्यकतानुसार घटायी एवं बढ़ायी जा सकती है, परन्तु मॉडल प्राक्कलन में 20 अद्द कम्पोस्ट पिट का प्रावधान करते हुए प्राक्कलन तैयार किया गया है।
3. 1 कम्पोस्ट पिट का आकार  $4 \times 4$  फीट तथा ऊँचाई 3 फीट रखी गयी है तथा ब्रीक वर्क के ऊपर 3 इंच आर०सी०सी० कोपिंग दिया गया है ताकि ब्रीक वर्क स्टेबल रह सके। तैयार कम्पोस्ट को निकालने हेतु 1.5 फीट चौड़ाई का opening भी छोड़ा गया है, जिसमें मीडियम डेनसीटी का फाइबर स्टर लगाया जाना है।
4. शेड के लिए संलग्न नकशा में दर्शाये गये स्थिति के अनुसार फाउन्डेशन तैयार कर एम०एस० पोस्ट पर ट्रस का निर्माण कर पिट के दोनों तरफ सी०जी०आई० सीट से उसे कभर करना है ताकि बीच में रीज बन सके एवं बरसात में पानी से कम्पोस्ट निर्माण की प्रक्रिया को क्षति नहीं पहुँचे।
5. प्राक्कलन में निर्माण सामग्रियों के ढलाई का दर वास्तविकता के आधार पर प्रावधान करते हुए प्राक्कलन पर सक्षम प्राधिकार से तकनीकी स्वीकृति प्राप्त कर निर्माण कराया जा सकता है।
6. शेड निर्माण में एम०एस० पोस्ट 40एम०एम० व्यास का लगाया जाना है। साथ ही ट्रस, परलीन में भी 40एम०एम० व्यास का ही उपयोग किया जाना है। विंड टाई के रूप में  $40 \times 6$ एम०एम० के पट्टी का उपयोग किया जाना है।

**URBAN DEVELOPMENT AND HOUSING DEPARTMENT**

**MODEL ESTIMATE FOR CONSTRUCTION  
OF HONEY COMB BRICK WORK BOX (PIT)  
WITH CGI SHEET SHED FOR COMPOST-  
20 No.**

**ESTIMATED COST - 2,14,500/-**

## प्राक्कलन प्रतिवेदन

प्रस्तुत प्राक्कलन रूपये 2,14,500/- (दो लाख चौदह हजार पाँच सौ) रूपये मात्र का ~~इकाई~~ कचरा से compost तैयार करने हेतु 20 अद्द Honey Comb Brick Work Box (PIT) with CGI Sheet shed के निर्माण कार्य हेतु तैयार किया गया है।

प्राक्कलन में स्थल को 50' x 15' में साफ-सफाई कर 10" चौड़ा एवं 4" गहरा नींव खुदाई कर 4" thick P.C.C का foundation का प्रावधान किया गया है।

चारों तरफ 10" thick एवं बीच में 5" thick Honey comb Brick Work wall 3' height का प्रावधान कर 20 अद्द Box का निर्माण का प्रावधान किया गया है। Brick Work के ऊपर R.C.C का 3" thick coping का प्रावधान किया गया है। प्रत्येक Box में Compost निकालने हेतु 1'-6" x 3'-3" का gate का प्रावधान किया गया है तथा gate में Medium density fibre का shutter लगाने का प्रावधान किया गया है। प्राक्कलन में Shed with CGI Sheet का भी प्रावधान किया गया है, जो प्राक्कलन के (PART-B) के रूप में संलग्न है।

प्राक्कलन में सभी मदों का दर वर्तमान में चालू भवन निर्माण विभाग के अनुसूचित दर (17.10.2016 से प्रभावी) से ली गई है। सभी निकायों के लिए यह प्राक्कलन मॉडल प्राक्कलन के रूप में उपयोगी किया जा सकता है।

अक्टूबर २०१८

५३४  
कार्यपालक अभियंता

## GENERAL ABSTRACT OF COST

1	Construction of Honey Comb Brick Work (20 NOS. BOX)	
2	Construction of Shed with CGI sheet (20 NOS. BOX)	82900.00
	<b>GRAND TOTAL FOR 20 NOS. BOX</b>	131600.00
		<b>214500.00</b>

Technically approved for Rs 2,14,500.00 (Rupees Two lac  
Fourteen thousand five hundred) only.

Leviha  
12.2.18  
A-E  
BUDA

G. M.  
12.2.18  
E.E  
BUDA

S. E.  
12.2.18  
S.E  
BUDA

PART - A

Detailed Estimate for Construction of Honey Comb Brick  
work Box (Pit) for Compost Preparation

Sl. No.		Item of Work		
1	<b>BCD</b> <b>2.1</b>	Earth work in surface excavation not exceeding 30 cm in depth but exceeding 1.5 m in width as well as 10 sqm on plan including disposal of excavated earth upto 50 m and lift upto 1.5 m disposed soil to be leveled and neatly dressed	$15' \times 50' = 750.00 \text{ sft} = 64.70 \text{ m}^2$ @ 3274.40/100 m <sup>2</sup>	Rs. 2282.00
2	<b>BCD</b> <b>2.8.1</b>	Earth work in excavation in foundation trenches or drains(not exceeding 1.5 m in width or 10 sqm on plan) including dressing of sides and ramming of bottoms, lift upto 1.5 m . including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.	$2 \times 45'-7'' \times 10'' \times 4'' = 25.313 \text{ cft}$ $2 \times 8'-5'' \times 10'' \times 4'' = 4.673 \text{ cft}$ $9 \times 8'-5'' \times 5'' \times 4'' = 10.503 \text{ cft}$ $10 \times 4' \times 5'' \times 4'' = 5.546 \text{ cft}$ $46.035 \text{ cft} = 1.303 \text{ m}^3$ @ 230.50m <sup>3</sup>	Rs. 300.00
3	<b>BCD</b> <b>5.1.3</b>	Providing and laying in position specified grade of reinforced cement concrete excluding the cost of centring,shuttering,finishing and reinforcement-All work puto plinth level 1:2:4 (1 cement:2 coarse sand:4 graded stone aggregate 20 mm nominal size)	$2 \times 45'-7'' \times 10'' \times 4'' = 25.313 \text{ cft}$ $2 \times 8'-5'' \times 10'' \times 4'' = 4.673 \text{ cft}$ $9 \times 8'-5'' \times 5'' \times 4'' = 10.503 \text{ cft}$ $10 \times 4' \times 5'' \times 4'' = 5.546 \text{ cft}$ $46.035 \text{ cft} = 1.303 \text{ m}^3$ @ 3984.50m <sup>3</sup>	Rs. 5192.00
4	<b>BCD</b> <b>6.32A</b>	Honey- comb brick work 11/11.4 cm thick with bricks of class designation 100A in cement mortar 1:4 (1 cement: 4 coarse sand)	$9 \times 8'-5'' \times 3'' = 222.232 \text{ sft}$ $10 \times 4' \times 3'' = 120.00 \text{ sft}$	

347.232 sft = 32.27 m<sup>2</sup>

@ 384.80/m<sup>2</sup> Rs. 12417.00

5      **BCD**    Brick work with bricks of class designation 100A in foundations and plinth  
6.1.12/I    in : Cement mortar 1 :4 (1 cement: 4 coarse sand )

2 x 45'-7" x 10" x 3' = 227.823 cft

2 x 8'-5" x 10" x 3' = 42.063 cft

269.886 cft

Less of Open door (gate)

20 x 1'-6" x 10" x 3' = (-) 74.970 cft

194.916 cft

Less for Honey Comb       @ 20% = (-) 38.983 cft

155.933 cft = 4.416m<sup>3</sup>

@ 4724.40/m<sup>3</sup>    Rs. 20863.00

6      **BCD**    Providing and laying in position specified grade of reinforced cement  
5.1.3    concrete excluding the cost of centring,shuttering,finishing and  
einforcement-All work upto plinth level 1:2:4 (1 cement:2 coarse sand:4  
graded stone aggregate 20 rr,m nominal size)

2 x 45'-7" x 10" x 3" = 18.985 cft

2 x 8'-5" x 10" x 3" = 3.505 cft

9 x 8'-5" x 5" x 3" = 7.877cft

10 x 4' x 5" x 3" = 4.160 cft

Less or gate

20 x 1'-6" x 10" x 3" = (-) 6.247 cft

28.28 cft = 0.80 m<sup>3</sup>

@ 3984.50m<sup>3</sup>    Rs. 3188.00

7      **BCD**    Reinforcement for R.C.C. work including straightening, cutting,  
5.22.7A    bending, placing in position and binding all complete. Thermo-  
Mechanically Treated bars TMTC-500-8mm dia.

2 x 2 x 45'-7" = 182.332 rft

2 x 2 x 10'-1" = 40.332 rft

9 x 10'-1" = 90.747 rft

1 x 45'-7" = 45.583 rft

358.994 rft

Copying-

358.994 x 2 = 717.988 rft

For Latera/Reinforcement

$$2 \times 223 \times 1'-2" = 517.36 \text{ sft}$$

$$1235.348 \text{ rft} = 376.630 \text{ m}$$

$$@ 0.39 \text{ kg/m} = 146.89 \text{ kg} @ 56.00/\text{kg}$$

8      **BCD**    Centring and shuttering including strutting, propping etc. and removal of  
**5.9.1**    form for. Foundations, footings, bases of columns etc. for mass concrete.      Rs.    8226.00

$$2 \times 2 \times 45'-7" \times 4" = 60.77 \text{ sft}$$

$$2 \times 2 \times 10'-1" \times 4" = 13.44 \text{ sft}$$

$$2 \times 9 \times 8'-5" \times 4" = 50.49 \text{ sft}$$

$$2 \times 10 \times 4' \times 4" = \underline{26.66 \text{ sft}}$$

$$151.36 \text{ sft}$$

at top

$$\underline{113.52 \text{ sft}}$$

$$264.88 \text{ sft} = 24.617 \text{ m}^2$$

$$@ 169.00/\text{m}^2 \quad \text{Rs.} \quad 4160.00$$

Providing and fixing Pre-laminated medium density fibre board IS:

14587:1998 marked, with one side decorative lamination other side balancing lamination Grade-I(exterior grade) in shelves with screws and

9      **BCD**    fittings wherever required, edges to be sealed with PVC edge bending  
**9.157.1**    tape 2.00 mm thick of approved brand (fittings to be paid separately).  
 Pre-laminated with decorative lamination one side and other side balancing  
 lamination exterior Grade - I MDE Board 18 mm thick confirming to  
 IS:14587

$$20 \times 2' \times 3' = 120.00 \text{ sft}$$

$$= 11.152 \text{ m}^2$$

$$@ 1268.20/\text{m}^2 \quad \text{Rs.} \quad 14143.00$$

10 CARRIAGE OF MATERIAL

(i)	Cement- 1.308 MT @ 275.52/MT	Rs.	360.00
(ii)	Coarse Sand - 2.721 m <sup>3</sup> @ 262.43/m <sup>3</sup>	Rs.	714.00
(iii)	Stone Chips 1.872 m <sup>3</sup> @ 388.48/m <sup>3</sup>	Rs.	727.00
(iv)	Brick 3298 No. @ 620.14% No	Rs.	2045.00

**11 Difference Cost of Material**

Cement (PSC) - 1.308 MT @ 0.00

NIL

Brick 3298 No @ 0.00

NIL

**TOTAL**

**74617.00**

**12 Add Extra Cost of Carriage of Material and difference Cost of Material for  
other ULB. @ 10%**

Rs. 7461.70

**TOTAL**

**82079.00**

Add Contingency @ 1%

Rs. 821.00

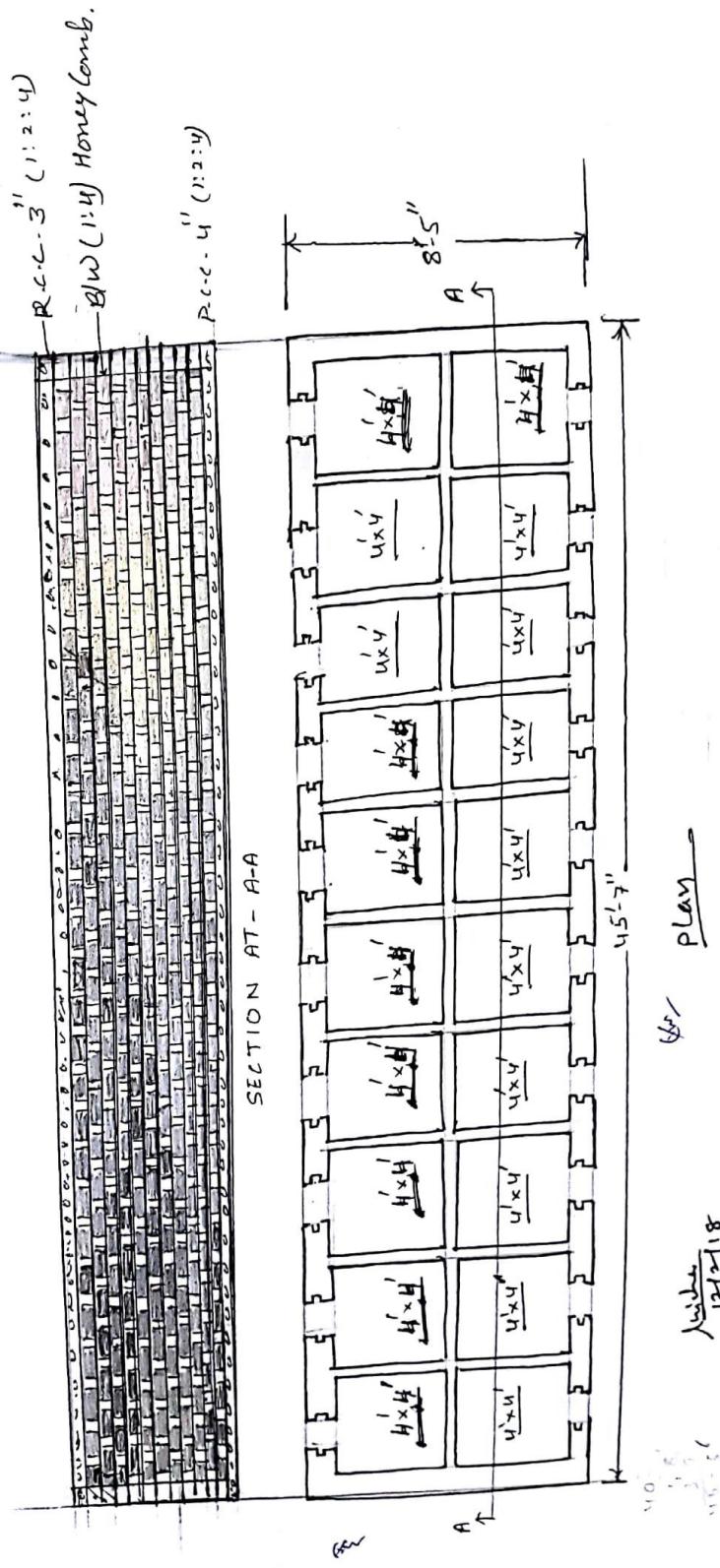
**GRAND TOTAL**

**82900.00**

Rate of one unit = Rs. 4145

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### PART - B

## Detailed Estimate for Construction of Honey Comb Brick work Box (Pit) for Compost Preparation

Sl. No.	Item of Work	@	Rs.
1	<b>BCD</b> <b>2.8.1</b> Earth work in excavation in foundation trenches or drains(not exceeding 1.5 m in width or 10 sqm on plan) including dressing of sides and ramming of bottoms, lift upto 1.5 m . including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.	$8 \text{ No} \times 2' \times 2' \times 2' - 6'' = 80.00 \text{ cft} = 2.265\text{m}^3$ @ 230.50/m <sup>3</sup>	522.00
2	<b>BCD</b> <b>2.28</b> Supplying and Filling in plinth with local sand and under floors including, watering, ramming consolidating and dressing complete.	$8 \text{ No} \times 2' \times 2' \times 3'' = 8.00 \text{ cft} = 0.226\text{m}^3$ @ 204.40/m <sup>3</sup>	46.00
3	<b>BCD</b> <b>11.72</b> Providing designation 100 A one brick flat soling joints filled with local sand including cost of watering, taxes, royalty all complete as per building specification and direction of E/I,	$8 \times 1' - 3'' \times 1' - 3'' = 12.50 \text{ sft} = 1.162\text{m}^2$ @ 253.80/m <sup>2</sup>	295.00
4	<b>BCD</b> <b>5.1.3</b> Providing and laying in position specified grade of reinforced cement concrete excluding the cost of centring,shuttering,finishing and einforcement-All work upto plinth level 1:2:4 (1 cement:2 coarse sand:4 graded stone aggregate 20 mm nominal size)	$8 \times 1' - 0'' \times 1' - 0'' \times 2' - 0'' = 16.00 \text{ cft} = 0.453\text{m}^3$ @ 3984.50/m <sup>3</sup>	1805.00
5	<b>BCD</b> <b>10.16.1</b> Steel work in built up tubular trusses including cutting, hoisting, fixing in position and applying a priming coar of approved steel primer, welded and bolted including special shaped washers etc. complete: Hot finished welded type tubes	for Post - $8 \times 8' = 64.00 \text{ rft}$ For truss - $4 \times 42' - 2'' = 168.66 \text{ rft}$ Purline - $4 \times 50' - 0'' = 200.00 \text{ rft}$ $432.66 \text{ rft} = 131.91 \text{ m}$ @ 3.50 kg/m = 461.685 kg @ Rs. 92.30/kg      Rs. 42614.00	

6	<b>BCD</b>	Providing corrugated G.S. sheet roofing fixed with G.I.J. or hooks, bolts and nuts 8 mm diameter with bitumen and G. I. limpet washers or with G.I. steel primer and two coats of approved paint on over lapping of sheets complete (upto a pitch of 60°) excluding the cost of purlins, rafters and trusses.	175
	<b>12.1.4</b>		
7	<b>BCD</b>	Providing ridges or hips of width 60 cm overall width plain G.S. sheet fixed	@ 729.70/m <sup>2</sup> Rs. 54252.00
	<b>12.6.1</b>	with G.I.J. or L hooks . Bolts and nuts 8 mm dia. G. I. limpet and bitumen washers complete.	
			$50' \times 0'' = 15.24$ No say 16 m
8	<b>BCD</b>		@ 499.900/m      Rs. 7998.00
	<b>12.13</b>	Extra for providing and fixing wind ties of 40x6mm flat iron section.	
			$4 \times 50' - 0'' = 200.00$ rft
9	<b>BCD</b>	Painting with ready mixed paint of approved brand and manufacture in all shades to give an even shade:	@ 113.20/m      Rs. 6902.00
	<b>13.82.1</b>	New steel work (two or more coats)	
		$2 \times 74.348 \text{ m}^2 = 148.696 \text{ m}^2$	
		Post- $8 \times 2.40 \text{ m} \times 3.14 \times (0.04) = 2.413 \text{ m}^2$	
		Truss- $131.91 \times 3.14 \times (0.04) = 16.576 \text{ m}^2$	
		$167.685 \text{ m}^2$	
			@ Rs 63.60/m <sup>2</sup> Rs. 10664.00
10	<b>BCD</b>	Providing and fixing 16mm dia threaded Bolt and Nut	
			$8 \times 4 = 32$ no - L.S Rs. 20 each      Rs. 640.00
11	<b>BCD</b>	Steel work in built up tubular trusses including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer, welded and bolted including special shaped washers etc. complete:	
	<b>10.16.1</b>	Hot finished welded type tubes	
			at Base- 8 No = 14.13 kg
			@ 92.30/kg      Rs. 1304.00
12	<b>BCD</b>	Reinforced cement concrete work in well-steining excluding the cost of centrin,shuttering, finishing and reinforcement with 1:2:4 (1cement:2 coarse sand:4 graded stone aggregate 20 mm nominal size)	
	<b>5.7</b>		
		$8 \times 4 \text{ No} \times 3' - 0'' = 96.00 \text{ rft} = 29.268 \text{ m} @ 0.62 \text{ kg/m} = 18.14 \text{ kg}$	
			@ 54.70/kg      Rs. 1006.00

8mm Ring 8 x 7 No x 3' - 8" = 205.33 rft = 62.60m @ 0.39kg/m = 24.41 kg  
 @ 56.00/kg Rs. 1367.00

**13 CARRIAGE OF MATEIRAL**

(i)	Brick 38 No. @ 621.75 % No	Rs.	24.00
(ii)	Cement- 0.145 MT @ 275.52/M <sup>3</sup>	Rs.	40.00
(iii)	Coarse Sand - 0.202 m <sup>3</sup> @ 842.25/m <sup>3</sup>	Rs.	170.00
(iv)	Stone Chips 0.404 m <sup>3</sup> @ 1472.50/m <sup>3</sup>	Rs.	49.00
(v)	Local Sand 0.226 m <sup>3</sup> @ 217.99/m <sup>3</sup>		130293.00
	<b>TOTAL</b>	Rs.	1303.00
	<b>Add Contigency @ 1%</b>		131596.00
	<b>GRAND TOTAL</b>	Rs.	131600.00

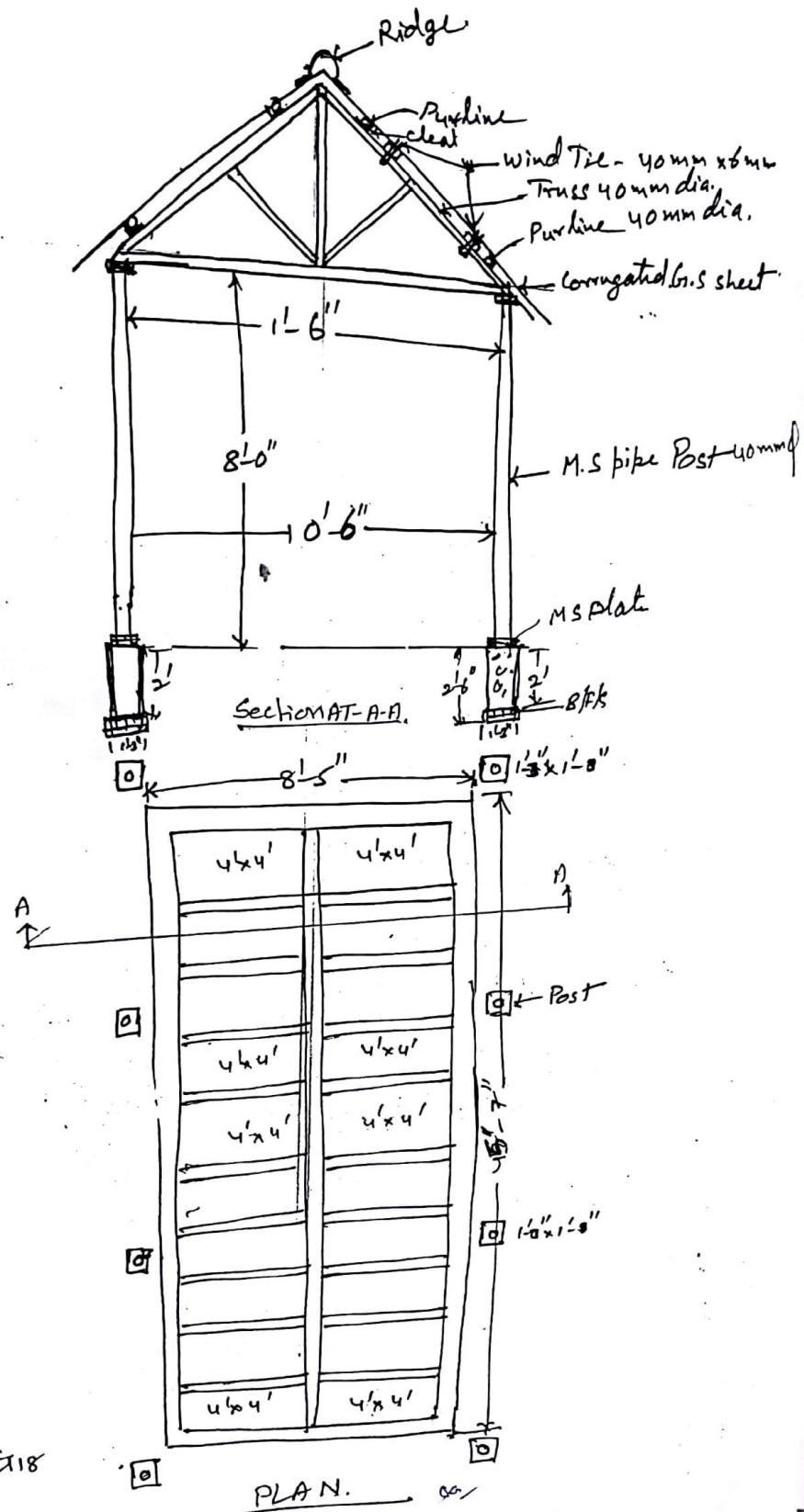
SAY

✓ ✓

✓ ✓

corrugated galvanised steel sheet Roofing shed.

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## **SCHEDULE-I**

[See rule 15 (w), (zi), 16 (1) (b) (e), 16 (4)]

### **Specifications for Sanitary Landfills**

**(A) Criteria for site selection.-**

- (i) The department in the business allocation of land assignment shall provide suitable site for setting up of the solid waste processing and treatment facilities and notify such sites.
- (ii) The sanitary landfill site shall be planned, designed and developed with proper documentation of construction plan as well as a closure plan in a phased manner. In case a new landfill facility is being established adjoining an existing landfill site, the closure plan of existing landfill should form a part of the proposal of such new landfill.
- (iii) The landfill sites shall be selected to make use of nearby wastes processing facilities. Otherwise, wastes processing facility shall be planned as an integral part of the landfill site.
- (iv) Landfill sites shall be set up as per the guidelines of the Ministry of Urban Development, Government of India and Central Pollution Control Board.
- (v) The existing landfill sites which are in use for more than five years shall be improved in accordance with the specifications given in this Schedule.
- (vi) The landfill site shall be large enough to last for at least 20-25 years and shall develop ‘landfill cells’ in a phased manner to avoid water logging and misuse.
- (vii) The landfill site shall be 100 meter away from river, 200 meter from a pond, 200 meter from Highways, Habitations, Public Parks and water supply wells and 20 km away from Airports or Airbase. However in a special case, landfill site may be set up within a distance of 10 and 20 km away from the Airport/Airbase after obtaining no objection certificate from the civil aviation authority/ Air force as the case may be. The Landfill site shall not be permitted within the flood plains as recorded for the last 100 years, zone of coastal regulation, wetland, Critical habitat areas, sensitive eco-fragile areas..

- (viii) The sites for landfill and processing and disposal of solid waste shall be incorporated in the Town Planning Department's land-use plans.
- (ix) A buffer zone of no development shall be maintained around solid waste processing and disposal facility, exceeding five tonnes per day of installed capacity. This will be maintained within the total area of the solid waste processing and disposal facility. The buffer zone shall be prescribed on case to case basis by the local body in consultation with concerned State Pollution Control Board.
- (x) The biomedical waste shall be disposed of in accordance with the Bio-medical Waste Management Rules, 2016, as amended from time to time. The hazardous waste shall be managed in accordance with the Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016, as amended from time to time. The E-waste shall be managed in accordance with the e-Waste (Management) Rules, 2016 as amended from time to time.
- (xi) Temporary storage facility for solid waste shall be established in each landfill site to accommodate the waste in case of non-operation of waste processing and during emergency or natural calamities.

**(B) Criteria for development of facilities at the sanitary landfills.-**

- (i) Landfill site shall be fenced or hedged and provided with proper gate to monitor incoming vehicles, to prevent entry of unauthorised persons and stray animals
- (ii) The approach and / internal roads shall be concreted or paved so as to avoid generation of dust particles due to vehicular movement and shall be so designed to ensure free movement of vehicles and other machinery.
- (iii) The landfill site shall have waste inspection facility to monitor waste brought in for landfilling, office facility for record keeping and shelter for keeping equipment and machinery including pollution monitoring equipment. The operator of the facility shall maintain record of waste received, processed and disposed.
- (iv) Provisions like weigh bridge to measure quantity of waste brought at landfill site, fire protection equipment and other facilities as may be required shall be provided.

- (v) Utilities such as drinking water and sanitary facilities (preferably washing/bathing facilities for workers) and lighting arrangements for easy landfill operations during night hours shall be provided.
- (vi) Safety provisions including health inspections of workers at landfill sites shall be carried out made.
- (vii) Provisions for parking, cleaning, washing of transport vehicles carrying solid waste shall be provided. The wastewater so generated shall be treated to meet the prescribed standards.

**C. Criteria for specifications for land filling operations and closure on completion of land filling.-**

- (i) Waste for land filling shall be compacted in thin layers using heavy compactors to achieve high density of the waste. In high rainfall areas where heavy compactors cannot be used, alternative measures shall be adopted.
- (ii) Till the time waste processing facilities for composting or recycling or energy recovery are set up, the waste shall be sent to the sanitary landfill. The landfill cell shall be covered at the end of each working day with minimum 10 cm of soil, inert debris or construction material.
- (iii) Prior to the commencement of monsoon season, an intermediate cover of 40-65 cm thickness of soil shall be placed on the landfill with proper compaction and grading to prevent infiltration during monsoon. Proper drainage shall be constructed to divert run-off away from the active cell of the landfill.
- (iv) After completion of landfill, a final cover shall be designed to minimise infiltration and erosion. The final cover shall meet the following specifications, namely :--
  - a) The final cover shall have a barrier soil layer comprising of 60 cm of clay or amended soil with permeability coefficient less than  $1 \times 10^{-7}$  cm/sec.
  - b) On top of the barrier soil layer, there shall be a drainage layer of 15 cm.
  - c) On top of the drainage layer, there shall be a vegetative layer of 45 cm to support natural plant growth and to minimise erosion.

**(D) Criteria for pollution prevention.-**In order to prevent pollution from landfill operations, the following provisions shall be made, namely:-

- (i) The storm water drain shall be designed and constructed in such a way that the surface runoff water is diverted from the landfilling site and leachates from solid waste locations do not get mixed with the surface runoff water. Provisions for diversion of storm water discharge drains shall be made to minimise leachate generation and prevent pollution of surface water and also for avoiding flooding and creation of marshy conditions.
- (ii) Non-permeable lining system at the base and walls of waste disposal area. For landfill receiving residues of waste processing facilities or mixed waste or waste having contamination of hazardous materials (such as aerosols, bleaches, polishes, batteries, waste oils, paint products and pesticides) shall have liner of composite barrier of 1.5 mm thick high density polyethylene (HDPE) geo-membrane or geo-synthetic liners, or equivalent, overlying 90 cm of soil (clay or amended soil) having permeability coefficient not greater than  $1 \times 10^{-7}$  cm/sec. The highest level of water table shall be at least two meter below the base of clay or amended soil barrier layer provided at the bottom of landfills.
- (iii) Provisions for management of leachates including its collection and treatment shall be made. The treated leachate shall be recycled or utilized as permitted, otherwise shall be released into the sewerage line, after meeting the standards specified in Schedule- II.. In no case, leachate shall be released into open environment.
- (iv) Arrangement shall be made to prevent leachate runoff from landfill area entering any drain, stream, river, lake or pond. In case of mixing of runoff water with leachate or solid waste, the entire mixed water shall be treated by the concern authority.

**(E) Criteria for water quality monitoring.-**

- (i) Before establishing any landfill site, baseline data of ground water quality in the area shall be collected and kept in record for future reference. The ground water quality within 50 meter of the periphery of landfill site shall be periodically monitored covering different seasons in a year that is, summer, monsoon and post-monsoon period to ensure that the ground water is not contaminated.
- (ii) Usage of groundwater in and around landfill sites for any purpose (including drinking and irrigation) shall be considered only after ensuring its quality. The following specifications for drinking water quality shall apply for monitoring purpose, namely :-

<b>Sl. No</b>	<b>Parameters</b>	<b>IS 10500:2012, Edition 2.2(2003-09) Desirable limit (mg/l except for pH)</b>
<b>1</b>	<b>2</b>	<b>3</b>
	Arsenic	0.01
	Cadmium	0.01
	Chromium(as Cr <sup>6+</sup> )	0.05
	Copper	0.05
	Cyanide	0.05
	Lead	0.05
	Mercury	0.001
	Nickel	-
	Nitrate as NO <sub>3</sub>	45
	pH	6.5-8.5
	Iron	0.3
	Total hardness (as CaCO <sub>3</sub> )	300
	Chlorides	250
	Dissolved solids	500
	Phenolic compounds as C <sub>6</sub> H <sub>5</sub> OH)	0.001
	Zinc	5
	Sulphate (as SO <sub>4</sub> )	200

#### **F. Criteria for ambient air quality monitoring..**

- (i) Landfill gas control system including gas collection system shall be installed at landfill site to minimize odour, prevent off-site migration of gases, to protect vegetation planted on the rehabilitated landfill surface. For enhancing landfill gas recovery, use of geo-membranes in cover systems along with gas collection wells should be considered.

- (ii) The concentration of methane gas generated at landfill site shall not exceed 25 per cent of the lower explosive limit (LEL).
- (iii) The landfill gas from the collection facility at a landfill site shall be utilized for either direct thermal applications or power generation, as per viability. Otherwise, landfill gas shall be burnt (flared) and shall not be allowed to escape directly to the atmosphere or for illegal tapping. Passive venting shall be allowed in case if its utilisation or flaring is not possible.
- (iv) Ambient air quality at the landfill site and at the vicinity shall be regularly monitored. Ambient air quality shall meet the standards prescribed by the Central Pollution Control Board for Industrial area.

**G. Criteria for plantation at landfill Site.-** A vegetative cover shall be provided over the completed site in accordance with the following specifications, namely:-

- (a) Locally adopted non-edible perennial plants that are resistant to drought and extreme temperatures shall be planted;
- (b) The selection of plants should be of such variety that their roots do not penetrate more than 30 cms. This condition shall apply till the landfill is stabilized;
- (c) Selected plants shall have ability to thrive on low-nutrient soil with minimum nutrient addition;
- (d) Plantation to be made in sufficient density to minimise soil erosion.
- (e) Green belts shall be developed all around the boundary of the landfill in consultation with State Pollution Control Boards or Pollution Control Committees.

**H. Criteria for post-care of landfill site.-** (1) The post-closure care of landfill site shall be conducted for at least fifteen years and long term monitoring or care plan shall consist of the following, namely :-

- (a) Maintaining the integrity and effectiveness of final cover, making repairs and preventing run-on and run-off from eroding or otherwise damaging the final cover;
- (b) Monitoring leachate collection system in accordance with the requirement;
- (c) Monitoring of ground water in and around landfill;
- (d) Maintaining and operating the landfill gas collection system to meet the standards.

(2) Use of closed landfill sites after fifteen years of post-closure monitoring can be considered for human settlement or otherwise only after ensuring that gaseous emission and leachate quality analysis complies with the specified standards and the soil stability is ensured.

**I. Criteria for special provisions for hilly areas.**-Cities and towns located on hills shall have location-specific methods evolved for final disposal of solid waste by the local body with the approval of the concerned State Pollution Control Board or the Pollution Control Committee. The local body shall set up processing facilities for utilisation of biodegradable organic waste. The non-biodegradable recyclable materials shall be stored and sent for recycling periodically. The inert and non-biodegradable waste shall be used for building roads or filling-up of appropriate areas on hills. In case of constraints in finding adequate land in hilly areas, waste not suitable for road-laying or filling up shall be disposed of in regional landfills in plain areas.

**J.Closure and Rehabilitation of Old Dumps**- Solid waste dumps which have reached their full capacity or those which will not receive additional waste after setting up of new and properly designed landfills should be closed and rehabilitated by examining the following options:

- (i) Reduction of waste by bio mining and waste processing followed by placement of residues in new landfills or capping as in (ii) below.
- (ii) Capping with solid waste cover or solid waste cover enhanced with geo-membrane to enable collection and flaring / utilisation of greenhouse gases.
- (iii) Capping as in (ii) above with additional measures (in alluvial and other coarse grained soils) such as cut-off walls and extraction wells for pumping and treating contaminated ground water.
- (iv) Any other method suitable for reducing environmental impact to acceptable level.

**Name of the Urban Local Body**  
**Criteria for site selection for landfill**

**Annexure-4**

- 1- **Urban Local Bodies who have already selected site for landfill should give the details of land status according to the below listed format.**
- 2- **Urban Local Bodies not selected land for sanitary landfill can select land as per the below mentioned criteria.**

<b>Sl. No</b>	<b>Criteria</b>	<b>Status</b>
1	<b>Lake or Pond:</b> No landfill shall normally be constructed within 200 m of any lake or pond	
2	<b>River:</b> No landfill shall be constructed within a 100 m of a river.	
3	<b>Flood Plain:</b> No landfill shall be constructed within a 100-year flood plain.	
4	<b>Highway:</b> No landfill shall be constructed within 200 m of the right of way of any state or national highway.	
5	<b>Habitation:</b> A landfill site shall be at least 200 m from a notified habitation area.	
6	<b>Public Parks:</b> No Land fill be constructed within 200 m of Public Park	
7	<b>Critical Habitat Areas:</b> No landfill shall be constructed within critical habitat areas including reserved forest areas.	
8	<b>Wetlands:</b> No landfill shall be constructed within wetlands.	
9	<b>Airport:</b> No Landfill shall be constructed within 20 km of Airports or Airbase.	
10	<b>Water Supply:</b> No landfill shall be constructed within 200 m of any water supply well.	
11	<b>Coastal Regulation Zone:</b> No landfill shall be sited in a coastal regulation zone	
12	<b>Sensitive eco-fragile zone:</b> No Landfill shall be constructed in potentially unstable zone	

**Location Criteria as per the EIA Notification, 2006 and Categorization of Project Besides above conditions the sites does not attract General Conditions of the Schedule of Environmental Impact Assessment Notification, 2006.**

<b>Sl. No</b>	<b>Criteria</b>	<b>Status</b>
1	Critically Polluted Areas	
2	Protected Areas/Reserved Forest/National Parks etc.	
3	Inter-State boundaries	
4	Notified Eco-sensitive areas	

## **Annexure-5**

### **FORM – I**

**[see rule 15 (v) 16 (1) (c), 21(3) 1]**

#### **Application for obtaining authorisation under solid waste management rules for processing/recycling/treatment and disposal of solid waste**

To

The Member Secretary,

State Pollution Control Board or Pollution Control Committee,

I/We hereby apply for authorisation under the Solid Waste Management Rules, 2016 for processing, recycling, treatment and dispersal of solid waste.

1.	Name of the local body/agency appointed by them/ operating facility	
2.	Correspondence address Telephone No. Fax No. , e-mail:	
3.	Nodal Officer & designation(Officer authorised by the local body or agency responsible for operation of processing/ treatment or disposal facility)	
4.	Authorisation required for setting up and operation at the facility (Please tick mark)	waste processing recycling treatment dispersal at landfill
5.	Attach copies of the Documents Site clearance (local body) Proof of Environmental Clearance Consent for establishment Agreement between municipal authority and operating agency Investment on the project and expected return	

6.	<p><b>Processing/recycling/treatment of solid waste</b></p> <p>(i) Total Quantity of waste tea he processed per day  Quantity of waste tea he recycled  Quantity of waste tea he treated  Quantity of waste tea to be disposed into landfill</p> <p>(ii) Utilisation programme for waste processed (Product utilisation)  (iii) Methodology for disposal (attach details)</p> <p>Quantity of leachate  Treatment technology for leachate  (iv) Measures to be taken for prevention and control of environmental pollution  (v) Measures to be taken for safety of workers working in the plant  (vi) Details on solid waste processing/recycling/treatment/disposal facility (to be attached)</p>	
7.	<p><b>Disposal of solid waste</b></p> <p>Number of sites identified  Quantity of waste tea to be dispensed per day  Details of methodology or criteria followed for site selection (attach)  Details of existing site under operation  Methodology and operational details of  landfilling  Measures taken to check envii</p>	
8	Any either information.	

Date:

Signature:

Place:

Designation

**Form – III**  
**[see rule 19 (6), 24 (1)]**

**Format of annual report to be submitted by the operator of facility to the local body**

1.	Name of the City/Town and State	
2.	Population	
3.	Area in sq. kilometers	
4.	Name & Address of the local body  Telephone No.:  Fax No.:  E-mail:	
5.	Name and address of operator of the facility	
6.	Name of officer in-charge of the facility  Phone No.:  Fax No.:  E-mail:	
7.	Number of households in the city/town,  Number of non-residential premises in the city  Number of election/administrative wards in the city/town	
8.	Quantity of Solid waste  Estimated of solid waste generated in the local body area per day in metric tones	/tpd
	Quantity of solid waste collected per day	/tpd
	Per capita waste collected per day	/gm/day
	Quantity of solid waste processed	/tpd
	Quantity of solid waste disposed at landfill	/tpd
9.	Status of Solid Waste Management (SWM) service  Segregation and storage of waste at source  Whether solid waste is stored at source in domestic/commercial/institutional bins If yes,  Percentage of households practice storage of waste at	Yes/No  %

	source in domestic bins  Percentage of non-residential premises practice storage of waste at source in commercial/institutional bins  Percentage of households dispose of throw solid waste on the streets  Percentage of non-residential premises dispose of throw solid waste on the streets  Whether solid waste is stored at source in a segregated form  If yes, Percentage of premises segregating the waste at source	%  %  %  Yes/No  %
	Door to Door Collection of solid waste	
	Whether door to door collection (D2D) of solid waste is being done in the city/town	Yes/No
	If yes	
	Number of wards covered in D2D collection of waste	
	No. of households covered	
	No. of non-residential premises including commercial establishments, hotels, restaurants educational institutions/offices etc covered  Percentage of residential and non-residential premises covered in door to door collected through:  Motorized vehicle  Containerized tricycle/handcart  Other device	%  %  %
	If not, method of primary collection adopted	
	Sweeping of streets	
	Length of roads, streets, lanes, bye-lanes in the city that need to be cleaned	Km
	Frequency of street sweepings and percentage of	Frequency Daily Alternate days Twice a Occasionally

	population covered	week				
		% of population covered				
Tools used	%					
Manual sweeping	%					
Mechanical sweeping	Yes/No					
Whether long handle broom used by sanitation workers	Yes/No					
Whether each sanitation worker is given handcart/tricycle for collection of waste	Yes/No					
Whether handcart/tricycle is containerized	Yes/No					
Whether the collection tool synchronizes with collection/waste storage containers utilized						
Secondary Waste Storage facilities						
No. and type of waste storage depots in the city/town	No. Capacity in m <sup>3</sup>					
Open waste storage sites						
Masonry bins						
Cement concrete cylinder bins						
Dhalao/covered rooms/space						
Covered metal/plastic containers						
Upto 1.1 m <sup>3</sup> bins						
2 to 5 m <sup>3</sup> bins						
Above 5m <sup>3</sup> containers						
Bin-less city						
Bin/population ratio						
Ward wise details of waste storage depots (attach):						
Ward No:						
Area:						
Population:						
No. of bins placed						
Total volume of bins placed						

	Total storage capacity of waste storage facilities in cubic meters		
	Total waste actually stored at the waste storage depots daily		
Give frequency of collection of waste from the depots  Number of bins cleared	Frequency	No. of bins	
	Daily		
	Alternate day		
	Twice a week		
	Once a week		
	Occasionally		
	Whether storage depots have facility for storage of segregated waste in green, blue and black bins	Yes/No (if yes, add details)  No. of green bins:  No. of blue bins:  No. of black bins:	
	Whether lifting of solid waste from storage depots is manual or mechanical. Give percentage	(5) of Manual Lifting of SOLID WASTE	%
		(%) of Mechanical lifting	%
	If mechanical – specify the method used	Front-end loaders/Top loaders	
	Whether solid waste is lifted from door to door and transported to treatment plant directly in a segregated form	Yes/No (if yes, specify)	
	Waste Transportation per day  Type and Number of vehicles used (pl tick or add)	No. Trips made  Waste  Transported	
	Animal cart  Tractors  Non tipping Truck		

Tipping Truck	
Dumper Placers	
Refuse collectors	
Compactors	
Others	
JCB/loader	
Frequency of transportation of waste	Frequency (%) of waste transported Daily Alternate day Twice a week Once a week Occasionally
Quantity of waste transported each day	/tpd
Percentage of total waste transported daily	%
Waste Treatment Technologies used	
Whether solid waste is processed	Yes/No
If yes, Quantity of waste processed daily	/tpd
Land(s) available with the local body for waste processing (in Hectares)	
Land currently utilized for waste processing	
Solid waste processing facilities in operation	
Solid waste processing facilities under construction	
Distance of processing facilities from city/town boundary	
Details of technologies adopted	
Composting	Qty. raw material processed Qty. final product produced Qty. sold Qty. Of residual waste landfilled
Vermin composting	Qty. raw material processed Qty. final product produced

		Qty. sold Quantity of residual waste landfilled
	Bio-methanation	Qty. raw material processed Qty. final product produced Qty. sold Quantity of residual waste landfilled
	Refuse Derived Fuel	Qty. raw material processed Qty. final product produced Qty. sold Quantity of residual waste landfilled
	Waste to Energy technology such as incineration, gasification, pyrolysis or any other technology (give details)	Qty. raw material processed Qty. final product produced Qty. sold Quantity of residual waste landfilled
	Co-processing	Qty. raw material processed
	Combustible waste supplied to cement plant	
	Combustible waste supplied to solid waste based power plants	
	Others	
	Solid waste disposal facilities	
	No. of dumpsites sites available with the local body	
	No. of sanitary landfill sites available with the local body	
	Area of each such sites available for waste disposal	
	Area of land currently used for waste disposal	
	Distance of dumpsite/landfill facility from city/town	Kms
	Distance from the nearest habitation	Kms
	Distance from waste body	Kms
	Distance from state/national highway	Kms
	Distance from Airport	Kms
	Distance from important religious places or historical	Kms

	monument	
	Whether it falls in flood prone area	Yes/No
	Whether it falls in earthquake fault line area	Yes/No
	Quantity of waste landfilled each day	Tpd
	Whether landfill site is fenced	Yes/No
	Whether Lighting facility is available on site	Yes/No
	Whether Weigh bridge facility available	Yes/No
	Vehicles and equipments used at landfill (specify)	Bulldozer, Compacters etc. available
	Manpower deployed at landfill site	Yes/No (if yes, attach details)
	Whether covering is done on daily basis	Yes/No
	If not, Frequency of covering the waste deposited at the landfill	
	Cover material used	
	Whether adequate covering material is available	Yes/No
	Provisions for gas venting provided	Yes/No, (if yes, attach technical data sheet)
	Provision for leachate collection	Yes/No, (if yes, attach technical data sheet)
10.	Whether an Action Plan has been prepared for improving solid waste management practices in the city	Yes/No (if yes, attach Action Plan details)
11.	What separate provisions are made for:  Dairy related activities:  Slaughter houses waste:  C & D waste (construction debris):	Attach details on Proposals,  Steps taken,  Yes/No  Yes/No
12.	Details of Post Closure Plan	Attach Plan
13.	How many slums are identified and whether these are provided with Solid Waste Management facilities:	Yes/No (if Yes, attach details)
14.	Give details of manpower deployed for collection including street sweeping, secondary storage, transportation, processing and disposal of waste	

15.	Mention briefly, the difficulties being experienced by the local body in complying with provisions of these rules	
16.	Mention briefly, if any innovative idea is implemented to tackle a problem related to solid waste, which could be replicated by other local bodies	

**Signature of Operator**

**Date:**

**Place:**

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## **Annexure-7**

### **Form-IV**

[see rules 15(za),24(2)]

**Format for annual report on solid waste management to be submitted by the local body**

CALENDAR YEAR	DATE OF SUBMISSION OF REPORT

1.	Name of the City/Town and State	
2.	Population	
3.	Area in sq. kilometers	
4.	Name & Address of the local body  Telephone No.  Fax No.  E-mail:	
5.	Name of officer in-charge dealing with solid waste management(SOLID WASTEM)  Phone No.:  Fax No.:  E-mail:	
6.	Number of households in the city/town  Number of non-residential premises in the city  Number of election/administrative wards in the city/town	
7.	Quantity of solid waste (solid waste)	
	Estimated quantity of solid waste generated in the local body area per day in metric tones	/tpd
	Quantity of solid waste collected per day	/tpd
	Per capita waste collected per year	/gm/day
	Quantity of solid waste processed	/tpd
	Quantity of solid waste disposed at dumpsite/landfill	/tpd
8.	Status of Solid Waste Management service	
	Segregation and storage of waste at source	
	Whether SOLID WASTE is stored at bsource in	

	domestic/commercial/institutional bins, if yes, Percentage of households practice storage of waste at source in domestic bins Percentage3 of non-residential premises practice storage of waste at source in commercial/institutional bins Percentage of household dispose or throw solid waste on the streets Percentage3 of non-residential premises dispose or throw solid waste on the streets Whether SOLID WASTE is stored at bsource in segregated form. If yes, Percentage of premises segregating the waste at source	Yes/No &        %
	Door to Door collection of solid waste	
	Whether door to door collection (D2D) is being done in the city/town	Yes/No
	If Yes	
	Number of wards covered in D2D collection of waste	
	No. of households covered	
	No. of non-residential premises including commercial establishments, hotels, restaurants, educational institutions/offices etc. covered	
	Percentage of residential and non-residential premises covered in door to door collection through: Motorized vehicle Containirized tricycle/handcart Other device	% % %
	If not, method of primary collection adopted	
	Sweeping of streets	
	Length of roads, streets, lanes, bye-lens in the city that need to be cleaned	Km
	Frequency of street sweepings and percentage of population covered	Frequency Daily Alternate Days Twice a week Occassionaly
		% of population covered

	Tools used  Manual sweeping  Mechanical sweeping  Whether long handle broom used by sanitation workers  Whether each sanitation worker is given handcart/tricycle for collection of waste  Whether handcart/tricycle is containerized  Whether the collection tool synchronizes with collection/waste storage containers utilized	%  %  Yes/No  Yes/No  Yes/No  Yes/No
	Secondary Waste Storage facilities	
	No. and type of waste storage depots in the city/town <ul style="list-style-type: none"><li>• Open waste storage sites</li><li>• Masonry bins</li><li>• Cement concrete cylinder bins</li><li>• Dhalao/covered rooms/space</li><li>• Covered metals/plastic containers</li><li>• Upto 1.1 m3 bins</li><li>• 2 to 5 m3 bins</li><li>• Above 5 m3 containers</li><li>• Bin-less city</li></ul>	No. Capacity in m3
	Bin/population ratio	
	Ward wise details of waste storage depots (attach)  Ward No.:  Area:  Population:  Number of bins placed:  Total volume of bins placed:	
	Total storage capacity of waste storage facilities in cubic meters	
	Total waste actually stored at the waste storage depots daily	
	Give frequency of collection of waste from the depots  Number of bins cleared	Frequency      No. of bins
		Daily
		Alternate Day
		Twice a week

		Once a week	
		Occasionally	
	Whether storage depots have facility for storage of segregated waste in green, blue and black bins	Yes/No (if yes, add details) No. of green bids: No. of blue bids: No. of black bids:	
	Whether lifting of solid waste from storage depots in manual or mechanical. Give percentage  (%) of Manual Lifting of solid waste (%) of Mechanical lifting	(%) (%)	
	If mechanical- specify the method used	Front-end loaders/Top loaders	
	Whether lifted from door to door and transported to treatment plant directly in a segregated form	Yes/No (if yes, specify)	
	Waste transportation per day  Type and Number of vehicles used	No. trips made waste Transported	
	Animal cart  Tractors  Non tipping Truck  Tipping Truck  Dumper Placers  Refuse collectors  Others  JCB/Loader		
	Frequency of transportation of waste	Frequency (%) of waste transported  Daily  Alternate day  Twice a week  Once a week  Occasionally	
	Quantity of waste transported each day	/tpd	
	Percentage of total waste transported daily	%	
	Waste Treatment Technologies used		

	Whether solid waste processed daily	Yes/No
	If yes, Quantity of waste processed daily	/tpd
	Whether treatment is done by local body or through an agency	
	Land(s) available with the local body for waste processing (in Hectares)	
	Land currently utilized for waste processing	
	Solid waste processing facilities in operation	
	Solid waste processing facilities under construction	
	Distance of processing facilities from city/town boundary	
	Details of technologies adopted	
	Composting,	Qty. raw material processed Qty. final product produced Qty. sold Quantity of residual waste landfilled
	Vermi composting	Qty. raw material processed Qty. final product produced Qty. sold Quantity of residual waste landfilled
	Bio-methanation	Qty. raw material processed Qty. final product produced Qty. sold Quantity of residual waste landfilled
	Refuse Derived Fuel	Qty. raw material processed Qty. final product produced Qty. sold Quantity of residual waste landfilled
	Waste to Energy technology Such as incineration, gasification, pyrolysis or any other technology (give detail)	Qty. raw material processed Qty. final product produced Qty. sold Quantity of residual waste landfilled
	Co-processing	Qty. raw material processed
	Combustible waste supplied to cement plant	
	Combustible waste supplied to solid waste based power plants	

	Other	Qty
	Solid waste disposal facilities	
	No. of dumpsites available with the local body	
	No. of sanitary landfill sites available with the local body	
	Area of the as such site available for waste disposal sites	
	Distance of dumpsite/landfill facility from city/town	kms
	Distance from the nearest habitation	Kms
	Distance from water body	Kms
	Distance from state/national highway	Kms
	Distance from airport	Kms
	Distance from important religious place or historical monuments	Kms
	Whether it falls in flood prone area	Yes/No
	Whether it falls in earthquake fault line area	Yes/No
	Quantity of waste landfill each day	Tpd
	Whether landfill site is fenced	Yes/No
	Whether landfill facility is available on site	Yes/No
	Whether Weigh bridge facility available	Yes/No
	Vehicles and equipments used at landfill (specify)	Bulldozers, compacters available
	Man power deployed at landfill site	Yes/No  If Yes, (attach details)
	Whether covering is done on daily basis	Yes/No
	If not, frequency of covering the waste deposited at landfill	
	Cover material used	
	Whether adequate covering material is available	Yes/No
	Provisions for gas venting provided	Yes/No  (If yes, attach technical data sheet)
	Provisions for leachate collection	Yes/No  (If yes, attach technical data sheet)
	Whether an action plan has been prepared for improving solid waste management practices in the city	Yes/No  (If yes, attach technical data sheet)
	What separate provisions are made for :	Attach details on proposal, steps taken

	Dairy related activities: Slaughter houses waste: C&D waste (construction debris):	Yes/No Yes/No Yes/No
	Details of Post closure Plan	Attach plan
	How many slums are landfill and whether these are provided with solid waste management facilities:	Yes/No (If yes, attach details)
	Give details of:  Local body's own manpower deployed for collection including street sweeping, secondary storage, transportation, processing & disposal waste	
	Give details of :  Contractor/concessionare's manpower deployed for collection including street sweeping, secondary storage, transportation, processing & disposal of waste	
	Mention briefly, the difficulties being experienced by the local body in compliance with provisions of these rules	
	Mention briefly, if any innovative idea is implemented to tackle a problem to solid waste, which could be replicated by other local bodies	

Signature of CEO/Municipal Commissioner/  
Executive Officer/Chief Officer

Date:

Place:

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## A small habit that can have a big impact.

Segregate wet and dry waste  
to contribute towards the wellbeing  
of your colony.



**URBAN DEVELOPMENT & HOUSING DEPARTMENT**  
*Government of bihar*

## **Preface:**

---

The Government of India has launched the Swachh Bharat Mission on 2nd October, 2014 with the target to make the country clean by 2nd October, 2019. Solid Waste Management is an important component of the Mission and is to be implemented in all notified Urban Local Bodies.

The Union Ministry of Environment, Forests and Climate Change (MoEF &CC) recently notified **the new Solid Waste Management Rules (SWM), 2016**. These will replace the Municipal Solid Wastes (Management and Handling) Rules, 2000, which have been in place for the past 16 years. These rules are the sixth category of waste management rules brought out by the ministry, as it has earlier notified plastic, e-waste, biomedical, hazardous and construction and demolition waste management rules.

The regulatory framework, which requires behavioral change and day to day compliance by the citizens, need to be widely publicized through a well-structured awareness campaign. IEC (Information, Education and Communication) would be used to make people/community/ULBs aware about the collection, Segregation and treatment of municipal Solid waste and Advocacy undertaken for the capacity Building activities and community participation for sustainable Solid waste Management.

Principles of strategy for IEC and Public awareness are based on the downward dissemination theory and Convergence theory for the message dissemination, Behavior change and capacity development on integrated Solid Waste Management (ISWM). The IEC activities maybe initiated at State level and ULB level to aware the Masses. A State level agency may be empaneled to develop the IEC strategy and design the effective IEC campaign. The state agency and local authorities therefore need to draw up a plan of creating public awareness expeditiously.

*The campaign/ IEC activities may principally focus on below mention points:*

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- Not to litter waste on the streets, drains, water bodies, open spaces etc
- Not to burn or bury the waste
- Segregate wet and dry waste at source and store in two separate bins (educate on bio-degradable and non-bio-degradable waste components)
- Keep domestic hazardous waste, C&D waste, horticulture waste separately as and when generated and deal with them as directed by local authority from time to time
- How to handle sanitary waste, diapers, as and when generated
- Practice the concept of Reduce, Reuse, Recycle and Recover (RRRR)
- Practice home/institutional level composting/bio-gas generation or community level composting/bio-gas generation
- Handover recyclables to waste pickers or recyclers at source
- Handover segregated waste to the waste collectors
- Pay user charges for the sustainability of the project
- Educating street vendors, resident welfare associations, market associations, gated communities & institutions, hotels & restaurants to discharge their obligation as per Rule 4.

*IEC Implementation Strategy for Solid Waste Management:*

---

<b>Stakeholders</b>	<b>Content of Information</b>	<b>Methodology</b>	<b>Responsible Authorities</b>
1. HHs	Collection & segregation and possible treatment	Inter Personal Communication (IPC) along with Poster, Leaflet, Brochure	ULBs
2. Community	Use of underground Bins for Collection & segregation and treatment at community level	Hoardings for the use of Underground Bins and all aspects of SWM.	ULBs
3. Mass Level	All aspects of SWM practices.	Print Media, Electronics Media, Poster, Hoardings, Use of Public Transport.	UD & HD

4. City Level	All aspects of SWM practices.	Technical Manual, Brochure, Workshop with Opinion Leaders, Street Play, Awareness rally etc.	ULBs
5. Institutions	All aspects of SWM practices.	Rallies, Quiz Competition, Debate, Incorporates the concept Page-5 of SWM in school Curriculum, SWM Oath at schools.	Schools, Colleges Faith Institutions

*The Following activities maybe undertake to create awareness among the masses on Solid Waste Management:*

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#### **4. Awareness Generation on Bulk Waste Generator:**

After identification of Bulk waste generator, the awareness campaign should be placed in ULB to generate the awareness on bulk waste generator and onsite composting.

Sl. No	Type of IEC Activities	Sub activities
1	Identification of a Brand Ambassador to aware the masses on bulk waste generator and onsite composting	B. ULB can choose an Ambassador from local opinion leader/ religious leader / Swachhata worker to promote bulk waste generator and onsite composting.
2	Meeting with RWAs, MAs Hostel/Schools, Colleges, Universities, Educational & Training Institutions, and Restaurant with more than 200 seating capacity, All 4 and 5 Star Hotel(s), Shopping Complex (es)/ Mall(s), Clubs, Marriage halls, hospitals etc to create awareness and guide them for bulk waste generator and onsite composting.	C. Fixed a Meeting for various stake holders to motivate them on bulk waste generator and onsite composting. D. Finalization the list and action plan of bulk waste generator as per discussion with state holders.
3	Displaying hoarding / banners/ posters in public places to create awareness on bulk waste generator and onsite	D. Develop the hoarding / poster for various stake holders to create awareness on bulk waste generator and onsite composting. E. Displaying the hoardings in public places

	composting.	including market, school, collages, hospitals etc. F. Rally / awareness camp may be organized in presence of Brand Ambassador to aware the masses / stake holders on bulk waste generator and onsite composting.
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## 5. State and City Level Workshop on Solid Waste Management Rule 2016:

This workshop shall be aimed at sensitization of community leaders and also take their feedback. These town leaders shall be requested to disseminate the information amongst their community and they will be motivated to spearhead the movement in the town. This workshop shall also be utilized to identify volunteers dedicated to the cause of MSWM.

The areas maybe covered on:

- Segregate wet and dry waste at source and store in two separate bins (educate on bio-degradable and non-bio-degradable waste components)
- Practice home/institutional level composting/bio-gas generation or community level composting/bio-gas generation
- Handover recyclables to waste pickers or recyclers at source
- Handover segregated waste to the waste collectors
- Pay user charges for the sustainability of the project
- Educating street vendors, resident welfare associations, market associations, gated communities & institutions, hotels & restaurants to discharge their obligation as per Rule 4.

## 6. Newspaper advertisement

Local /state level Newspaper advertisement may be initiated to disseminate the information of

- Not to litter waste on the streets, drains, water bodies, open spaces etc
- Not to burn or bury the waste
- Segregate wet and dry waste at source and store in two separate bins (educate on bio-degradable and non-bio-degradable waste components)

### Wall Painting in each Urban Local Bodies:

'Wall Painting' medium is the most widespread form of advertising and is the favorite of the Indian masses, as they can view it at their leisure. Wall paintings are important because they constantly remind the local communities about name and logos in addition to highlighting the key messages. Wall painting strategies may apply to create awareness among the masses regarding Solid Waste Management. The below mention areas can be covered in Wall paintings:

- Not to litter waste on the streets, drains, water bodies, open spaces etc
- Not to burn or bury the waste
- Segregate wet and dry waste at source and store in two separate bins (educate on bio-degradable and non-bio-degradable waste components)
- How to handle sanitary waste, diapers, as and when generated

**7. Outdoor publicity Hoarding/Poster/sticker—using local public transport and offices/ Bus stop/ Public toilets/ Schools in ULBs**

- I) Outdoor advertising is an incredibly rich and diverse medium to disseminate the information of Solid Waste Management to the potential targets. 4-5 design of hoarding may be designed to aware the masses on desired information.
- II) Poster and stickers may be developed to disseminate the information in ULBs and Poster and stickers may be affixed in local transportation. 3-4 design for poster and stickers may be developed to serve the purpose.

**8. Street Play (Nukkad Natak) at ULB level:**

Street theatre as a form of communication is deeply rooted in the Indian tradition. In recent times this form has been used to propagate social and political messages and to create awareness amongst the masses regarding critical issues. Street theatre breaks the formal barriers and approaches the people directly. The below mention points maybe covered:

- Not to litter waste on the streets, drains, water bodies, open spaces etc
- Not to burn or bury the waste
- Segregate wet and dry waste at source and store in two separate bins (educate on bio-degradable and non-bio-degradable waste components)
- How to handle sanitary waste, diapers, as and when generated
- Practice home/institutional level composting/bio-gas generation or community level composting/bio-gas generation

**9. Documentary film/ Video:**

5-6 video documentation (2-3 Min) maybe developed regarding various issues related Solid waste management. These video may be use during awareness generation, local cable channel, LCD projector of city.

**10. Radio Jingle / Jingle on “Solid Waste Management” :**

Jingle is an important medium to create awareness on various issues related environment, social and political issues. This medium maybe used through radio/ FM/ local promotion to create awareness generation Solid Waste Management.

## Annexure-9

### **Name of the ULB**

### **Base Line data on Existing Dump/Legacy Waste**

#### **Format-1**

Sl. No	No. of dump site	Location of the existing dump/legacy waste site	The dump site/legacy site (temporary/permanent)	Distance from the city	Total area (In acre/Ha.)	Accumulation of waste since (approx. in years)	Approximate quantity of waste accumulated (in tonn)	Currently dumping is done at the same location (Yes/no)
1								
2								
3								

Signature of the Executive Officer/Municipal Commissioner  
Name of the Municipality