



SOLID WASTE MANAGEMENT POLICY AND STRATEGY FOR NELLIKUPPAM MUNICIPALITY

(complying with the SWM Rules 2016)



Commissionerate of Municipal Administration
TamilNadu

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CHAPTER I

BACKGROUND

1.1 INTRODUCTION

Solid waste management (SWM) is a major problem for many urban local bodies (ULBs) in India, where urbanization, industrialization and economic growth have resulted in increased per capita Municipal Solid Waste (MSW) generation. Effective SWM is a major challenge in urban local body and managing the waste properly is essential for building a sustainable and liveable habitat. The ULBs are responsible for implementing solid waste management in their respective local bodies. Effective solid management systems are needed to ensure better human health, safety and environment.

Recognising this, the Ministry of Environment & Forests (MoEF), Govt. of India had notified Municipal Solid Waste (Management & Handling) Rules, 2000 which was subsequently revised into Solid Waste Management Rules 2016 for its effective implementation. The above rule mandates each urban local body (ULB) to frame Policy on Solid Waste Management and Solid Waste Management Action Plan to address the growing concern of waste management in their town / city.

Nellikuppam Municipality, a second grade Municipality, spread over an extent of 21.49 sq.km with a population of 46678 as per 2011 census. The present population of the town is 47128. Total quantity of MSW generation is 12.00 TPD.

1.2 SOLID WASTE MANAGEMENT RULES, 2016

Solid Waste Management Rules, 2016 was enacted by the Ministry of Environment, Forest and Climate Change, Government of India through S.O. 1357(E).on 8th April, 2016 in supersession of the Municipal Solid Waste (Management and Handling) Rules, 2000. The responsibilities of various stake holders viz., waste generators, Ministries, Departments and local bodies for sustainable solid waste management have been clearly mentioned in the SWM Rules, 2016.

1.3 DUTIES OF LOCAL BODIES

It has been emphasised that it is the duty of every local body (as the prime responder for solid waste management) to carry out the Collection, Transportation, Processing and

Disposal of solid waste generated in their jurisdiction in a scientific manner on day to day basis.

Under the rule, ULB should arrange for door to door collection of segregated solid waste from all households, ensure safe storage and transportation of waste to processing facilities, setup scientific processing facilities, material recovery facilities with sufficient space for sorting of recyclable materials, involving the 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. It is also emphasised the need for creating public awareness through continuous Information, Education and Communication activities to educate the waste generators on waste management particularly on segregation of waste at source.

The rule further facilitates the local bodies to apply penalty clause for the effective enforcement of the rule apart from the user charges. Under the rule, Solid waste management plan as per the State policy and strategy on solid waste management to be prepared within six months from the date of notification of state policy and strategy. Accordingly necessary bye-laws were framed by Nellikuppam Municipality and notified through Cuddalore District gazette on 28.06.2017 and revised gazette notification dated 28.06.2018

1.4 DUTIES OF WASTE GENERATORS

Moreover, every waste generator to segregate and store the waste generated by them in three separate streams namely bio-degradable, non-biodegradable and domestic hazardous wastes in suitable bins and handover segregated wastes to waste pickers or waste collectors of Urban Local Body. In a bid to encourage this and improve stakeholder participation for achieving zero littering (in open public spaces, drains, and water bodies) and to slash open burning, extensive awareness programs have been directed to be carried out by local bodies. 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 hotels and restaurants, resident welfare and market associations, gated communities and institutions shall ensure segregation of waste at source by the generators as prescribed; facilitate collection of segregated waste in separate streams, handover the

recyclable material to either the authorised waste pickers or the authorized recyclers. The bio-degradable waste generated by them shall be processed, treated and disposed off through composting or bio-methanation within the premises as far as possible.

1.5 COLLECTION AND TRANSPORTATION

As per the SWM Rules, 2016, Nellikuppam Municipality should arrange for door to door collection of segregated solid waste from all households including slums and informal settlements, commercial, institutional and other non-residential premises. From multi-storage buildings, large commercial complexes, malls, housing complexes, etc., this may be collected from the entry gate or any other designated location. The Municipality has proposed to phase out the push carts and tricycles by introduction of Battery Operated Vehicles (BOV) and Light Commercial Vehicles (LCV) for primary collection of waste. As the Municipality is handling the wet waste through decentralised Micro Composting centres/On site Composting Centres, all the primary collection vehicles will be used for collection of waste from house hold and transported to these waste processing centres, no need of secondary collection and transportation is required. By adapting this method, Nellikuppam Municipality is aimed for dust bin free and dumpsite free town.

1.6 PROCESSING AND DISPOSAL OF SOLID WASTE

Urban Local Body shall also collect the 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 in the area. Further ULB shall facilitate construction, operation and maintenance of solid waste processing facilities and other associated infrastructure either through ULB or with private sector participation or through any agency adopting suitable technology prescribed through guidelines issued by the Ministry of Urban Development. Preference shall be given to de centralised processing to minimize transportation cost and environmental impacts such as development of bio-methanation plants, Micro Composting Centres for microbial composting, vermi-composting, or any other suitable processing methods for bio-stabilization of biodegradable waste. The dry fraction of solid waste shall be stored and refused derived fuel (RDF) shall also be produced so as to supply as feedstock to power plants or cement industries or other thermal industries.

1.7 DECENTRALISING THE WASTE MANAGEMENT PROCESS

It is also recommended that the concept of home composting, community composting through Decentralised approach. Further the rule reduces the burden of local bodies by introducing the concept of handling the waste by bulk waste generators by themselves. Considering this, Government of Tamil Nadu has adopted a holistic State policy towards sustainable waste management. In accordance with this, Action plan for Nellikuppam Municipality is framed.

Dry waste fraction collected from the households on Wednesday shall be separated and the saleable and recyclable waste shall be disposed to the recycling vendors for recycling purpose. The amount accrued from the disposal of saleable dry waste shall be distributed to the waste collector who involved in the waste collection as an incentive to promote waste segregation at source.

1.8 STATE POLICY ON SOLID WASTE MANAGEMENT GOVERNMENT OF TAMIL NADU

The changing urban life style has resulted in both positive and negative effects. While the standard of living condition has considerably improved, a large volume of solid waste has become its bye product. Many new approaches have been adopted to process these wastes in a sustainable manner. The Government of Tamil Nadu has felt the necessity to frame a State policy to cater to the needs under the solid waste management covering from primary collection to scientific processing and safe disposal of the Municipal Solid Waste in an eco-friendly manner. Government of TamilNadu has notified the Solid Waste Management Policy and Strategy for the State through gazette notification No.303, Part II-section 2 dated. 24th August 2018.

1.9 ZERO-WASTE CONCEPT

The policy is drafted in such a way that it provides necessary guidance to dispose all type and nature of solid waste scientifically to achieve under zero-waste concept. Handling of every category of waste such as Bio & Non-biodegradable waste (both recyclable and non-recyclable), domestic hazardous waste, E-waste, waste collected though street sweeping, highly littered public places etc., and are considered. The ULB shall also coordinate with other concerned departments and TNPCB in handling other than the MSW viz., hazardous

waste, bio medical waste. The policy focuses on the technology suitable for the urban local bodies based on the quality and the quantity of waste that is being generated.

Urban Local Bodies were instructed to adapt suitable methods to minimize the waste by promoting 4R principle and also through extended producers responsibility.

1.10 INFORMATION EDUCATION AND COMMUNICATION (IEC) ACTIVITIES

A part from this, Bulk waste generators are activated to develop onsite facilities for handling the waste generated by them. Moreover, Continuous and rigorous IEC programs are emphasized to inculcate behavioral changes among the public to encourage Source segregation.

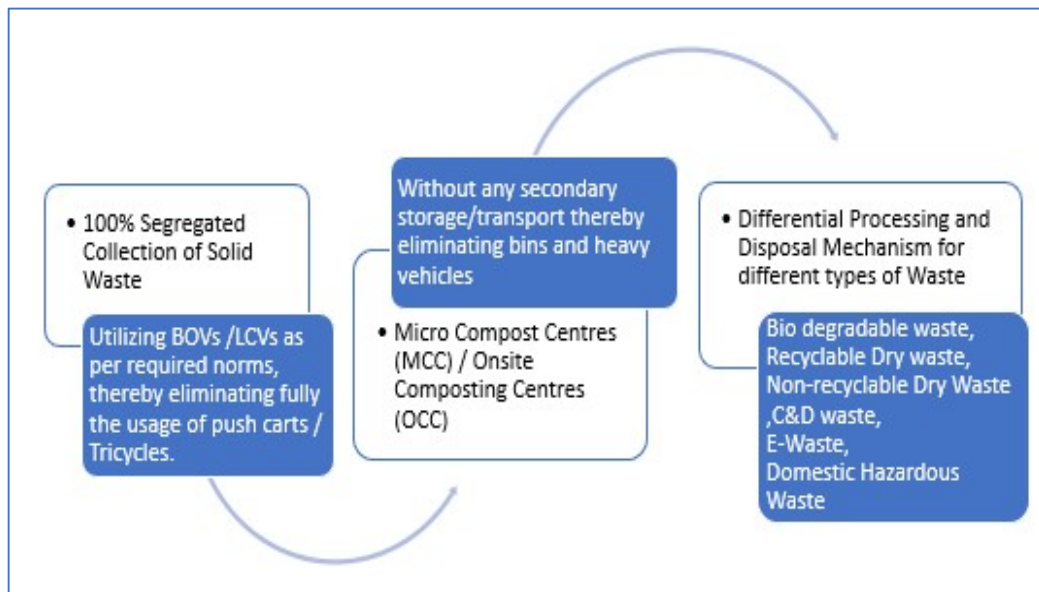


Figure 1: Approach of waste management-Government of Tamil Nadu

CHAPTER II

PRESENT STATUS OF SOLID WASTE MANAGEMENT IN NELLIKUPPAM MUNICIPALITY

2.1 INTRODUCTION

Nellikuppam Municipality comprises of 30wards with a population of 46691 as per 2011 census. The current population on 2018 is 47128. It consists of 11089 residential households with 831 commercial establishments. The town is spread over an area of 21.49 Sq. km.

The town is divided into 30 wards and population is 46691 as per 2011 Census. The ULB has one Bustand , An important aspect is that Pennaiyrrar River flows along Northern boundry the town and Lord Siva Temple (Poologanathar koil) is also an additional important place in this town. No. of households are 11089 with 814 commercial establishments and 232 year old EID Parry sugar factory Located in this town.

Total quantity of MSW generation of this town is about 12.50 MT/Day with a per capita generation of 250 gms / day / person. The following activities under solid waste management are being carried out and the biodegradable wet waste is handled through one MCC and eight nos. OCCs which are located in different parts of the town.

- ✓ Primary collection of waste through door to door collection is being carried out
- ✓ The wet waste are collected daily at every door step
- ✓ The dry waste is being collected once in a week i.e. on Wednesday
- ✓ The domestic and household hazardous waste such as sanitary napkin, diaper are collected daily and disposed through incinerators installed in MCCs.
- ✓ E Waste, other hazardous waste and C&D waste collection to be practiced.
- ✓ Animators are involved in imparting awareness and motivation to the households on source segregation through behavioral change.

2.2 QUANTITY OF WASTE GENERATION

Nellikuppam Municipality generates about 12.50 MT of solid waste per day. Sources and types of waste in Nellikuppam was ascertained by conducting random sampling survey in three different areas-residential, commercial and slums during three different occasions-Week days, holidays and festive season and the same is indicated as below. The per capita waste generation is assessed as 250 gms.

Table 1: Waste Generation

Source of Waste	No. of HH/ Assessment	Per Capita Waste generation (in grams)	Waste Generation in TPD			Inert, Silt and C & D Waste	Total Waste Generation in TPD
			Wet Waste	Dry Waste	Total		
Domestic	11089	250	4.50	4.00	9.50	0.50	12.50
Commercial	814	275	1.02	2.00	3.02		
BWG	7	-	0.35		0.35		
Industrial	-	-	-	-	-		
Total	11908	250	6.00	6.00	12.00		12.50

2.3 DOOR TO DOOR COLLECTION AND SEGREGATION

The Municipality is collecting the solid waste through waste collectors daily through 49 municipal workers and 55 outsourced workers. 13 nos. Battery operated vehicles (BOV) and 3 nos of Light Commercial Vehicles (LCV) being used for primary collection of waste from household. The collection of waste by bulk waste generators themselves and wet waste is only being handled by them in their premises. The level of door to door collection and segregation of waste at source is indicated as below;

Table 2: % of D2D collection & source segregation

Waste Generation	12.50 TPD
Door to Door Collection	90 %
Source Segregation	90%

2.4 COLLECTION AND TRANSPORTATION

The details of availability of vehicles for primary collection and requirement based on the norms prescribed for BOVs and LCVs and action plan for fulfilling the gaps is indicated below:

- BOV Vehicles are used at 400 HH/vehicle /day (covering 3 Trips)
- LCV vehicles are used at 1200 HH/Vehicle/day (covering 3 Trips)
- Primary collection at Door steps is being done and wastes collected are directly transported to processing centre. This is being done using
 - ✓ 13 BOV and 3 LCV covering 11089 House Holds
 - ✓ 1 no. of Tipper Lorry are used for covering 814 Commercial Establishments
 - ✓ 1 Tipper Lorry for collection of C&D Waste

Nellikuppam Municipality has identified about 7 Bulk Waste Generators within the municipal limit and they have been instructed to set up their own waste processing facilities within their premises. Necessary register for BWGs is being maintained as per the guidelines provided.

It has been estimated that about 0.350 TPD of solid waste being generated by the BWGs and they are maintaining the waste processing facilities within their premises. In this way, about 3 % of the total waste is handled by BWG which reduces the burden of the Municipality due to the mandate provisions made in SWM Rule 2016.1

2.5 PROCESSING STATUS ON DISPOSAL OF SOLID WASTE

The Municipality is handling the bio degradable portion of the solid waste through One MCC and 8 OCCs with a total capacity of 6.50 TPD. The features of SWM activities on processing and disposal of waste are as follows.

- ✓ Biodegradable waste is being handled partially, processed and converted as compost with a daily capacity of 5.50 TPD as against total quantity of 6.00 TPD with 92 percent.

- ✓ Micro Composting centres have been established with decentralized approach in 1 locations with a capacity of 2.00 TPD
- ✓ On site Composting Centres have been set up in 8 locations with a total capacity of 4.50TPD
- ✓ Recyclable dry waste which is saleable is being sold to recycling vendors and the waste collectors are permitted to avail the monetary benefits from sale.
- ✓ Non saleable dry waste such as soiled plastic, rags, cloths, used shoes, used mattresses, pillows, rexin covers, damaged bags and other combustible materials etc., is now being disposed to cement industries.

CHAPTER – III

ISSUES AND GAPS

The major issues in implementing better Solid Waste Management system for a town are (i) Inadequate planning (ii) In house capabilities (iii) Lack of public awareness and community participation in segregation and handling of waste (iv) Inadequate processing facilities (v) Improper implementation strategy and accordingly the gap analysis in each activity was made for Nellikuppam Municipality

3.1 ISSUES IN COLLECTION AND TRANSPORTATION

- ✓ Requirements of primary collection vehicle were arrived based on the norms prescribed for different type of vehicles, capacity, and number of trips with reference to the types and sources of waste. Finally the “Gap” is analyzed based on the availability of vehicles and action to be taken adequate procurement.
- ✓ Adequate awareness among the citizen has to be carried out continuously.

3.2 ISSUES IN SCIENTIFIC PROCESSING AND DISPOSAL

- ✓ Insufficient manpower with adequate knowledge in processing at compost yard
- ✓ Proper marketing mechanism has to be established for sale of compost produced from the composting centre.
- ✓ Lack of incinerators in waste processing facilities to handle the house hold hazardous waste
- ✓ Non saleable dry waste disposal mechanism to be identified and in operation without any interruption

3.3 ISSUES IN IN-HOUSE CAPABILITIES

- ✓ All the staff involving in SWM activities have to be provided with training periodically on methodology and process to keep them with updated skills and knowledge
- ✓ The shortfall in man power requirement has to be determined by conducting GAP analysis
- ✓ Nellikuppam Municipality is entitled to engage 137 no's of sanitary workers as per the norms prescribed through GO Ms. No. 101. Dated 30.4.97.
- ✓ At present, only 104 no. of sanitary workers (49 permanent and 55 outsourced) are being engaged in the SWM activities.
- ✓ The shortfall of man power requirement as per norms is 33 and the Municipality shall engage sanitary workers through outsourcing which will fulfill the gap in SWM activities in Nellikuppam Municipality.
- ✓ Though biometric attendance system was installed and the same shall be linked with payroll for all the Sanitary workers (both Regular and outsourced).

3.4 GAPS IDENTIFIED ON SWM

The Municipality has identified the following gaps in requirement of vehicles for primary collection, man power and processing facilities based on the norms prescribed.

The vehicle requirement for primary collection based on the norms and the availability of vehicles with the municipality and the shortfall is tabulated below.

Table 3: Vehicle shortfall

S No	Description	House hold	Requirement of Vehicles	Availability	Short fall
1	Battery Operated Vehicles	5200	13	13	0
2	Light Commercial Vehicles	3600	3	3	0
3	Tipper Lorry	Commercial area	2	2	0

The manpower requirement based on the norms prescribed and the availability of workers with the municipality and gap in manpower is indicated below.

Table 4: Manpower shortfall

S No	Municipality	Requirement as per norms prescribed through G.O No.101 dated 30.04.1997	Availability of manpower	Shortfall
1.	Nellikuppam	137	104	33

The municipality is generating 12.50 MT of organic waste daily and the same is being handled through one(1) no. Micro Composting Centre and 8 nos. Onsite Composting Centres. The details of MCCs and OCCs and their capacities for handling the bio degradable waste and the requirement of additional facilities are detailed below.

Table 5: Processing facilities shortfall

S No	Description	Capacity of processing facilities required (MT)	Total Capacity of MCCs/OCCs available (MT)	Shortfall (MT)
1	Micro Composting Centre	2.00	2.00	-
2	On site Composting Centre	4.00	4.50	-
3	Bio methanation Plant	-	-	-
4	Facilities maintained by Bulk waste Generators	0.35	0.35	-

CHAPTER – IV

VISION, GOALS, OBJECTIVES ON SWM FOR NELLIKUPPAM MUNICIPALITY

4.1 VISION

To provide better quality of life to the people of Nellikuppam Municipality and to make the town livable through implementation of sustainable solid waste management strategy

4.2 GOAL

- (i) To have high standard of cleanliness in Nellikuppam Municipality
- (ii) To ensure 100 % Door to Door collection of the waste and prohibition of unhygienic system of disposal by the households
- (iii) To ensure 100 % waste segregation at source
- (iv) To ensure non littering throughout the town
- (v) To ensure dust bin free town
- (vi) To promote the practice of Reduce, Reuse, Recycle and Recover
- (vii) To have “No Landfill Concept”
- (viii) To achieve “Zero Waste Concept”

4.3 POLICY OBJECTIVE

Objectives shall endeavor to

- (i) Protect public health and environment
- (ii) Make the citizen to realize the responsibility and accountability on SWM
- (iii) Minimizing the generation of solid waste through sustainable IEC on 4R Concept

- (iv) Involving the community groups RWA, CBOs, SHGs to ensure community participation in managing and minimizing the Municipal Solid Waste locally.
- (v) Conduct periodical meeting with Resident Welfare Associations on segregation of waste at source, disposal of manure
- (vi) Provide integrated solution to dispose the solid waste (both wet and dry waste) with cost effective and efficient delivery of service
- (vii) Conduct periodical meeting with workers on segregated waste collection, dry waste handling, composting process
- (viii) Dispose the dry waste through the vendors
- (ix) Build in capacity of Municipal staffs through periodical training.
- (x) Establish “Green cross society” or “Eco clubs” in educational institutions to impart information on the necessity of SWM to keep the town with livable condition.
- (xi) Promote the town to have better star rating in respect of SWM
- (xii) Make the SWM services self-sustainable by collecting user charges to cover Operation & Maintenance cost and levy taxes to meet out the cost of capital investment.
- (xiii) Follow the polluter pay principle to bear the cost associated for damaging the environment.
- (xiv) Culminate the practice of throwing the waste in to the streets, public places, open spaces, water bodies and culminate the practice of burning the garbage.

CHAPTER- V

IMPLEMENTATION STRATEGY

5.1 IMPLEMENTATION STRATEGY:

Door to Door Collection	<ul style="list-style-type: none">• Wet waste collection on daily basis• Dry waste collection on weekly basis (every Wednesday)• Domestic Hazardous waste like sanitary napkins, diapers will be collected separately during wet waste collection on a daily basis.• Domestic hazardous waste like tube light, paint container and other waste will be collected weekly basis.• E waste collection on monthly basis• C & D waste on need basis• Bio waste will not be collected from the Bulk Waste Generators and recyclable dry waste shall be collected on weekly basis
Source Segregation	<ul style="list-style-type: none">• 100 % source segregation is ensured through sustainable IEC activities by engaging Animators (Green Ambassadors)
Transportation	<ul style="list-style-type: none">• Primary collection at door step using Battery Operated vehicles and Light commercial vehicles with proper route chart and trip chart as per coverage area• Eliminating Secondary storage bins on roadside• Minimizing secondary transportation
Scientific Disposal of Waste	<ul style="list-style-type: none">• Disposal of wet waste through composting by Establishing Micro level Compost Centers, On Site Composting Centers under Decentralized approach for processing and disposal of wet waste.

	<ul style="list-style-type: none"> ● Bio gas technology shall be adapted for handling food waste and slaughter house waste ● Disposing the dry waste to the identified vendors for recycling ● Plastic waste and other recyclable waste to be disposed to the recycling vendors ● Other non recyclable, non saleable but combustible to be disposed to thermal industries / cement industries or vendors who wants to use it as fuel or to dispose through Pyrolysis plant through PPP mode. ● Other non recyclable and non combustible waste and silt are disposed along with C & D waste ● Dead animals shall be disposed scientifically through burial method in the earmarked site ● Domestic Hazardous waste such as Diapers, Napkins, blood stained cottons, Paramedical wastes are separately collected during the daily wet waste collection and are sent for incineration through the small incinerators erected in the processing centers or bio medical waste processing facilities ● Hazardous waste and E waste to be collected once in 30 days and store at Resource Recovery Center by Municipality and periodically dispose the same to the concerned operators handling waste processing facility in coordination with TNPCB for further processing. ● C & D waste to be collected and stored in the earmarked location and to use on needy basis.
IEC activities , Capacity buildings and motivation	<ul style="list-style-type: none"> ● Periodical meeting with RWAs, NGOs, elected body members Bulk Waste Generators to create awareness on waste management and periodical training to sanitary workers involved in SWM activities ● Updating the knowledge of the personnel involving in SWM

5.2 SWM MONITORING CELL

The Municipality shall constitute a SWM Monitoring Cell under the Chairmanship of Municipal Chairman comprising the Commissioner as Member secretary and five other members including / Sanitary officer/Sanitary Inspector, Municipal Engineer, Town Planning Inspector, .

This committee will meet once in a month and discuss the implementation strategy and facilitate the ULB for implementation of SWM

5.3 HOME COMPOSTING

Municipality shall take all efforts to promote the concept of Home Composting among the citizen through intensive campaign for its effective implementation in their home to minimize the waste generation.

CHAPTER- VI

ACTION PLAN

The infrastructural facilities pertaining to the solid waste management shall be considered as two categories:

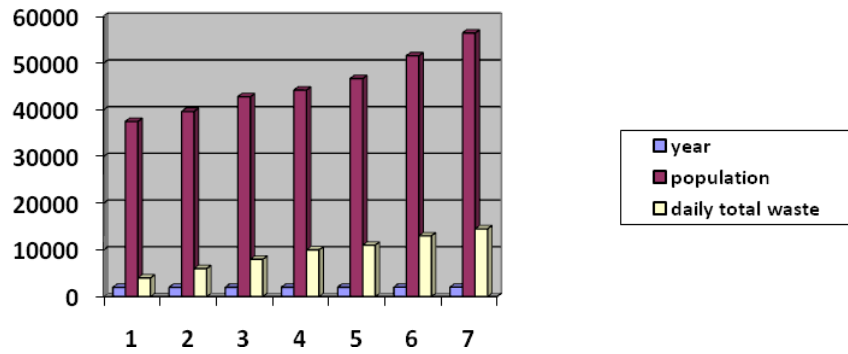
- 1) Immovable infrastructure ie, the land and the facilities developed based on the desirable technology to process scientifically and dispose the solid waste being generated daily. This has to be developed considering the future vision and projected population for a period of minimum 10 years.
- 2) Movable infrastructure ie. The vehicles need to determined based on the life of the vehicle and quantity of waste to be transported on daily basis without stagnation and accumulation in the town for long period.

Considering the projected population for the year 2030 the requirement of the processing facilities is determined and the gap is analyzed for future development. Whereas the movable infra ie., the requirement of vehicles is to be estimated based on the quantity of waste generated by the present population and the gap analysis has to be carried out every year.

At present, the total quantity of waste generated in this town is 12.50 TPD. In the next ten years i.e., 2030, with the increase in population, quantity of waste will obviously increase by 15% i.e 14.50 TPD. The capacity of the Micro Composting Centers and Onsite Composting Centers available at present is sufficient to handle the waste which would be generated in the next five years and further, the Municipality is insisting home composting and barrel composting in the residential areas to process the generated of waste in more decentralized manner. The normal practice of analyzing the requirement of vehicles depends on the increase in population and quantity of waste will be followed.

- 3) In the same manner, requirement of workers will be analyzed and action will be taken to fill the gap either through engaging Self Help Groups or by engaging workers through outsourcing on contract.

Projection of Population and Daily waste generation chart



year	1971	1981	1991	2001	2011	2021	2031
population	37497	39615	42783	44222	46691	50360	55496
daily total waste	4000	6000	8000	10000	11000	13000	14500

Figure: 3 Projection of Population and weight Chart

6.1 DOOR TO DOOR COLLECTION AND SEGREGATION AT SOURCES

Presently D2D collection of waste is achieved at 90% and it was achieved through continuous motivation on waste segregation through animators. Further, various IEC activities are being carried out to motivate the public on segregation. However, in-anticipation of the population growth, development residential colonies and also vertical expansion through multi storied apartments in the town, continuous IEC activities is planned to achieve 100% D2D Collection before April 2019.

For source segregation, awareness is being given through Animators / RWA / NGO / SHGs to the citizen / waste generators on segregation of waste as Wet (Bio-degradable) and Dry (Non degradable / Recyclable) Waste, Household hazardous waste. The citizen are being sensitized to practice Home Composting in their homes which will considerably reduce the quantity of waste collection by the municipality.

6.2 COLLECTION MECHANISM OF DIFFERENT TYPES OF SOLID WASTE

As per the Solid Waste Management Rule 2016 its mandates, waste generators/citizens are responsible for the management of their waste at the source of its generation. They should take responsible for source segregation as bio-degradable & non bio-degradable waste (recyclable and inert waste). The segregated waste will be collected properly by the sanitary workers every day. In Nellikuppam Municipality the size and volume of solid waste both wet waste and dry waste (bio-degradable & non bio-degradable waste) is daily generated only 12.50TPD. Hence it is decided to have Decentralized Processing Centre for both wet and dry waste at local level without exceeding 1000- 1500 households per processing centers which will pave a path to achieve 100 % Door to Door collection sustainably with minimum transportation cost by avoiding the secondary transportation and secondary storage bins/ stations. Accordingly, route chart with earmarked vehicles for collection, deputation of waste collectors, prescribed time for each trip are finalized and all the households in the Urban Local Body have been educated for behavioral changes through an effective IEC programme by engaging Animators.



Figure:4 D2D Collection and Segregation of Domestic Solid Waste

At present, primary collection of waste on Door to Door basis is being effectively done by utilizing 13 Battery Operated Vehicles (BOV) and 3 Light Commercial Vehicles (LCV). Further 13 Battery Operated Vehicles will be Purchased. The entire collection is being carried out with the engagement of 137 sanitary workers at present NELLIKUPPAM Municipality is entitled to engage 49 no. of sanitary workers as per **GO Ms. No. 101. Dated 30.04.97**, sanction for the outsourcing of 55 more sanitary workers is obtained.

In view of eliminating the conventional vehicle such as puchcarts it is proposed and procured 13 nos BOV and 3nos. LCV to collect the solid waste and door step on day to day basis.. The pushcarts will then be used for transporting silt collected from drains and for transport of compost generated in the

s. Safety equipment such as hand gloves, face masks, reflected jackets, gumboots, helmets and raincoats are issued to all sanitary workers to handle the waste hygienically and safely.

6.3 WET WASTE COLLECTION (BIO DEGRADABLE WASTE):

Wet waste which includes all items that are considered as Bio Degradable ie kitchen waste such as stale food, fruits and vegetables. The details of disposal mechanism of wet waste are discussed below.

- At present, biodegradable waste from house - holds are being collected on day to day basis using 13 nos of BOVs and 3 nos. of LCVs.
- Trip wise 'Route chart' were prepared for each vehicle, each waste collectors with designated streets, households and trips.
- Wet waste from the commercial areas is collected using the Light commercial vehicles earmarked for the purpose.
- Market waste is being collected using the available high capacity tipper lorries.
- Domestic Hazardous waste such as Diapers, Napkins, blood stained cottons etc is being collected separately during the wet waste collection and sent for incineration on a daily basis through the incinerators installed in the MCCs.

6.3.1 Existing Wet Waste Processing Mechanism in Nellikuppam Municipality

At present, 6.00 MT of wet waste is being processed in the 8 OCCs and through 1638 households practicing Home Composting. The details of waste processing followed is given in Table 6

Table: 6 Wet Waste Processing in Nellikuppam Municipality.

S.No	Methods of Composting	Capacity of Composting in MT
1	Micro Composting Centre - 1	Under construction
2	Onsite composting Centre - 8	4.50
3	Home Composting (1638 Nos. HHs Practicing)	1.00
Total		5.50

The details of wet waste processing facilities maintained by the Municipality viz., MCC, OCC , details of household practicing Home Composting is detailed below

a. Onsite Composting Center (OCC) for Garden waste Collection

The waste generated in parks, gardens are addressed by developing Onsite composting facilities wherein the waste from the nearby households are also being processed. Nellikuppam Municipality had established 8 Nos. of Onsite Composting Centers with a handling capacity of 4.50 TPD as detailed below.

Table: 7 Details of Onsite Compost Centers

S. No	On site Compost centre Location (Name of the park)	Capacity of the wet waste processing facility (TPD)	Present Status
1	Municipal Office Campus	1.00	Functioning
2	Vanpakkam	0.50	
3	Chozhavalli	0.50	
4	Kailasanthar koil	0.50	
5	Narmatha nagar	0.50	
6	Maruthi Nagar	0.50	
7	Thiruvalluvar Nagar	0.50	
8	Visvanathpuram	0.50	
	Total	4.50	



Figure 5. Onsite Compost Center in Nellikuppam Municipality

b. Home composting

Nellikuppam Municipality is steadily moving towards promoting home composting with the involvement of citizen. IEC activities are carried out to encourage home composting among the households so as to motivate them to process the wet waste generated by them. This is done by utilizing the services of Animators. At present 1638 Households are practicing home composting, processing about 1000 Kg/day of wet waste (biodegradable waste).



Figure : 6 Home Composting

6.3.2 Action Plan for Wet Waste Processing in Nellikuppam Municipality

It is planned to process the balance 0.50 MT & future wet waste generation for achievement of 100% of wet waste processing in Nellikuppam Municipality through functioning of Micro composting centre under construction by mid April 2019.

Table: 8 MCC Details

S.no	MCC Location	No of Ward	No of House hold	Population	Quantity of waste generation (TPD)	Wet waste Quantity	Processing Capacity TPD	Present status (Proposed/Ongoing)
1	Saravanpuram Pattai	Part,20,27,28&30	1600	6400	1.60	0.80	2.00	under Construction



Figure : 7 Ongoing Construction Activities in Micro Composting Centre

6.4 ROUTE MAPPING AND TRIP CHART MECHANISM

The Route chart for collection and disposal of wet waste to the earmarked decentralized Micro composting centers and onsite composting centers is prepared by classifying the collection areas into areas adjoining the processing centers, nearer to the collection centers and farther distance from the collection centers

6.4.1 Route map of Nellikuppam Municipality

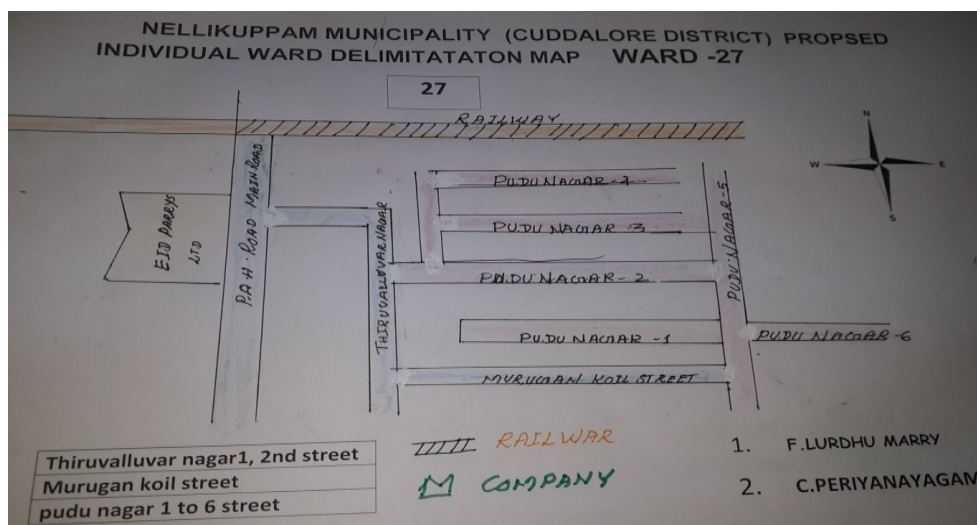


Figure : 8 Onsite Area Coverage details

Table : 10 Nellikuppam Municipality Thiruvalluvar Nagar Onsite Compost Centre

Ward No	Vehicle No.	No. of House	Name of the Worker	Name of the Street	Garbage Collection Time	Garbage Closing Time
27	Pushcart	126	F.Lurdhu marry	Thiruvalluvar nagar 1, 2nd street	6.30 am	11.00 am
27		121	C.periyanayagam	Vocnagar 2 nd street	6.30 am	11.00 am

Sanitary Supervisor : M.Sivakozhundhu

Sanitary Inspector : K.V.Senthil Kumar

The trip chart, the workers in charge, supervisors in charge are also finalized for each decentralized Micro composting centers covering the details of number of households are disclosed to the Residential Welfare Association (RWA) and the public for awareness and cooperation with the Municipality.

6.5 BULK WASTE GENERATORS (BWG)

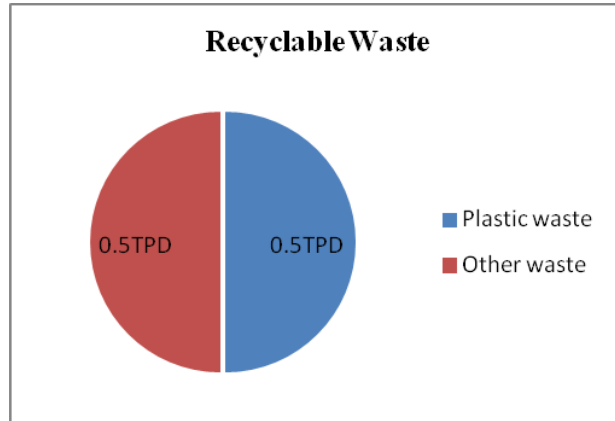
- ✓ Bulk Waste Generators contribute substantial amount of waste ie nearly 3% of the daily waste. According to the Solid Waste Management Rules 2016, Bulk Waste Generators are responsible for managing their own waste within their premises. Nellikuppam Municipality has identified 7 BWGs comprising 1 Hotels, 5 KalyanaMandapams and 1 Educational Institutions in accordance as defined in SWM Rules 2016
- ✓ Register related to the BWGs are being maintained by the Municipality as per the guidelines provided.
- ✓ Total waste generated by BWG was estimated as 0.35 TPD and the same is being handled by the BWGs themselves by establishing their waste processing facilities. In this way about 3 % of waste is reduced by the Municipality at the collection stage itself as per the provisions of SWM Rule 2016.
- ✓ Hence entire wet waste generated in the ULB is addressed by disposing it scientifically



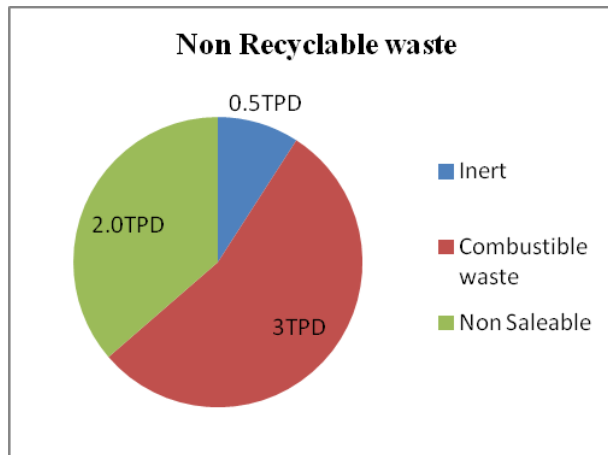
Figure:9 Bulk Waste Generators- Onsite Composting

6.6 DRY WASTE (NON-BIODEGRADABLE) COLLECTION

Dry waste includes all items that are dry in nature. This includes both recyclable and non-recyclable materials. The details of composition of dry waste such as Recyclable waste and Non-recyclable waste is given below.



Recyclable (Saleable) wastes sold to local recyclers/vendors and sold amount to be paid to sanitary workers as incentive



Non Saleable and Combustible fraction sent to M/s Ultratech Cements

Figure:10 Dry Waste Disposal Mechanism

- ✓ Dry Waste is being collected on Wednesdays of every week,
- ✓ About 1.00TPD of collected recyclable waste is sold to the authorized vendors/Recyclers available in and around Nellikuppam Municipality every week. The sold amount is distributed to sanitary workers who involved in the collection task, to motivate the workers to play a key role in this collection mechanism.
- ✓ A separate register is being maintained for getting necessary acknowledgement from the sanitary workers for the receipt of amount by them.
- ✓ The non-recyclable/non-saleable fraction of waste is transported to M/s Ultra Tech, Cements Ariyalur , for usage as fuel.
- ✓ Also, the ULB has a plan to use the plastic and combustible fraction of waste in the Pyrolysis plant that will be established in Nellikuppam Municipality or nearby ULB to achieve a sustainable solution for disposal of this fraction of waste.

6.7 DOMESTIC HAZARDOUS WASTE& E WASTE COLLECTION

- ✓ Domestic Hazardous waste such as Diapers, Napkins, blood stained cottons, Paramedical wastes are separately collected during the daily waste collection and sent for incineration on daily basis located at the existing dump yard and it is proposed to erect incinerators with a capacity of 300-400 Napkins/Diapers per day in the MCCs by mid April 2019.
- ✓ The other domestic hazardous waste such as discarded paint container, garden pesticides and chemical detergent container will be disposed through the proposed pyrolysis plant.
- ✓ E-waste will be collected and sold to the locally available authorized dealers by Tamil Nadu Pollution Control Board.
- ✓ IEC activities have been carried out to educate the Public regarding the establishment of separate centre for the deposition of domestic hazardous waste and E-waste generated by them and they are encouraged to deposit such wastes in these centers on their own.

6.8 BIOMEDICAL WASTE

- ✓ Biomedical Waste collected in the nursing homes , private hospitals in the Nellikuppam Municipal limit is handed over by the concerned to M/s Tamil Nadu Waste Management

Ltd, No.323 Poonamamaillee High Road Chennai. who is the authorized facilitator in Cuddalore by TNPCB.

- ✓ Register Containing the Name, Location, and the name of disposal facilitators of Nursing homes and Hospitals are maintained by the ULB for reference and information. Photos of the Register are shown in Figure 18.
- ✓ The clinics and Nursing homes have been sensitized to prominently display the name of authorised facilitator in their place for the awareness of the public at large.

6.9 CONSTRUCTION & DEMOLITION WASTE:

- ✓ The C&D waste generated by the Nellikuppam Municipality(about 0.50TPD)is mainly consumed by public themselves for filling the basement, foundation within their premises and a very meager quantity expected to be disposed is collected by earmarked vehicle.
- ✓ A space is located in Saravanapuram (around 1.0 acre), where generators will be encouraged to deposit the C&D waste or the ULB will transport the C&D waste on its own using a private operator by levying prescribed fee from the generators and such wastes will be finally used for filling low lying areas and pot holes.

6.10 DISPOSAL OF LEGACY WASTE AND RECLAMATION OF DUMP SITE

In Nellikuppam Municipality the solid waste collected over the past five decades had been dumped in Ward.no.4 Arokkiya swamy street Compost Yard. Since the municipality has now started to dispose the Solid Waste scientifically, action was taken by the Nellikuppam municipality to remove the legacy waste dumped in the aforesaid site through the process of Bio mining and about 2.68 acres of land will be reclaimed before September 2019. After reclamation the land it is planned to convert the land for constructing park for public usage. Nellikuppam Municipality is taking remarkable steps to notify its status as “**dumpsite free ULB**” in district gazette.

7 PLANNING FOR VEHICLE AND TRANSPORTATION

- ✓ Minimizing the secondary collection
- ✓ Bin free town
- ✓ Eradication of Pushcarts and Tricycles

- ✓ Encouraging Primary collection on door step in house holds
- ✓ Utilizing high capacity vehicle for collection of Garbage/Solidwaste at commercial, Market area, De-silting the Drain and collection C&D waste

A. Shortfall in primary collection vehicles:

- ✓ The existing vehicle such as pushcarts are in redundant stage and are proposed to be used on smaller scale for removal cum transport of silt from the storm water drainages and in solid waste processing plants for the transport of compost produced.
- ✓ It is decided to utilize the Battery-Operated vehicles and Light Commercial Vehicles for Door to Door Collection of Solid waste along with segregation practice.
- ✓ The following norms scientifically suggested by the Commissioner of Municipal Administration are followed to determine the required number of vehicles for primary collection of solid waste at door step; accordingly, adequacy is verified for further plan of action.

Battery Operated vehicles	Payload capacity is 0.75 cu. m /500kg	400 households shall be covered using one vehicle with minimum of three trip per day (@150 households per trip)
Light Commercial Vehicles	Payload capacity is 2cu.m /800 kg	1200 households shall be covered using one vehicle with minimum of three trip per day (@400 households per trip)

The requirements and gap are determined as per the norms discussed above and the shortfall or the gap is justified

Table: 11 Vehicle gap analysis

Type of vehicle	House hold covered	Required (including standby 10%)	Available	Balance		Remarks
				7 th SHPC Sanctioned	8 th SHPC Sanctioned	
BOV (for 65 % of HH)	6095	13	13	-	13	
LCV (for 35 % of HH)	3300	3	-	3	-	
Commercial & market waste	834	1 tipper lorry	-		1 tipper lorry	

B Adequacy for Secondary collection vehicles

The present mechanism followed for processing the wet waste to bio manure is a localized cum decentralized approach. Hence the need of secondary storage (bins), collection and transportation is eliminated.

6 PLANNING FOR MANPOWER

- ✓ All the staff involving in SWM have to be periodically provide with training on methodology and technology to keep them with updated skill knowledge
- ✓ The shortfall in man power to address the SWM has to be determined to conducting GAP analysis
- ✓ Nellikuppam municipality is entitled to engage 137 no. of sanitary workers as per GO Ms. No. 101. Dated 30.04.97.
- ✓ At present, only 104 nos.of sanitary workers (49 permanent and 55 outsourced) are engaged in the collection process.
- ✓ Action has to be taken to have adequate sanitary workers and supervising staff.

Table: 12 Sanitary workers detail

Sl.no	No of HHs	required sanitary workers	Sanctioned strength	As on date available	shortfall	outsourcing permission obtained	Remarks
1	11089	137	71	104	33	55	Proposal for engagement of balance 33 sanitary workers through outsourcing will be completed before March 2019

Also the ULB has a proposal to engage Sanitary Workers exclusively for undertaking day to day functionality of MCC

9 PROCESSING AND DISPOSAL

1. Decentralized approach
2. Micro composting the wet waste
3. Identify the sufficient site / Land and keep in reserve to address the future requirement.
4. Storing the recyclable waste and disposing the same to the identified vendors.
5. Establishing Pyrolysis Plant to dispose the non-recyclable waste (Except inert and C&D waste)
6. Keeping Hazardous waste/E-waste at RRC and disposing the same to PCB periodically by maintaining register.
7. Domestic Hazardous waste such as Napkin,Diaper is to be incinerated separately in daily basis.
8. Improving the facility to handle the increased quantity periodically.
9. Towards dump yard free city.
10. Curbing the practice of throwing the Garbage into water bodies/drain and eradicate the burning practice.
11. Disposing the End product after processing the waste that is compost and other materials to the identified vendors by maintaining the registers.

Table: 13 Adequacy of Wet Waste Processing Facility

Source of waste	Quantity of wet waste (TPD)	Total quantity of wet waste (TPD)	Processing Method	No. of facilities available	Capacity of Facilities (TPD)	Total Capacity of processing facility (TPD)	Remarks
Domestic & Park	5.50	6.00	OCC	8	4.50	7.50	
Commercial (excluding BWGs)	0.50		MCC	1	2.00		
			Home Composting	1638	1.00		

Note: 1.Bulk Waste Generators are processing their own waste capacity of 0.35TPD by onsite composting and given to the piggeries.

Table: 14 Adequacy of Dry Waste Disposal Mechanism

Source of waste	Quantity of dry waste (TPD)	Total quantity of dry waste (TPD)	Disposing method	Recyclable (TPD)	Non-recyclable (TPD)	Total Quantity of dry waste(TPD)	Shortfall (TPD)
Domestic And park	5.50	6.00	Recyclers	0.50	0.50	6.00	Nil
Commercial	0.50		Cement Industries	0	3.50		
			Stored in Municipality**	0	1.50		

** Note: Non-recyclable waste stored in division office, subsequently the waste will be sent to cement factory.

10 INTEGRATION OF INFORMAL SECTOR

SWM Rules 2016 prescribes establishment of a system to recognize organizations of waste pickers or informal waste collectors to promote and establish a system for integration of these authorized waste-pickers and waste collectors to facilitate their participation in solid waste management including door to door collection of waste. Accordingly, measures have been taken to integrate the authorized waste pickers to address the shortfall of sanitary workers. Identification cards have been distributed for successful inclusion of them into sustainable handling and disposal of solid waste.

11 POLLUTER PAYS PRINCIPLE

SWM Rules 2016 authorizes to prescribe user fee from time to time as deemed appropriate and collect the fee from the waste generators. Accordingly, Nellikuppam Municipality has framed a bye-law and published in district gazette following procedure for the enforcement of the same. Criteria for levying of spot fine for persons who litters or fails to comply with the provisions of these rules have also been highlighted in the bye-law.

12 CAPACITY BUILDING OF SANITARY WORKERS

To attain the system sustainability in solid waste management periodical refreshment training is planned and training given to 104 sanitary workers and the balance will be given in phased manner.



Figure : 11 Capacity Building of Sanitary Workers

13 COMMUNITY AWARENESS

The more the participation, sooner we accomplish any mission. Recognizing this, Community participation and awareness has been given high priority in the SWM Rules-2016. Public awareness through Information, Education and Communication (IEC) campaign thru inculcate of the citizen/waste generators on the following is being undertaken:

- Not to litter i.e. throw or dispose of any waste such as paper, water bottles, liquor bottles, soft drink canes, tetra packs, fruit peel, wrappers, etc., or burn or burry waste on streets, open public spaces, drains, water bodies.
- Minimise the generation of waste and insist to reuse the waste to the extent possible.
- Practice segregation of waste into bio–degradable, non-biodegradable (recyclable and combustible), sanitary waste and domestic hazardous wastes at source.
- Practice Home Composting, Vermicomposting, Bio Wire Mesh Composting, Barrel Composting.
- Wrap securely used sanitary waste as and when generated in the pouches provided by the brand owners or a suitable wrapping as prescribed by the local body and place the same in the bin meant for non-biodegradable waste.
- Storage of segregated waste at source in different bins;
- Handover segregated waste to waste pickers, waste collectors, recyclers or waste collection agencies.
- Pay monthly user fee or charges to waste collectors or local bodies or any other person authorised by the local body for sustainability of solid waste management.

- Additionally giving awareness for plastic ban and motivate public to go green.
- Towards Zero Waste Target to be achieved through practicing the concept of reduce, reuse, recycle and recover in a concerted manner



Figure: 12 Community Awareness/ IEC activities

14 SALE OF MANURE GENERATED

The end product viz., manure generated from the MCC / OCC / Windrow Method Compost will be sold to farmers at marginal cost and the Department of Horticulture/ Agriculture will be roped in for the periodical intake of manure generated at the centers. Steps are being taken to effect an agreement between TANHODA and the Office of CMA to this effect.

Further, the revenue generated through the sale of manure is disbursed to the sanitary workers working in MCC/OCC as an incentive.

A separate register is being maintained for the production and sale of manure in each and every MCC/OCC with the details of manure produced, to whom sold, sale value, and details of amount disbursed to sanitary workers.



Figure: 13 Manure Sales

15 TIME FRAME ON ACTION PLAN

Sl.No	Action Plan	Timeline
1	100 % Door to Collection	15.04.2019
2.	100 % Source Segregation	15.04.2019
3	Prevention of burning and throwing the waste to the water bodies	Achieved
4.	Communicating the Reduce Reuse Recycle to the community	Continuous process
5.	Bye law pertaining to the Solid waste Management Rule 2016 and Plastic waste management Rule 2016	Framed and Implemented
6.	Processing facility for wet waste	Partially completed. The remaining facility infra will be completed before 31.03.19
7.	Disposal Mechanism of Dry Waste	Practised. Continuous process.
8.	Identifying the storage facility for domestic hazardous waste and E waste	Achieved.
9.	Identifying the storage facility and disposal mechanism for construction debris	Before 30.04.19
10.	Bio mining	30.09. 2019.
11.	Effecting manure sale agreement with TANHODA	Before 30.03.2019
12.	Battery Operated Vehicle(13Nos) & Light commercial vehicle (3Nos)	Completed
13.	Bin free city	Achieved
14.	Integration of informal sectors/ SHGS	Completed
15.	Formation of SWM monitoring Committee at Municipal Corporation level	30.05.2019
16.	Dump free city	30.04.2019

**COMMISSIONER
NELLIKUPPAM MUNICIPALITY**



**'SANITATION IS MORE IMPORTANT
THAN INDEPENDENCE.'**

~ MAHATMA GANDHI

