Report of the Comptroller and Auditor General of India

Performance Audit on Solid Waste Management in urban areas of Union Territory of Puducherry

for the year ended March 2022

Government of the Union Territory of Puducherry
Report No. 1 of 2024

TABLE OF CONTENTS

	Reference to paragraph	Page
Preface		v
Executive summary		vii
CHAPTER - 1 INTRODUCTION		
Introduction	1.1	1
Solid Waste Management in Union Territory of Puducherry	1.2	1
Organisational setup	1.3	2
Responsibilities of different departments and agencies	1.3.1	3
Audit Objectives	1.4	3
Audit Criteria	1.5	4
Audit Scope, Methodology and Sampling	1.6	4
Acknowledgement	1.7	5
CHAPTER - 2 PLANNING AND FINANCIAL MANAGEMENT		
Planning and Strategy for Solid Waste Management	2.1	7
Non-assessment of waste generation	2.1.1	7
Absence of comprehensive State Policy for Solid Waste Management	2.1.2	8

	Reference to paragraph	Page
Preparation of Action Plan as required under legal framework	2.1.3	10
Non-inclusion of mandatory activities under Construction and Demolition Waste in Action Plan	2.1.4	11
Non-availability of strategies for waste reduction, reuse and recycling	2.1.5	12
Financial Management	2.2	13
Allocation and utilisation of funds	2.2.1	13
Non-availing of GoI funds under SBM-U	2.2.2	14
Collection of user fee	2.2.3	15
Non-execution of works under Smart City Project	2.2.4	16
Conclusion	2.3	16
Recommendations	2.4	17
CHAPTER - 3 SEGREGATION, COLLECTION AND TRANSPORTATION OF WASTE		
Segregation of waste	3.1	20
Non-segregation of wastes	3.1.1	20
Non-utilisation of services rendered under Corporate Social Responsibility	3.1.2	22
Collection of waste	3.2	24
Transportation	3.3	26
Non-provision of Personal Protection Equipment	3.4	26

	Reference to paragraph	Page
Conclusion	3.5	27
Recommendations	3.6	27
CHAPTER - 4 PROCESSING AND TREATMENT OF SOLID WASTE		
Processing and Treatment	4.1	29
Bio-Mining	4.1.1	31
Non-clearance of legacy waste at Karuvadikuppam dumpsite in Puducherry	4.1.2	32
Non-clearance of legacy waste at Karaikal and Yanam dumpsites	4.1.3	33
Recycling and Recovery	4.2	34
Non-setting up of material recovery park in PUAA	4.2.1	34
Delay in setting up of Material Recovery Facility in Yanam	4.2.2	35
Composting	4.3	37
Bio-Methanation	4.3.1	38
Sanitary Landfill	4.4	39
Status of dumpsites	4.4.1	40
Improper disposal of Construction and Demolition Waste	4.5	43
Improper disposal of slaughterhouse waste	4.6	44
Conclusion	4.7	45
Recommendation	4.8	46

	Reference to paragraph	Page
CHAPTER - 5 MONITORING		
Monitoring by Apex Bodies	5.1	47
Monitoring by Local Administration Department	5.1.1	47
Non-functioning of GPS in vehicles used for waste transportation	5.1.2	48
Monitoring by Puducherry Pollution Control Committee	5.2	49
Ineffective enforcement of SWM Rules	5.2.1	49
Non-levying of Environmental Compensation	5.2.2	49
Issue of improper authorisation for Dumpsite in Yanam	5.2.3	50
Deficiencies in monitoring of environmental impacts	5.2.4	50
Inadequate Information, Education and Communication activities	5.3	53
Conclusion	5.4	54
Recommendation	5.5	55
Glossary of abbreviations		57

PREFACE

This Report for the year ended March 2022 has been prepared for submission to the Lieutenant Governor under Section 49 of the Government of Union Territories Act, 1963.

The Report of the Comptroller and Auditor General of India contains the results of Performance Audit on Solid Waste Management in urban areas of Union Territory of Puducherry covering the period from 2017-18 to 2021-22.

The instances mentioned in this Report are those, which came to notice in the course of Performance Audit conducted during April 2022 to December 2022. Matters relating to the periods outside the audit period have also been reported in places where they were found necessary.

The audit has been conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India.

Audit acknowledges the co-operation received from Department of Local Administration, Municipalities and Puducherry Pollution Control Committee for smooth conduct of Audit.

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Why we did this Audit?

The management of Solid Waste in urban areas has emerged as one of the biggest challenges faced by the Municipalities throughout the country which is aggravated by rapid urbanisation. Elimination of dumped wastes and substantially increasing the recycling of solid waste for safe reuse is one of the targets set in Sustainable Development Goals (SDGs). Proper solid waste management (SWM) presents an opportunity not only to avoid the adverse impact on public health and environment, but also enable to recover resources, realise environmental, economic and social benefits. Therefore, scientific disposal of solid waste through segregation, collection, transportation, processing and disposal in an environmentally acceptable manner by the municipalities is the goal that minimises adverse impact on public health and environment.

Considering the importance of Solid Waste Management to minimise the adverse impact on public health and environment, CAG took up this Performance Audit covering the activities of the Department during 2017-22. The objectives of this Audit were to assess whether: (1) strategy and planning commensurate with the wastes generated and as per legal framework; (2) collection, segregation, storage, transportation, disposal and social inclusion of informal waste workers were effective, efficient and economical; (3) planning, construction, commissioning, operation and maintenance of projects was effective, efficient and financially sustainable (4) monitoring and evaluation of SWM system including adequacy of awareness was adequate and effective.

What we found?

The quantity and the composition of Municipal Solid Waste (MSW) generated in ULBs is the basis which determine the collection, processing and disposal options that could be adopted for scientific management of solid waste. Audit found that neither Local Administration Department (LAD) nor the five ULBs had conducted any survey to assess the quantity of waste generation. The mandatory State Policy for management of solid waste as required under SWM Rules, 2016 was prepared in the year 2018 after a delay of one year. But the Policy was yet to be notified in the official gazette of the Union Territory of Puducherry. The Policy valid upto the year 2025 did not address the key issues

viz., waste reduction, reuse, recycling, etc., so as to minimise the impact of solid waste on human health and environment.

Neither long term nor short term plan for SWM was prepared by ULBs. Consequently, there was no realistic plan of action in addressing the gap in integrated SWM. Besides, there was no separate plan for management of Construction and Demolition waste. No ULBs except Oulgaret Municipality had identified and registered informal sector in SWM as envisaged in SWM Manual, 2016.

The UTP had forgone the opportunity to avail GoI funds to the tune of ₹ 6.37 crore under Swatch Bharat Mission due to non-finalisation of requisite projects. The ULBs had a pendency of ₹ 3.78 crore towards collection of user fee for SWM. Funds to the tune of ₹ 22.13 crore released under Smart City Mission meant for SWM projects had been parked in bank for more than four years due to non-finalisation of projects.

The responsibilities of ULBs associated with SWM includes segregation, collection, transportation, processing and safe disposal. However, in three out of five ULBs of UT of Puducherry, there was no system for segregation of waste at the first point of door-to-door collection from the Households and Commercial establishments.

In Puducherry Municipality, there was a proposal to establish three resource recovery facility under Corporate Social Responsibility (CSR) funding. However, the one resource recovery facility created was not functional due to non-diversion of required dry waste and other two facilities were not created till date which had resulted in 12 TPD of dry waste being dumped into the dumpsite.

During joint physical verification conducted by Audit in PUAA and Yanam, it was noticed that the handcarts, tricycles, light commercial vehicles (mini trucks) were utilised for collection of waste. But these vehicles were not suitably partitioned for collection of segregated wastes.

SWM manual prohibits engagement of work force in handling of Solid Waste without protection equipments including uniform, fluorescent jacket and hand gloves etc. However, joint field visit revealed that majority of the work force involved in manual handling of waste were not using the protective equipment as required.

The concessionaire engaged for reclamation of land through bio-mining had been paid ₹ 12.27 crore for processing of legacy waste and remediation of the land. However, the concessionaire has disposed off only the legacy waste of around 77,916 tonnes but had not done proportionate reclamation of land thereby got an undue benefit of ₹ 6.27 crore.

Though, SWM Rules stipulates that ULBs have to analyse the old dumpsite for the bio-remediation, the 12 acres of land at Karuvadikuppam in which dumping was stopped in the year 2011 was not bio-remediated till date (March 2023).

Though legacy waste had to be cleared by March 2021, the project for the same at Karaikal was taken up only in March 2023 after a lapse of two years and in Yanam, it was still at tender stage.

Due to non-creation of Material Recovery Facility (MRF) in PUAA and Yanam, fresh waste was continued to be dumped thereby defeating the process of clearing the legacy waste through bio-mining.

Non-acceptance of lowest tender for creation of MRF at Yanam resulted in avoidable additional expenditure of ₹ 94.25 lakh. Though the work order for creation of MRF at Yanam was awarded in December 2021, the land for establishing the MRF was handed over by the municipality only in March 2023, thereby extending a wasteful expenditure of ₹ 77.11 lakh towards processing and also resulted in continued dumping of unsegregated waste.

The bio-methanation plant installed in Puducherry and Karaikal Municipality at a cost of ₹ 51.16 lakh was not put to use or not functional due to non-purchase of electrical generator and damages in the equipment.

In UTP, no sanitary landfills were created in any of the ULBs resulting in dumping of waste in open ground leading to ground water contamination. The joint inspection at Kurumbapet dumpsite revealed that leachate generated was allowed to stagnate around the dumpsite and flow over the approach road.

In Puducherry Region, though the land for processing Construction and Demolition (C&D) waste was identified, the processing facility was yet to be created. Consequently, the concessionaire continued to dump the C&D waste along with the other municipal waste at Kurumbapet dumpsite. Similarly, the waste generated from the slaughtering of animals were dumped along with municipal solid waste at the dumpsite causing unhygienic conditions.

The State Level Advisory Board for SWM did not review the State Policy and Strategy on solid waste management resulting in non-implementation of scientific SWM methods mandated under SWM Rules.

As per the agreement entered into for collection and transportation in PUAA, concessionaire had installed Global Positioning System (GPS) in all the vehicles to monitor their movement. However, neither PUDA nor the Municipalities had verified the log of the vehicles before making the payments to the concessionaire.

Due to non-compliance of SWM Rules, the NGT had levied Environmental compensation amounting to ₹ 96 lakh for the period April 2020 to December 2022. PPCC had issued improper authorisation to Yanam dump yard which was located on water channel. No air quality monitoring was done in Yanam dumpsite.

The analysis of quality of ground water in the dumpsites by Audit through Pondicherry University revealed that the water quality was poor and parameters such as TDS, chloride, iron, lead, etc., were beyond permissible limits. Due to inadequate Information, Education and Communication (IEC) activities, there were no community participation and behavioural change towards segregation of waste in PUAA and Yanam.

What we recommend?

We have made recommendations to ensure scientific disposal of municipal solid waste through proper planning, segregation of waste at source level, creation of required infrastructure for processing of waste, awareness and monitoring as required under Solid Waste Management Rules, 2016 and Solid Waste Manual, 2016.

PLANNING AND FINANCIAL MANAGEMENT

The Government should assess the quantum of actual waste generated in the UT of Puducherry to estimate and create appropriate facilities for waste management.

The Government should prioritise the '3Rs' *viz*., reduction, reuse, recycling of waste for implementing preferential order of solid waste management.

The Government should ensure engagement of informal sector in SWM as required in SWM Rules, 2016.

The Government should evolve a mechanism for periodical collection of user fee from commercial establishments.

The Government should take immediate steps for identification and implementation of projects for which funds have been sanctioned under SBM-U and Smart City Projects.

SEGREGATION, COLLECTION AND TRANSPORTATION OF WASTE

The Government should fix responsibility on the concerned officials of LAD for omission of Terms of Reference in the agreement entered with the concessionaire regarding the role on segregation of waste at source level.

The Government should ensure segregation of waste at source level and prevent mixing of waste till its disposal, in order to comply with the SWM rules and NGT orders.

The Government should ensure transporting of waste to the existing facility created under CSR fund and take further action to set up remaining two facilities.

The Government should ensure vehicles used for collection and transportation of waste must be partitioned and covered.

The Government should include penal provisions in the agreement (in line with Para 3(23) of the SWM Rules, 2016) entered with the concessionaire for non-compliance with the rules on collection, transportation and disposal of wastes.

PROCESSING AND TREATMENT OF SOLID WASTE

The Government should ensure collection of segregated waste and establish Material Recovery Facility in PUAA and Yanam to avoid dumping of fresh waste.

The Government should ensure clearance of legacy waste at Puducherry, Yanam and Karaikal dumpsite.

The Government should ensure functioning of the bio-methanation plant installed at Puducherry and Karaikal.

The Government should ensure establishment of sanitary landfill and leachate management facility to avoid ground water contamination.

MONITORING

The Government should ensure that PPCC installs a system of continuous monitoring of water and air in and around the dumpsites so as to take remedial action.

The Government should encourage community participation and strengthen IEC activities to ensure proper segregation and disposal of waste.

CHAPTER 1

INTRODUCTION

CHAPTER 1: INTRODUCTION

1.1 Introduction

Solid waste as defined by the "Solid Waste Management Rules, 2016 (SWM Rules)" includes solid or semi-solid domestic waste, sanitary waste, commercial waste, institutional waste, market waste and other non-residential wastes, such as silt removed from the surface drains, agricultural and horticulture waste, etc. Based on the characteristics, solid waste is further classified as biodegradable, non-biodegradable, combustible, dry and inert wastes.

The management of Solid Waste in urban areas has emerged as one of the biggest challenges faced by the Municipalities throughout the country which is aggravated by rapid urbanisation. Elimination of dumped wastes and substantially increasing the recycling of solid waste for safe reuse is one of the targets set in Sustainable Development Goals (SDGs). Proper solid waste management (SWM) presents an opportunity not only to avoid the adverse impact on public health and environment, but also enable to recover resources, realise environmental, economic and social benefits. Therefore, scientific disposal of solid waste through segregation, collection, transportation, processing and disposal in an environmentally acceptable manner by the municipalities is the goal that minimises adverse impact on public health and environment.

1.2 Solid Waste Management in Union Territory of Puducherry

The Union Territory of Puducherry (UTP) consists of four geographically unconnected regions *viz*., Puducherry, Karaikal (Tamil Nadu), Mahe (Kerala) and Yanam (Andhra Pradesh). The population of UTP as per 2011 Census was 12.48 lakh. In urban areas, the responsibility of management of solid waste is vested with Urban Local Bodies *viz*., Municipalities. There are five Urban Local Bodies (ULBs) in the UTP with a population of 7,28,761 (approximately 60 *per cent* of the total population) *viz*., Puducherry Municipality, Oulgaret Municipality, Karaikal Municipality, Mahe Municipality and Yanam Municipality. Among the five Municipalities, Puducherry and Oulgaret are adjacent to each other and hence these two

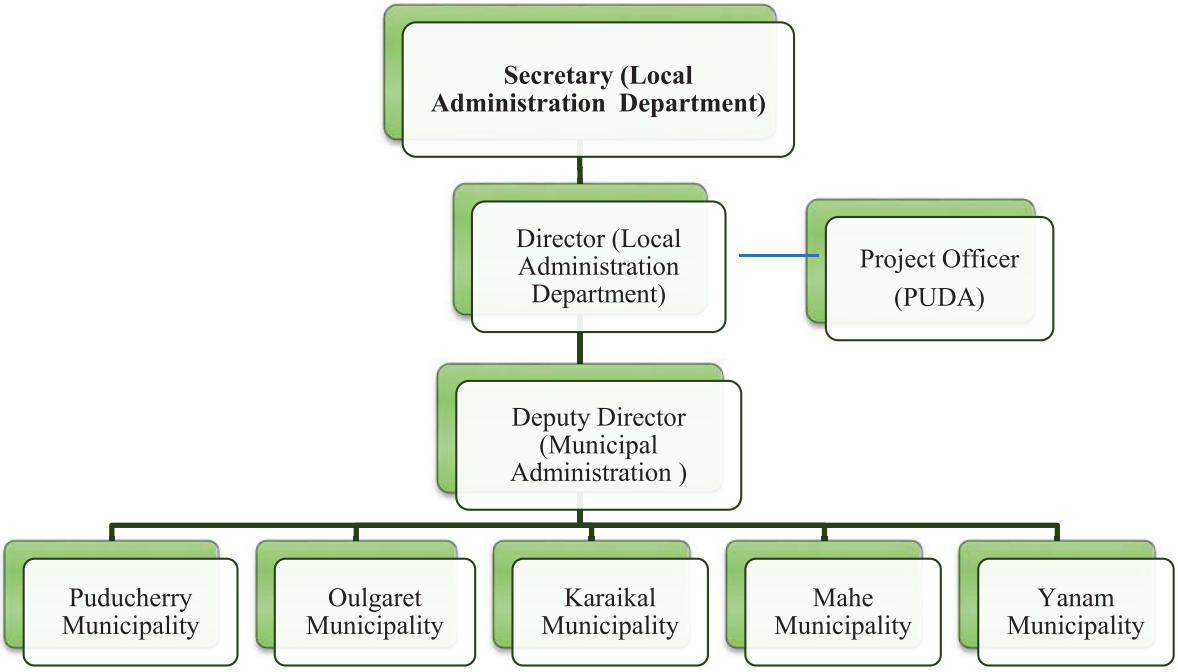
The terms and abbreviations used in this Report are listed in the Glossary at Page No. 57.

municipal areas along with certain urbanised pockets of Ariyankuppam and Villianur Commune Panchayats are called Puducherry Urban Agglomeration Area (PUAA). The five ULBs together generated approximately 500 tonnes[1] of municipal solid waste every day.

1.3 Organisational Setup

The Secretary to the Government, Local Administration Department (LAD) is the administrative head of the Department. The Director, LAD is the next level officer in the hierarchy who oversees the implementation of Solid Waste Management in UTP. Puducherry Urban Development Agency (PUDA an autonomous body) functioning under LAD and headed by the Project Officer is the implementing authority of the work relating to SWM in UTP. The Municipalities headed by the Commissioners are in charge of the field level implementation of SWM. The Organisational Setup is depicted in **Chart 1.1**.

Chart 1.1: Organisational Setup



[1] Source: Solid Waste Management Action Plan 2021 prepared by Local Administration Department, Puducherry.

1.3.1 Responsibilities of different departments and agencies

The Puducherry Municipalities Act, 1973 and Solid Waste Management Policy, 2018 of UTP mandate management of solid waste as an obligatory function of the ULBs. The Puducherry Pollution Control Committee (PPCC) functioning under the Department of Science, Technology and Environment will enforce these rules in UTP through local bodies. It reviews implementation of these rules at least twice a year and also monitors environmental standards and adherence to conditions as specified under Rule 16 of SWM Rules, 2016 for waste processing and disposal sites.

The departments and agencies involved in waste management in the UTP and the roles assigned to them are as given in **Table 1.1**.

Table 1.1: Roles of various Departments

Department/Agency	Roles
Local Administration Department (LAD)	Functions as the controlling and monitoring department of all local bodies in the UTP. It looks after formulation of policies, action plan, approval of Budget and release of Grants-in-aid towards basic functions of Local Bodies.
Puducherry Urban Development Agency (PUDA)	An autonomous body functioning under LAD, which facilitates implementation of various schemes *viz*., National Urban Livelihood Mission (NULM), Swachh Bharat Mission-Urban (SBM-U), etc.
Pondicherry Pollution Control Committee (PPCC)	A statutory body functioning under the Department of Science, Technology and Environment, which enforces various Acts/Rules, including SWM Rules, to prevent and control pollution in the UTP in line with Central Pollution Control Board.
Urban Local Bodies (ULBs)	Responsible for solid waste management, levy and collection of user fee along with property tax/trade licence, making of bye laws and publication of regulations.

1.4 Audit Objectives

The Performance Audit was conducted to assess whether:

- strategy and planning of solid waste management in ULBs is commensurate with the wastes generated and concurrent with the prevailing legal framework;
- municipal tasks associated with solid waste management including collection, segregation, storage, transportation, disposal and social

inclusion of informal waste workers were effective, efficient and economical;

- planning, construction, commissioning, operation and maintenance of solid waste management projects in ULBs was effective, efficient and financially sustainable;
- monitoring and evaluation of solid waste management system including adequacy of awareness creation, citizen engagement for effecting behavioural change, complaint redressal mechanism for citizens and assessment of environmental impacts and implementation of the internal control and monitoring mechanism was adequate and effective.

1.5 Audit Criteria

The observations in the report were benchmarked against criteria derived from:

- The Government of India's Manual of Municipal Solid Waste Management, 2016 and Solid Waste (Management and Handling) Rules, 2016;
- Construction and Demolition (C&D) Waste Management Rules, 2016;
- Guidelines for Swachh Bharat Mission 1 and 2.0 issued by Ministry of Housing and Urban Affairs;
- Tender Transparency Act and Rules, 1998;
- The Environment (Protection) Act and Rules, 1986;
- Water (Prevention and Control of Pollution) Act, 1974;
- The Puducherry Municipalities Act, 1973;
- Instructions, guidelines, policies issued by Central Pollution Control Board, Puducherry Pollution Control Committee, Government of India/UTP on solid waste management from time to time.

1.6 Audit Scope, Methodology and Sampling

The Performance Audit examined the efficacy of the management of solid waste by ULBs covering the period from 2017-18 to 2021-22. Since the SWM Rules also prescribes Standards/Rules for the management of C&D Waste by ULB, the same was also covered in the present Performance Audit.

The Entry Conference was held with the Secretary (Local Administration) on 24 June 2022 in which the audit methodology, scope, objectives and criteria were explained and agreed upon. The audit methodology involved scrutiny of records at Secretariat, LAD, PUDA, PPCC and five Municipalities[2]. The Audit methodology involved seeking responses to Audit enquires, joint physical verifications of project sites with municipal staff and collection of photographic evidences. Audit methodology also involved collection of samples of soil and water around the dump yards of Puducherry and Oulgaret and testing the same through the Centre for Pollution Control and Environmental Engineering, Pondicherry University to ascertain the levels of contamination of ground water in the dump yard.

On completion of the Audit, an Exit Conference was conducted with Secretary (Local Administration) on 03 April 2023 and reply of the Government has been incorporated in the report.

All the five Municipalities in the UT of Puducherry were selected for Audit. There are 127 wards in urban areas of UTP (PUAA-81, Karaikal-18, Mahe-14 and Yanam-14). Survey of 25 households in each wards was conducted in 33 out of 127 wards. Further out of 1,728 sanitary workers deployed by the concessionaire, 433 (25 *per cent*) sanitary workers were randomly selected and surveyed to assess the levels of performance of the sanitary workers.

1.7 Acknowledgment

Audit acknowledges the co-operation and assistance extended by the UT Government, Local Administration Department, Puducherry Urban Development Agency, all the Municipalities, Puducherry Pollution Control Committee in the smooth conduct and timely completion of Audit. Audit also acknowledges the assistance extended by Pondicherry University in conduct of test on water samples.

[2] Puducherry, Oulgaret, Karaikal, Mahe and Yanam.

CHAPTER 2

PLANNING AND FINANCIAL MANAGEMENT

CHAPTER 2: PLANNING AND FINANCIAL MANAGEMENT

Assessment of waste to determine the collection, processing and disposal options was not carried out either by LAD nor the five ULBs. Though the DPRs prepared by Puducherry and Oulgaret Municipalities projected an estimated quantity of 527 TPD of waste generated for the year 2020, the actual quantity of waste collected ranged between 320 and 371 TPD during 2017-22 thereby making the projections unrealistic.

The mandatory State Policy for management of solid waste as required under SWM Rules, 2016 was prepared in the year 2018 after a delay of one year. But the Policy was yet to be notified in the official gazette of the UTP. The Policy which is stated to be valid upto the year 2025 did not address the key issues *viz*., waste reduction, reuse, recycling, etc., so as to minimise the impact of solid waste on human health and environment.

Neither long term nor short term plan for SWM was prepared by ULBs. Consequently, there was no realistic plan of action in addressing the gap in Integrated Solid Waste Management. Besides, there was no separate plan for management of Construction and Demolition waste. No ULBs except Oulgaret Municipality had identified and registered informal sector in SWM as envisaged in SWM Manual, 2016.

Out of ₹ 18.93 crore released during 2017-22 for SWM projects, ₹ 14.36 crore was not utilised till date (March 2022) besides foregoing central assistance of ₹ 6.37 crore due to non-finalisation of requisite projects.

Similarly, funds of ₹ 22.13 crore sanctioned in 2017 was not drawn as the works relating to SWM under Smart City Project were yet to be taken up.

2.1 Planning and Strategy for Solid Waste Management

2.1.1 Non-assessment of waste generation

As per Section 1.4.3.3 of SWM Manual 2016, each ULB should assess the quantity and composition of waste generated for effective planning and

designing of requisite solid waste management facilities. The quantity and composition of municipal solid waste (MSW) generated in the ULB determine collection, processing and disposal options that could be adopted. The SWM Manual envisages the methods required for quantification of waste generated.

In this regard, the Central Pollution Control Board (CPCB) in its consolidated annual review report for the year 2013-14, had estimated the quantum of waste generated in PUAA as 430 Tonnes per Day (TPD). However, no estimation was done subsequently by PCB/ULBs to arrive at the actual quantum of waste generated in PUAA. Based on the above quantum of waste arrived by CPCB, GoP had projected the quantum of waste generated in PUAA as 527 TPD for the year 2020. However, it was noticed that during 2017-22, the actual waste collected by the concessionaire in PUAA varied between 320 and 371 TPD only.

Further, in respect of Yanam, the DPR prepared in October 2019 for creation of infrastructural facilities for waste processing, the quantum of waste was estimated as 16 TPD. However, on engagement of the concessionaire, the actual waste collected was around 25 TPD. Thus, it was evident that the estimated quantum of waste was incorrect since there was a difference between the assessed and collected waste. Due to absence of assessment of actual waste generated, the Government was not in a position to arrive upon the actual requirement of facilities for waste management.

In respect of Mahe Municipality, no assessment of waste generation was made till date (March 2023).

Though, the Government had prepared policy framework for SWM in UTP and an Action Plan in 2021, in the absence of assessment of actual waste generation, the efficiency on collection of municipal waste in all these ULBs could not be ascertained in Audit.

In reply, Government stated that the assessment of actual quantum of waste generated would be conducted for the upcoming years through the concessionaire identified for the waste collection.

2.1.2 Absence of comprehensive State Policy for Solid Waste Management

Rule 11(a) of the Solid Waste Management Rules, 2016 (SWM Rules), mandates the preparation of State Policy for Municipal Solid Waste Management (MSWM) by the State or the Union Territory in consultation with stakeholders within a period not later than one year from the date of notification of these rules *i.e.*, 2016.

In UTP, the State Policy for SWM was notified by Local Administration Department (LAD) in August 2018 after a delay of one year from the period

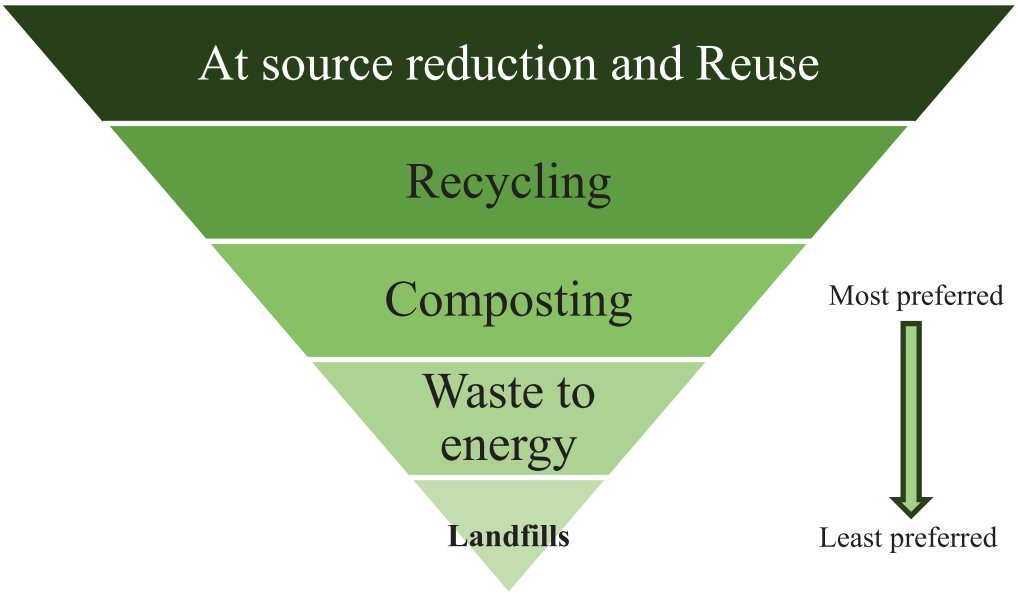
specified under SWM Rules. The validity of this policy was stated to be ten years from the date of notification. However, it was noticed that the State Policy was yet to be notified in the official gazette of UTP for implementation. In the absence of the legal status to the policy, enforcement of the policy by the line departments concerned for carrying out mandatory activities of SWM *viz*., segregation of waste at source, collection and transportation of segregated waste, processing and scientific disposal, as required under the SWM Rules could not be ensured by the Government.

As per Rule 11(b) of the SWM Rules, the State Policy and Strategy on solid waste management should lay emphasis 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.

As per Rule 11(c), 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.

In addition, the 'National Action Plan for MSWM' prepared by CPCB based on the order of National Green Tribunal (NGT) dated 5 February 2015, stated that the State may follow the waste management policy with the hierarchy (i) Waste prevention or minimisation (ii) Waste utilisation (iii) Waste recycling (iv) Waste processing (v) Waste-to-Energy and (vi) Landfilling.

Chart 2.1: Hierarchy of Integrated Solid Waste Management



Despite the mandatory Guidelines provided by SWM Rules and National Action Plan, the Policy prepared by LAD, did not include the preferential order of waste management which would comprise the strategy for management of solid waste.

Though the Reduce, Reuse and Recycling concepts were considered as one of the objectives, the methodology to achieve the same was not indicated in the Policy.

In reply, Government stated that action will be taken to prepare a comprehensive State Policy and Action Plan for solid waste management incorporating the reduction, reuse and recycle strategies mentioned in the SWM Rules, 2016.

2.1.3 Preparation of Action Plan as required under legal framework

Sections 1.4.5 and 1.4.6 of SWM Manual, 2016 and Rule 15(a) of SWM Rules mandate for preparation and implementation of a strategic and detailed solid waste management plan by every ULB. The Action Plan is to be prepared as given below:

- Long term planning horizon of 20-25 years embedding short term implementation plans covering 5 years each for implementation.
- A short term plan to cover the aspects of institutional strengthening, community mobilisation, waste minimisation initiatives, waste collection and transportation, treatment and disposal and financial outlay.

Though the SWM Rules and Manual came into force from April 2016, LAD/ULBs had not prepared short-term or long-term plans for adopting a systematic approach for SWM in UTP. Later, based on the instruction of Hon'ble NGT in February 2017, LAD had prepared Action Plans in April 2018 and April 2021 and a State Policy in October 2018. But it was noticed that no long-term plan *i.e.*, for 20-25 years embedded with short term plans (five years) was prepared as required under SBM Manual.

Further, as per Rule 22 of SWM Rules, the required infrastructure for implementation of these rules shall be created by the local bodies within the time frame specified below. However, Audit noticed that there were no strategy/plan included in the action plan for creating the required infrastructure for Integrated Solid Waste Management as detailed below:

Table 2.1: Status of implementation of mandatory activities

Sl. No.	Mandatory activity as required under legal framework	Timelines given in SWM Rules, 2016	Status of implementation				
			Puducherry	Oulgaret	Karaikal	Mahe	Yanam
1	Procurement of site for sanitary landfill.	April 2018	Yes	Yes	Yes	No	Yes
2	Enforcing waste generators to practice segregation of bio-degradable, recyclable, combustible, sanitary waste, domestic hazardous and inert solid wastes at source.	April 2018	No	No	Yes	Yes	No
3	Ensure door-to-door collection of segregated waste.	April 2018	No	No	Yes	Yes	No
4	Transportation in covered vehicles to processing or disposal facilities.	April 2018	No	No	No	NA	No
5	Ensure separate storage, collection and transportation of construction and demolition wastes.	April 2018	No	No	No	No	No
6	Setting up solid waste processing facilities.	April 2018	No	No	Yes	Yes	No
7	Setting up Sanitary Landfill.		No	No	No	No	No

(Source: Solid Waste Management Rules, 2016)

From the above, it could be seen that the above facilities were yet to be created even after a lapse of six years from the date of notification of SWM Rules. The impact of non-implementation of mandatory activities for SWM are discussed under various paragraphs in the Chapters III and IV of the Report.

2.1.4 Non-inclusion of mandatory activities under Construction and Demolition Waste in Action Plan

As per SWM Rules, 2016, the local bodies were to ensure that construction and demolition wastes had to be separately collected, stored, processed and safely disposed. Further, the Construction and Demolition Waste Management Rules, 2016 (C&D Rules) state that a separate policy for management of C&D waste to be formulated by the UTP within 12 months from the date of notification. The site for processing C&D waste has to be identified and the facility has to be commissioned within 18 months.

However, the above mandatory activities were not included in the Action Plan for implementation. As such the said facilities were yet to be created even after a lapse of six years from the notification of the said rules.

In reply, Government stated that strenuous efforts are being taken to create the required infrastructure for SWM and the projects are in different stages of implementation.

2.1.5 Non-availability of strategies for waste reduction, reuse and recycling

As per the SWM Manual 2016, Integrated Solid Waste Management (ISWM) is closely linked to the 3R approach (reduce, reuse and recycle), which preliminarily emphasises the importance of waste reduction, reuse and recycling over other forms of waste processing or management. As per Rule 15(zg) of SWM Rules, the ULB should create public awareness for minimising waste generation and reusing waste to the extent possible. The various waste reduction strategies as narrated in SWM Manual are (i) Extended Producer Responsibility[1] (EPR), (ii) Decentralised waste management systems and (iii) Integration of informal sector.

However, it was observed that the above strategies were not included either in the State Policy or Action Plan of the UTP. Thus, the absence of management policy incorporating the '3Rs' was a critical omission. Controlling the generation of waste at source was needed to ensure optimal usage of SWM facilities.

2.1.5.1 Extended Producer Responsibility (EPR)

Extended Producer Responsibility (EPR) is a policy approach wherein a producer is held responsible for the post-consumer stage of a product, typically for defined tasks of separate collection (e.g., for e-waste or hazardous waste components), reuse (e.g., disposal-refund systems for bottles), recycling (e.g., for used cars) and storage and treatment (e.g., for batteries).

As per Action Plan on elimination of single use plastic prepared in September 2021, there were 24 plastic production units and 15 plastic waste processing units functioning in UT of Puducherry. However, no policy/plans were made by the Government to implement EPR in the UT of Puducherry.

In reply, Government stated that considering the complexity of different grades of plastic being available in the market, CPCB has to devise a system to bind the plastic manufacturers under EPR and to find a strategy to reduce the waste.

---

[1] "Extended Producer Responsibility" (EPR) means responsibility of any producer of packaging products such as plastic, tin, glass and corrugated boxes, etc., for environmentally sound management, till end-of-life of the packaging products.

Further, waste pickers will be integrated and engaged in solid waste management in future.

2.1.5.2 Non-integration of informal sector in waste management

Section 1.2.4 of the SWM Manual, 2016 envisages integration of the informal sector such as Self-help Groups or Co-operatives in the solid waste management to capacitate them to work as entrepreneurs in a business entity.

As per Section 2.3.7 of SWM Manual, 2016 the Municipalities are required to engage authorised waste pickers in solid waste management including door-to-door collection and segregation of waste in material recovery facility or secondary storage facility.

The Audit examination of engagement of informal sector including waste pickers in SWM in UTP revealed the following deficiencies.

- The ULBs are yet to fully identify and engage informal sector in SWM as required under the SWM Manual, 2016.
- Though Oulgaret Municipality had registered 62 waste pickers, they were not engaged in door-to-door collection or in segregation of waste. In contrary, it was observed that the waste pickers were collecting recyclable articles from unsegregated waste dumped at Kurumbapet dump yard. As a result neither there was reduction of recyclable wastes reaching the dumpsite nor upgradation of the livelihood of the waste pickers, which was the main aim of utilisation of their services.

A waste picker was crushed to death by the garbage vehicle in April 2019 at Kurumbapet dumpsite. The Waste pickers working within the dumpsite of Kurumbapet dump yard wherein unsegregated wastes were being dumped would only result in health hazards to the waste pickers.

In reply, Government stated that waste pickers would be integrated and engaged in solid waste management in future.

2.2 Financial Management

2.2.1 Allocation and utilisation of funds

In UT of Puducherry, the funds for recurring expenditure towards collection and transportation of solid waste are met from the budget provision of LAD and capital expenditure towards creation of SWM projects are met from Swachh Bharat Mission - Urban (SBM-U). The details of funds received and expended during the period 2017-2022 are given in **Table 2.2**.

Table 2.2: Fund allocation and utilisation

(₹ in crore)

Year	Amount released under budget of LAD	Amount released under SBM		
		Central share	UTP share	Amount spent
2017-18	21.00	4.57*	--	4.57
2018-19	32.72	--	--	--
2019-20	33.02	0.58	--	--
2020-21	38.90	5.78	8.00	--
2021-22	31.93	--	--	--
Total	**157.57**	**10.93**	**8.00**	**4.57**

* Funds released from 2015-16 to 2017-18

(Source: Local Administration Department, Puducherry)

2.2.2 Non-availing of GoI funds under SBM-U

Swachh Bharat Mission - Urban (SBM-U) is a centrally sponsored scheme launched in October 2014 with an objective to improve the level of cleanliness in urban areas with a mission period upto March 2021. Modern and scientific solid waste management was one of the components under SBM-U. This included systematic process of waste segregation at source, primary collection, storage, secondary segregation, processing, treatment and final disposal of solid waste. The projects under SBM-U would receive GoI incentive of 35 *per cent* and the remaining 65 *per cent* would be borne by the UT.

Accordingly, out of the total outlay of ₹ 49.40 crore earmarked for 2015-21 under SBM, (GoI Share - ₹ 17.30 crore; UTP Share - ₹ 32.10 crore) for SWM projects, UTP had availed ₹ 10.93 crore of Central share. As against the proportionate UTP share of ₹ 20.32 crore, the UTP had released only ₹ 8 crore as of March 2022. The UT Government had to identify the projects relating to scientific disposal of wastes. However, except Bio-mining at Kurumbapet dumpsite, no other project was taken up under SBM. In spite of the need for other SWM projects *viz*., Material Recovery Parks, Sanitary Landfills, etc., and despite availability of funds, the said projects were still under DPR stage (March 2023).

As the Mission period ended in March 2021 and the UTP could not finalise the requisite projects within the Mission period, the UTP had to forgo the opportunity to avail GoI funds to the tune of ₹ 6.37 crore. Further, non-execution of projects had resulted in unspent balance of ₹ 14.36 crore as of March 2022.

In reply, the Government stated that as the SWM projects are under various stages of implementation, funds allocated for that purpose are utilised in phased manner.

2.2.3 Collection of user fee

As per Rule 4(3) read with Rule 15(f) of SWM Rules, 2016, the ULBs should prescribe from time-to-time user fee as deemed appropriate and collect the fee from the waste generators. Further, as per Section 1.4.5.6.3(b) of SWM Manual 'User charges' were to be levied for collection and safe disposal of waste from those responsible for waste generation. The variable rate may be prescribed for different categories of waste generators in proportion to the quantity of waste generated *viz*., households, commercial/industrial waste generators and bulk waste generators such as hotels, function halls and large commercial establishments, etc.

Accordingly, the ULBs had notified (February 2019) orders for levying the user charges for generating solid waste. Accordingly, the user charges were calculated based on the floor area and incorporated in the demand raised for Property tax in case of residential buildings and demand raised for fees to be paid for grant or renewal of Trade licences for the commercial activities carried out in the commercial establishments. It was observed that the ULBs did not collect user fee on a regular basis from households and institutions in their jurisdiction. The collection efficiency of user fee against the actual demand in respect of residential building by ULBs ranged from one to 64 *per cent* during the year 2021-22 as depicted in **Table 2.3**.

Table 2.3: Collection of User Fee

Municipality	Number of assessments	Demand	Collection	Balance	Percentage of collection
Puducherry	44,661	211.59	82.97	128.62	39
Oulgaret	57,066	261.10	166.61	94.49	64
Karaikal	23,262	95.30	3.81	91.49	4
Mahe	9,321	49.06	0.66	48.40	1
Yanam	8,840	19.60	4.42	15.18	23
Total	**1,43,150**	**636.65**	**258.47**	**378.18**	**41**

(Source: Local Administration Department, Puducherry)

In respect of the commercial establishments, it was observed that the ULBs did not have any mechanism in place to ensure that user fees were raised and collected. On this being pointed out, it was stated that the user fee were being collected only during the grant or renewal of Trade licence. However, no information as to how much user fees were collected from these establishments

under the respective ULBs was produced to Audit. As such the amount of user fee collected through grant or renewal of trade licence could not be quantified.

In reply, the Government stated that ULBs are taking sincere efforts to collect the pending amount from the public and suitable mechanism will be evolved to collect user fee from commercial establishments.

2.2.4 Non-execution of works under Smart City Project

Under the Smart City Project of the Ministry of Housing and Urban Affairs, the Puducherry Municipal Area was selected (March 2017) for enhancement of quality of life by improving smart civic infrastructure. The Puducherry Smart City Development Limited (PSCDL) established (September 2017) for this purpose, proposed various schemes which included SWM projects at an estimated cost of ₹ 22.13 crore as depicted in **Table 2.4**.

Table 2.4: Projects proposed under Smart City

(₹ in crore)

Sl. No.	Name of the project	Sanctioned Cost
1.	Segregation, collection and transportation vehicles with GPS tracking – 5 nos	4.67
2.	ICT on solid waste management (sensor-based bins)	1.71
3.	Waste to energy project	15.75
	Total	**22.13**

(Source: Smart City DPR, 2017)

However, even after lapse of more than five years of formation for creation of various infrastructure projects which included the above SWM projects, the projects are yet to be taken up till date (December 2022). As such, funds released against the sanctioned amount of ₹ 22.13 crore meant for these SWM projects had been parked in bank by the PSCDL for more than four years resulting in deprival of facilities identified under Government of India funding.

In reply, the Government stated that the issue will be taken up with Smart City Mission and necessary action will be taken to avail the funds for implementation of the projects.

2.3 Conclusion

The policy framework for SWM and the Action Plan prepared in 2021, lacked actual assessment of wastes generated and hence, the objective of strategy and planning of solid waste management in ULBs commensurating with generation of waste stands defeated. The State Policy prepared for SWM did not include

the preferential order of waste management. Further LAD/ULBs had not prepared short-term or long-term plans for adopting a systematic approach for SWM. Even after a lapse of six years of notification of SWM Rules, mandatory infrastructures for SWM are yet to be created. The UTP is yet to implement Extended Producer Responsibility and integrate informal sector in SWM. The UTP had forgone the opportunity to avail GoI funds to the tune of ₹ 6.37 crore due to non-finalisation of requisite projects. Non-execution of projects had resulted in unspent balance of ₹ 14.36 crore as of March 2022. The ULBs had a pendency of ₹ 3.78 crore towards collection of user fee for SWM. Funds to the tune of ₹ 22.13 crore released under Smart City Mission had been parked in bank account for more than four years due to non-finalisation of projects.

2.4 Recommendations

- The Government should assess the quantum of actual waste generated in the UT of Puducherry to estimate and create appropriate facilities for waste management.
- The Government should prioritise the '3Rs' *viz*., reduction, reuse, recycling of waste for implementing preferential order of solid waste management.
- The Government should ensure engagement of informal sector in SWM as required in SWM Rules, 2016.
- The Government should evolve a mechanism for periodical collection of user fee from commercial establishments.
- The Government should take immediate steps for identification and implementation of projects for which funds have been sanctioned under SBM-U and Smart City Projects.

CHAPTER 3

SEGREGATION, COLLECTION AND TRANSPORTATION OF WASTE

CHAPTER 3: SEGREGATION, COLLECTION AND TRANSPORTATION OF WASTE

The ULBs were entrusted with SWM activities *viz*., segregation, collection, transportation, processing and safe disposal. However, it was found that in three out of five ULBs of UT of Puducherry, there was no system for segregation of waste at the first point of door-to-door collection from the households and commercial establishments.

In Puducherry Municipality, there was a proposal to establish three resource recovery facility under Corporate Social Responsibility (CSR) funding. However, the one resource recovery facility created was not functional due to non-availability of dry waste and other two facilities were not created till date which had resulted in 12 TPD of dry waste being dumped in the dumpsite.

During joint physical verification conducted by Audit in PUAA and Yanam, it was noticed that the handcarts, tricycles, Light commercial vehicles (mini trucks) utilised for collection of waste were not suitably partitioned for collection of segregated wastes.

SWM Manual mandates that the work force involved in handling of Solid Waste should utilise personnel protection equipment *viz*., masks, hand gloves etc. However, joint field visit revealed that majority of the work force involved in manual handling of waste were not using the protective equipment as required.

The responsibility of ULBs associated with solid waste management includes various municipal tasks *viz*., segregation, collection, transportation, processing and safe disposal of wastes. The successful implementation of solid waste management requires that all the waste generated should be properly and fully collected at source. Thereafter, the collected waste should be transported and scientifically processed in accordance with the principles of reduce, reuse and recycle. The inert material remaining after processing has to be safely disposed. In all the five ULBs in UT of Puducherry, door-to-door collection and transportation of solid wastes were entrusted to private concessionaires. As per the Memorandum of Understanding (MOU), the concessionaire shall bring all the necessary equipment and deploy required manpower at his own cost to carry out the services in an effective and efficient manner. The effectiveness of implementation of various municipal tasks analysed in Audit are discussed below:

3.1 Segregation of waste

The Rule 4(a) of SWM Rules states that it is the duty of the 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 authorised waste pickers or waste collectors. Further, as per Rule 15 of SWM Rules, the ULB is responsible for arranging door-to-door collection of segregated solid waste from all households, including multi-storied buildings, large commercial complexes, malls, housing complexes, etc.

During the audit period, from 2017-18 to 2021-22, out of the five Municipalities only in two Municipalities *viz*., Karaikal and Mahe, the segregation of waste at source was done. In Karaikal, segregation at source was carried out through an elaborate Information, Education and Communication (IEC) action plan which forms the part of their contract. In Mahe Municipal area, all the bio-degradable wastes were used by the households themselves for kitchen garden manure and only non-biodegradable wastes were collected by the concessionaire. In the remaining three Municipalities *viz*., Puducherry, Oulgaret and Yanam, the mixed municipal wastes were dumped at dumpsite without segregation as discussed in the following paragraphs.

3.1.1 Non-segregation of wastes

In order to improve the solid waste management service in PUAA, a concession agreement with a concessionaire *viz*., M/s Swachatha Corporation was entered on 20 May 2015 by PUDA for a period of 10 years. As per the agreement, the concessionaire was to collect Municipal Solid Waste within the PUAA from households, community dustbins and open waste collection sites in the concession area and to transfer it to the designated site at Kurumbapet. The tipping fee[1] for collection and transportation of solid waste was fixed as ₹ 1,782 per tonne with an increase of five *per cent* every year. The concessionaire started the collection of waste from September 2015. In this connection, Audit observed the following:

- As per Rule 4(1) and 7(1) read with Schedule II of MSW Rules, 2000, segregation of waste at source was the responsibility of the ULBs/LAD. Accordingly, the Terms of Reference forming part of the Tender for Concessional agreement stipulated that the role and responsibilities of the concessionaire would include 'segregation of solid waste

[1] Tipping fees shall mean the amount payable per tonne of waste collected and transported in compliance with the terms and conditions of this agreement to designated site.

(Bio-degradable and non-biodegradable, etc.) at source, wherever possible, at the points of primary and secondary storage'. However, the clause fixing the responsibilities for segregation of solid waste at the source level was not included in the final agreement entered with the concessionaire. The reason for such an omission was not kept on record.

- In the meantime, GoI revised the SWM Rules in April 2016, with an emphasis for segregation of wastes at the time of door-to-door collection of Solid waste from the households and commercial establishments within two years from the date of notification *i.e.,* April 2018 onwards. Despite the same, segregation of waste was yet to be carried out in PUAA even after a lapse of five years (March 2023).

- In 2018, NGT suggested that all States/UTs shall mandatorily comply with the SWM Rules regarding segregation of solid waste at source. In spite of the above developments, the State Policy (August 2018) and Action Plan (2021) did not contain any methodology to ensure collection of segregated wastes by ULBs. Further, PUDA had not taken any concrete action for collection of segregated waste by amending the agreement with concessionaire. Hence, the concessionaire continued to collect the unsegregated waste and dumped the same at Kurumbapet dumpsite since September 2015 to till date (March 2023).

- Meanwhile, as per the request of LAD (November 2019), the concessionaire agreed and deployed five vehicles exclusively for collection and transportation of segregated waste wherever possible. However, it was observed that even the minimum collected segregated waste was again dumped along with the mixed waste, as there were no processing facilities available at the dumping yard.

- Based on the results of analysis of water sample collected by PPCC from four places in and around the dumpsite at Kurumbapet in October 2020, PPCC instructed the Puducherry and Oulgaret Municipalities to take appropriate action for segregation of solid wastes as the parameters of the water samples were above the prescribed limit due to leachate[2] formation. However, ULBs/LAD/PUDA did not take any action for segregating the waste before transportation to dumpsite, even after a lapse of more than two years.

- During the joint field survey conducted by Audit in the selected wards of PUAA, it was noticed that 74 *per cent* of households did not carry out

[2] "Leachate" means the liquid that seeps through solid waste or other medium and has extracts of dissolved or suspended material from it.

segregation of waste. Similarly, in Yanam source segregation was not carried out by 56 *per cent* of households surveyed.



Pictures 3.1 and 3.2: Unsegregated waste dumped at Kurumbapet dumpsite

- Similarly, in Yanam, though a concessionaire was engaged for waste collection, no source segregation was done. Consequently, unsegregated waste was dumped in the dumpsite as there were no processing facilities as discussed in paragraph 4.2.2 of this report.

Thus, due to non-emphasising of segregation of wastes, the first and foremost activity in the hierarchy of integrated solid waste management was not implemented in PUAA and Yanam evenafter the lapse of four years from the deadline specified for stoppage of collection of unsegregated waste.

In reply, Government stated that action is being taken to setup Material Recovery Facility[3] (MRF) in Puducherry and Yanam region through concessionaires. On setting up of MRF, segregation of waste would be insisted on the public. The reply was not acceptable as it is enforced by SWM Rules to insist on segregation at source. The contamination of ground water at Kurumbapet is a pointer for the necessity to insist on segregation of waste immediately and not wait for MRF to be setup.

3.1.2 Non-utilisation of services rendered under Corporate Social Responsibility

The Godrej Consumer Products Limited, under its Corporate Social Responsibility (CSR) initiative proposed to establish an Integrated Solid Waste Management model in Puducherry Municipal Region. The project envisaged, diverting of dry waste resource to Material Recovery Facility, thereby reducing the waste ending up at landfills. Accordingly, PUDA along with Puducherry

[3] Material Recovery Facility means a facility where non-compostable solid waste can be temporarily stored to facilitate segregation, sorting and recovery of recyclable waste.

Municipality entered into a tripartite agreement with Recity Network Pvt. Ltd., Mumbai in November 2020. As per the agreement, Recity Network Pvt. Ltd. prepared a DPR and projected that out of the 170 TPD waste generated in Puducherry Municipality, 12.92 TPD was dry/non-biodegradable waste and hence proposed for installation of three Sanitation Parks of each 4-5 TPD at different locations at an estimated cost of ₹ 1.34 crore. The land for the same would be provided by the Municipality. The project after completion would be handed over to the Puducherry Municipality for its continued operation.

As a pilot project, Recity Network Pvt. Ltd. established a 5 TPD Recovery Park at Vambakeerapalayam in June 2021 at the land provided by Municipality. The project required segregated waste collected by the existing facilitator (Swachatha Corporation) in Puducherry Municipality to be diverted to the Recovery Park for the processing. While the segregated high value plastic would be sold to recyclers, the low value plastic would be diverted to end-life solutions, *viz*., cement kilns/incinerators.

However, Audit noticed that the waste required for processing could not be supplied to Recity Network Private Limited as only unsegregated waste was collected at source level. As such the facility created in June 2021 could not achieve its intended objectives and same is being operated through waste procured from recyclers. Further, the PUDA had also not taken efforts to establish the two other recovery parks. As a result, 12 TPD of dry waste was being dumped in the dumpsite, besides payment of tipping charges of ₹ 2,507/Tonne to Swachatha Corporation. This would also result in further expenditure of ₹ 770/Tonne to M/s Zigma Global Environ Solution Private Limited, towards clearance of legacy waste through Bio-Mining as discussed in paragraph 4.1.1. Thus, non-diversion of dry waste to the facility created and non-establishment of two other facilities had resulted in avoidable liability of ₹ 50.54 lakh[4] for bio-mining.

In reply, Government stated that action is being taken to identify suitable site for setting up the other two processing plant and on setting up the same, plastic waste will be processed, thereby reducing and recycling the waste. However, the fact remains that even after a lapse of more than two years from entering into agreement with the concessionaire, the objective of setting up of processing facility could not be achieved, besides inability of the Government to take advantage of the CSR funding.

[4] ₹ 770 x 547 days x 12 tonnes.

3.2 Collection of waste

The SWM Manual states that containerised handcarts are suitable for door-to-door collection of solid wastes from households, shops and establishments from narrow lanes and also for collection of street sweepings. Handcarts should have provision for collecting segregated waste i.e., containers with green for wet waste and blue for dry waste.

During joint physical verification conducted by Audit in PUAA and Yanam, it was noticed that the handcarts, tricycles, light commercial vehicles (mini trucks) were utilised for collection of waste. However, it was noticed that the above vehicles were not suitably partitioned for collection of segregated wastes.





Pictures 3.3 and 3.4: Transportation of waste in unpartitioned vehicles

Thus, it was evident that only unsegregated wastes were being collected and transported to dumpsite. Even if segregated wastes were collected, the same could not be transported separately which resulted in dumping as mixed waste.





Picture 3.5 and 3.6: Segregated waste transported together in Puducherry

As per Rule 15(b) of SMW Rules, the Municipality shall 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. As per provision 1.4.5.6.3(d) of SWM Manual, the Municipality should collect waste from residential and non-residential areas on day-to-day basis and from bulk generators on demand basis.

In Mahe, bio-degradable waste was disposed by the households through their own compost facilities. The other commercial establishments like hotels, disposed food waste through tie-ups with nearby pig farms. As such only the non-biodegradable wastes were being collected once in a month through a concessionaire and the same was processed and disposed through MRF located at Palloor.

As per Rule 4(1)(b) of SWM Rules, 2016, every waste generator shall wrap securely the used sanitary waste like diapers, sanitary pads, etc., in the pouches provided by the manufacturers 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. Further as per Rule 4(2), no waste generator shall throw, burn or burry the solid waste generated by him.

In order to ascertain the SWM by commercial bulk producers *viz*., Hotels and Convention centres operated in the Mahe Municipal Area, a Joint Inspection was conducted by Audit. During the inspection, it was noticed that, since the non-biodegradable waste was collected only once in a month, the commercial operators resorted to burning of waste in their open yards or dumped in the back yards.

Further, during household survey conducted by Audit in Mahe, it was observed that the Municipality did not collect the sanitary wastes from the household and hence majority of the surveyed households (86 *per cent*) burnt the sanitary wastes. This resulted in emission of toxic gases which would cause hazardous impact on environment.




Pictures 3.7 and 3.8: Waste dumped and burnt in the back yards in Mahe

3.3 Transportation

Section 2.3.2 of SWM Manual stipulates for maintaining a well synchronised collection and transportation system, with regular and well communicated intervals of operation to avoid overflow/spillage and littering of waste. For this purpose, vehicles need to be covered and provided with two separate containers or a single container with an effective partition.

However, it was observed during Joint Physical Verification in PUAA, that the vehicles used for transportation, except compactors, did not have covering facility while transporting the waste to dumping yard leading to spillage of waste. In Yanam, only open vehicles were used for transportation of wastes to dumping yards.





Picture 3.9 and 3.10: Waste transported in uncovered vehicles in PUAA and Yanam

In reply, Government stated that action will be taken to ensure partition and cover the vehicle used for collection and transportation of waste.

3.4 Non-provision of Personal Protection Equipment

As per Rule 15 (zd) of SWM Rules, the ULB has to ensure that the operator of a solid waste management facility provides personal protection equipment including uniform, fluorescent jacket, hand gloves, raincoats, appropriate foot wear and masks to all workers handling solid waste and ensure that the same are used by the workforce. As per SWM Manual, manual handling of wastes is prohibited. However, if unavoidable due to constraints, manual handling should be carried out under proper precautions with due care for health and safety of workers. They should be subject to periodic health checks and should be provided with social security benefits including health insurance.

It was observed during Joint field visit in PUAA, that though the majority of the work force were involved in manual handling of waste, they were not using protective equipment particularly mask, gloves and boots.

Further, during joint field survey, the 29 *per cent* of public surveyed stated that the sanitary workers did not use protective equipment. Thus, the non-utilisation of protective equipment had put the workers at risk with the possibility of being exposed to health hazards especially in view of collection of non-segregated domestic hazardous waste.





Picture 3.11 and 3.12: Sanitary workers without protective equipment in PUAA

3.5 Conclusion

Out of the five Municipalities, only in two Municipalities *viz*., Karaikal and Mahe, the segregation of waste at source was done. Though segregation of waste was mandatory as per extant rules, PUAA and Yanam Municipality continued to collect unsegregated waste. Non-establishment of two waste processing facilities through CSR fund and non-diversion of dry waste to the existing facility, had resulted in avoidable liability of ₹ 50.54 lakh for clearance through bio-mining. The vehicles used for transportation of solid waste were not suitably partitioned for collection of segregated wastes and were not covered. In Mahe, since the non-biodegradable waste was collected only once in a month, the households resorted to burning of waste. Though the work force of SWM were involved in manual handling of waste, they were not using protective equipment particularly mask, gloves and boots, thereby exposing them to serious health hazards.

3.6 Recommendations

- The Government should fix responsibility on the concerned officials of LAD for omission of Terms of Reference in the agreement entered with the concessionaire regarding the role on segregation of waste at source level.

- The Government should ensure segregation of waste at source level and prevent mixing of waste till its disposal, in order to comply with the SWM rules and NGT orders.
- The Government should ensure transporting of waste to the existing facility created under CSR fund and take further action to set up remaining two facilities.
- The Government should ensure vehicles used for collection and transportation of waste must be partitioned and covered.
- The Government should include penal provisions in the agreement (in line with Para 3(23) of the SWM Rules, 2016) entered with the concessionaire for non-compliance with the rules on collection, transportation and disposal of wastes.

CHAPTER 4

PROCESSING AND TREATMENT OF SOLID WASTE

CHAPTER 4: PROCESSING AND TREATMENT OF SOLID WASTE

As per SWM Rules, ULBs have to set up sanitary landfills by April 2019 and bio-remediation of old dumpsite by April 2021. The concessionaire engaged for reclamation of land through bio-mining had been paid ₹ 12.27 crore for processing of legacy waste and remediation of the land. However, the concessionaire has disposed of only the legacy waste of around 77,916 tonnes but had not done proportionate reclamation of land thereby got an undue benefit of ₹ 6.27 crore.

Though, SWM Rules stipulates that ULBs have to analyse the old dumpsite for the bio-remediation, the 12 acre of land at Karuvadikuppam in which dumping was stopped in the year 2011 was not bio-remediated till date (March 2023).

The bio-methanation plant installed in Puducherry and Karaikal Municipality at a cost of ₹ 51.16 lakh was not functional due to non-purchase of electrical generator and damages in the equipment.

The joint inspection at Kurumbapet dumpsite revealed that leachate generated was allowed to stagnate around the dumpsite and flow over the approach road thus the conditions of the dumpsite posed a threat to the environment and human health.

In Puducherry Region, though the land for processing C&D waste was identified, the processing facility was yet to be created. Consequently, the concessionaire continued to dump the C&D waste along with the other municipal waste at Kurumbapet dumpsite.

Similarly, the waste generated from the slaughtering of animals was dumped along with Municipal Solid Waste at the dumpsite. This practice poses a health hazard in that area.

4.1 Processing and Treatment

As per Rule 15(v) of SWM Rules, the ULB has to facilitate construction, operation and maintenance of solid waste processing facilities and associated infrastructure on their own or with private sector participation. As per SWM Manual 2016 further reiterited that, the ULBs should adopt suitable technology

for processing *viz.,* recycling and recovery[1] for non-biodegradable, composting[2] and Waste to energy[3] projects e.g. Refuse Derived Fuel (RDF), bio-methanation[4], incineration, etc., for treating biodegradable waste. The timeline given for setting up solid waste processing facilities was two years from the notification of SWM Rules, 2016 *i.e.*, before 30 April 2018.

Further, in the matter of compliance of SWM Rules, 2000, NGT in its order dated 5 February 2015 stated that UTP had failed to submit the requisite project reports on establishment of municipal waste management plants despite repeated orders. Further, in its order dated August 2018, NGT had directed all the States to submit the Action Plan by October 2018 for compliance of all mandatory activities listed in SWM Rules, 2016 and execute the same by 31 December 2019. However, it was noticed that there were no requisite waste treatment facilities created in three[5] out of five ULBs in UT of Puducherry as discussed below.

As against the total collected waste of 350 Tonnes per day (TPD), Puducherry and Oulgaret Municipality (PUAA) had only one bio-methanation plant with one TPD capacity as discussed in the succeeding paragraph 4.3.1. In Yanam, no waste processing facility is available till date (March 2023). In Karaikal, Resource Recovery Park (RRP) were created for recycling of non-biodegradable waste and vermicomposting, windrows and bio-methanation for treating biodegradable wastes. In Mahe, one MRF was created for recycling non-biodegradable waste.

Though the ISWM hierarchy indicates that landfilling of municipal solid waste is the least preferred option for solid waste, it was observed that entire waste of 366 TPD generated in PUAA and Yanam were being dumped in the dumpsite resulting in clearance of the legacy waste through bio-mining as discussed in subsequent paras.

In reply, Government stated that action was being taken to setup MRF along with processing facilities in Puducherry and Yanam region through concessionaires.

---

1 Processing non-biodegradable waste to recover commercially valuable materials (e.g. plastic, paper, metal, glass, e-waste recycling).

2 Processing organic waste to recover compost (e.g. windrow composting, in-vessel composting, vermi composting).

3 Recovering energy before final disposal of waste.

4 Process entailing enzymatic decomposition of organic matter by microbial action to produce methane rich biogas.

5 Puducherry, Oulgaret and Yanam.

4.1.1 Bio-Mining

According to SWM Rule 15(zj), the ULB should investigate and analyse all old open dumpsites and existing operational dumpsites for their potential of bio-mining and bio-remediation and take necessary actions to bio-mine or bio-remediate the sites. Further, as per Rule 15(zh) of SWM Rules notified in April 2016, dumping of mixed waste has to be stopped by setting up of sanitary landfills by April 2019 and bio-remediation of old dumpsite should be carried out by April 2021.

It was noticed that NGT in its order dated August 2018, in the matter of non-compliance of SWM Rules, 2016 and earlier rules, ordered that bio-mining of legacy waste was to be carried out by March 2021 in the sites wherein unsegregated wastes were dumped. Subsequently, the NGT in January 2019, issued another order for creation of SWM facilities without any further delay. Thereafter, the DPR for bio-mining of Kurumbapet dumpsite was finalised in August 2020 and the work was awarded to M/s Zigma Global Environ Solution Private Limited in June 2021.

4.1.1.1 Reclamation of Land through Bio-remediation and Bio-mining at Kurumbapet dumping site

In the PUAA, mixed municipal solid waste of about 350 TPD was being dumped at Kurumbapet Dumpsite to an extent of 23.6 acres in Puducherry from July 2011. As of March 2020, legacy waste of 4,97,932 MT was accumulated in the 21 acres of the dumpsite.

A Request For Proposal was floated in August 2019 for Reclamation of Land and the work was awarded in June 2021 to M/s. Zigma Global Environ Solutions, Erode at the rate of ₹ 770 per tonne. As per the agreement conditions, the payment has to be made based on weighment system of waste processed and the release of payment shall be linked to the achievement of land reclamation. The concessionaire commenced the work in December 2021. As of July 2022, the concessionaire had processed 2,23,841 tonne and disposed 77,916 tonne of waste, for which he was paid an amount of ₹ 12.27 crore as of August 2022.

It was observed that, the concessionaire had disposed only 77,916 tonne of waste for which he was eligible only for a payment of ₹ 6 crore[6], as the processed waste of 1,45,925 tonnes was yet to be disposed from the dump yard. This implies that the concessionaire had only processed the waste, but was yet to reclaim the land as per the terms of the contract. Thus, the concessionaire was

[6] 77,916 tonnes x ₹ 770.

extended an undue benefit of ₹ 6.27 crore towards un-disposed waste and un-reclaimed land.





Pictures 4.1 and 4.2: Bio-mining at Kurumbapet dumpsite

Further, the dumping of segregated ignitable materials in the dumpsite would be hazardous as it may cause fire accident which already occurred in December 2016 and January 2018 at the dumpsite.

In reply, Government stated that suitable instructions would be issued to the contractor for reclamation of the land as per the contract.

4.1.2 Non-clearance of legacy waste at Karuvadikuppam dumpsite in Puducherry

As per Rule 15(zj) and (zk), ULB has to investigate and analyse all old dumpsites for their potential of bio-mining or bio-remediation or it shall be scientifically capped to prevent further damage to the environment.

Earlier, GoP had allotted (June 2002) 12 acres of land at Karuvadikuppam for dumping the municipal solid wastes collected in PUAA. However, as per the directions of the Hon'ble High Court, Chennai dated 24 July 2011, ULBs stopped dumping waste at Karuvadikuppam and started dumping the waste at Kurumbapet dumpsite from July 2011. Audit noticed that the old dump yard at Karuvadikuppam is not capped or bio-remediated scientifically till date (March 2023).

In March 2016, based on orders of NGT, a technical team from PPCC inspected the site and observed that the land was dumped to the level of four meter depth and approximately one lakh tonne of municipal solid waste was accumulated. Further, on examination of the dumped wastes, it was noticed that almost all bio-degradable wastes have been decomposed due to natural process and only dried plastic wastes combined with few inert materials like glass and ceramic pieces were present throughout the site. As there were possibility of contamination of ground water by leachate formation, based on NGT orders

5 April 2016, PPCC directed (April 2016) LAD to clean the Karuvadikuppam dump yard within two months' time.



Pictures 4.3 and 4.4: Old dumpsite at Karuvadikuppam

However, LAD had not taken any action to clear the site as directed by NGT even after a lapse of more than six years. It was noticed that the impact of the leachate formation was not analysed by PPCC. Further, it was noticed that the Public Works Department (PWD) was operating a Sewerage Treatment Plant (STP) adjacent to the dump yard and the sludge from the STP were being unloaded in this site. Thus, contamination of dumpsite was allowed to be continued by PUDA for more than 10 years without any remedial action.

In reply, Government stated that the issue will be looked into and necessary action will be taken. The Government and the Local Body need to execute remedial action on the lines suggested by PPCC.

4.1.3 Non-clearance of legacy waste at Karaikal and Yanam dumpsites

In Karaikal, the unsegregated municipal solid waste is being dumped in approximately 10 acre dump yard facility located at Paravaipet, Karaikal for the past 30 years. Approximately 40 TPD is being dumped in the yard thereby accumulating legacy waste, which was yet to be cleared. Though, as per NGT orders, legacy waste has to be cleared by March 2021, the work order for the same was issued only in March 2023 after a delay of two years.

Similarly in Yanam, unsegregated waste are dumped for the last 14 years at the site identified in UKV Nagar, Yanam which is situated on Government poramboke land categorised as water channel. Approximately 16 TPD was being dumped in the yard thereby accumulating legacy waste and the proposal for clearing the legacy waste was still at DPR stage (March 2023).

In reply, Government stated that it has been proposed to clear the legacy waste through the concessionaire who will be operating the MRF facility at Yanam.

The reply was not tenable as bio-mining was not part of the agreement entered with the concessionaire and the said work cannot be carried out through them.

4.2 Recycling and Recovery

As per SWM Rule 15(h), the ULB shall setup material recovery facilities or secondary storage facilities with sufficient space for sorting of recyclable materials such as paper, plastic, metal, glass, textile. Section 3.1.1 of SWM Manual states that recycling diverts a significant fraction of municipal, institutional and business waste from disposal and thereby, reduces environmental impacts like climate change and the burden on public authorities to manage waste. Recycling can generate revenues, which result in reducing overall costs for MSWM. According to the ISWM hierarchy, recycling is a preferred waste management strategy after source reduction and reuse. Hence, recycling systems should be adopted before planning for any waste processing or treatment facilities.

However, out of the five municipalities, only in two municipalities *viz.,* Karaikal and Mahe, the MRF were created in January 2017 and October 2018 respectively. The non-creation of MRF in other Municipalities are discussed below:

4.2.1. Non-setting up of material recovery park in PUAA

As per Rule 22 of SWM Rules, the timeline given for setting up solid waste processing facilities was two years from the notification of SWM Rules, 2016 *i.e.*, before 30 April 2018. In respect of PUAA, the unsegregated waste load being dumped at Kurumbapet dumpsite as discussed in preceding paragraph 3.1.2. Moreover, no material recovery facility was created for recovering the reusable/recyclable materials before dumping into the dumpsite.

In this connection, it was observed that, out of the 23.6 acres of dumpsite, waste was filled in 21 acres. As such, an area of 2.6 acres was readily available with PUDA for establishing processing unit and landfill. Despite, commencement of bio-mining to dispose the legacy waste, the processing unit and landfill were still at tender stage, due to which fresh waste was continued to be dumped over the existing waste.

Further, as per the orders of NGT dated August 2018, in the matter of non-compliance of Solid Waste Management Rules 2000 and 2016, the Solid waste processing facilities were to be established by December 2019. Despite, allocation of GoI grants under Swachh Bharat Mission-Urban (SBM-U) for Solid Waste Management Projects, the processing facility was yet to be

established (March 2023). Further, as per NGT orders, the ULBs were liable to pay a penalty of ₹ 1 lakh for every month of delay, thereby implying a potential liability of ₹ 39 lakh till March 2023.




Pictures 4.5 and 4.6: Waste overflowing at Kurumbapet dumpsite

It was further observed that the clearance of legacy waste through bio-mining was also not done as the fresh wastes were not treated and safely landfilled, resulting in environmental deterioration. Further, there would be additional financial burden of ₹ 29.51 crore[7] to the Government towards the expenditure on clearing the fresh waste through bio-mining.

In its reply, Government stated that the tender for creation of MRF at Puducherry is under finalisation. The fact, however remained that the same was not finalised till date (March 2023).

4.2.2 Delay in setting up of Material Recovery Facility in Yanam

(i) In Yanam, approximately 16 TPD of unsegregated solid waste was being collected door-to-door by engaging a concessionaire *viz.,* Yanam Peoples Voluntary Service Organisation for the period from April 2017 to November 2021. The concessionaire was paid a flat rate of ₹ 13.18 lakh per month irrespective of quantum of waste collected. The scope of work was only collection and transportation of unsegregated solid waste to the dumpsite situated at UKV Nagar, Yanam.

Audit noticed that in September 2015, the State High Powered Committee had decided to take-up the project for source segregation and composting. Accordingly, the DPR for the project was approved in October 2019 for ₹ 3.32 crore and an amount of ₹ 58 lakh was released for implementation of the project.

The RFP for the project was called for thrice (January 2020, April 2020 and May 2020). In the last tender floated in May 2020, out of the two tenderers

[7] Quantity of wastes dumped from January 2020 to December 2022 = 350 TPD x 1,095 days x ₹ 770 = ₹ 29.51 crore.

participated, only one tenderer was qualified (September 2020) for financial bid who quoted ₹ 4,950 as tipping and processing fee per tonne and the same was negotiated to ₹ 3,903 per tonne (March 2021). However, LAD had opined that the rate of ₹ 3,903 was still on the higher side and hence cancelled the tender (May 2021).

Subsequently, fresh tenders were called for in August 2021. Out of the three tenderers, the lowest rate of ₹ 4,969 per tonne quoted by M/s HR square, Hyderabad was reduced to ₹ 4,721 by negotiation (September 2021). The same was accepted and the agreement with the lowest bidder was entered in November 2021 for a contract period of 15 years. The scope of work included collection, segregation, transportation, processing and disposal of waste at a flat rate of ₹ 4,721 per tonne as tipping fee, construction of sanitary landfill site for ₹ 24 lakh, civil structures for ₹ 47.63 lakh and Bio-methanation Plant for ₹ 80 lakh. The concessionaire had to develop these facilities within six-month time from signing the agreement. The work of collection of waste and transportation commenced from 08 December 2021. In this connection, Audit observed the following:

- Though the technically qualified tenderer had quoted ₹ 3,903 per tonne during September 2020, the LAD had rejected the bid stating that the rate was on higher side without any comparitive study of rates that prevailed in neighbouring/adjoining municipalities. This failure had resulted in accepting the higher rate of ₹ 4,721 per tonne in the subsequent tender which led in avoidable additional expenditure of ₹ 818 per tonne and this failure resulted in accepting additional expenditure of ₹ 94.23[8] lakh for the period from December 2021 to March 2023 and would result an expenditure of ₹ 10.60[9] crore to the concessionaire at the end of contract period.

(ii) The work of 'Integrated Municipal Solid Waste Processing Project on Design, Build, Operate and Transfer (DBOT) basis at Yanam' was awarded to the concessionaire in December 2021 and the required processing facilities were to be established by the concessionaire within six months *i.e.*, June 2022. However, the land for developing the project was identified by Yanam Municipality belatedly in March 2023 due to which the processing facility was not created. During the household survey conducted by Audit, it was observed that majority of the households (56 *per cent*) were giving segregated waste to the concessionaire, but the segregated waste was mixed with unsegregated

[8] 16 months x 24 TPD x 30 days x ₹ 818 (₹ 4,721-₹ 3,903).

[9] 15 years x 12 months x 30 days x 24 TPD x ₹ 818.

waste and dumped together at the dumpsite thereby making the efforts of segregation at the source level futile.

This forced the Department to pay ₹ 1,190 additionally per tonne for the work of collection and transportation, due to which the concessionaire is receiving the entire payment, but without carrying out processing and scientific disposal of waste as required under this agreement. Due to this omission, the Municipality incurred wasteful expenditure of ₹ 77.11 lakh[10], being the difference in the cost of collection and transportation of waste with and without processing for the past nine months *i.e.*, from July 2022 to March 2023.




Pictures 4.7 and 4.8: Dumpsite at UKV Nagar, Yanam

Delay in handing over the land for development of processing facilities would also result in unsegregated wastes being dumped in the dumpsite and additional financial burden of ₹ 49.90 lakh[11] towards excavating the legacy waste through bio-mining.

As per NGT order, the Municipality was liable to pay a penalty of ₹ 1 lakh per month for dumping the waste without processing. Thus, delay in handing over of land and developing processing facilities had resulted in avoidable expenditure of ₹ 56.45 lakh (for six months).

In reply, Government stated that the land for setting up of MRF at Yanam has been identified and handed over to Municipality with instructions to commence the work immediately.

4.3 Composting

Rule 15 (v) of SWM Rules 2016 envisages that bio-degradable waste be processed, treated and disposed of through suitable technologies *viz.,*

[10] 9 months x 30 days x 24 TPD x ₹ 1,190 (₹ 4,721-₹ 3,531) (rate adopted for without processing).

[11] 9 months x 24 TPD x 30 days x ₹ 770.

composting, bio-methanation, conversion of waste to energy etc. Composting is controlled decomposition of the organic matter.

In this connection, it was observed that though 181.24 TPD of bio-degradable waste is generated in PUAA and Yanam, no facility has been created for composting the same. In Karaikal, facilities *viz.,* windrow and vermi compost were established at MRF and the same is operational. In Mahe, bio-degradable waste is used as compost by the households themselves. The other green waste is collected by ULB and is processed through their compost plant.

Good Practice

In Karaikal and Mahe, the facilities created for vermicomposting were functional and the produced compost was sold to the public.





Pictures 4.9 and 4.10: Vermicompost Sheds at Karaikal and Mahe

4.3.1 Bio-Methanation

As per SWM Manual 2016, Bio-methanation is one of the most technically viable options for Indian municipal solid waste due to the presence of high organic and moisture content. As per Rule 15(m) of SWM Rules, the ULB has to collect waste from vegetable, fruit, flower, meat, poultry and fish market on day-to-day basis and set up of decentralised compost plant or Bio-methanation plant at suitable locations in the markets or in the vicinity of markets ensuring hygienic conditions.

4.3.1.1 Non-functioning of Bio-Methanation plants

The Puducherry Pollution Control Committee (PPCC) extended (February 2017) financial assistance of ₹ 20 lakh each to Oulgaret Municipality and Karaikal Municipality for installation of one TPD capacity Bio-methanation plant. The project proposed for the disposal of the vegetables waste from the markets, thereby reducing the quantity of waste to be transported to the dumpsite. The processing of one tonne of vegetable waste in the plant would generate 60-80 cu m of Methane gas which can illuminate 60 street lights (150 w) for 10 hours.

Accordingly, the above two Municipalities decided to setup the plants at Resource Recovery Park at Kurumbapet, Puducherry and Paravaipet, Karaikal. Based on the same, bids were called for in June 2017 and work was awarded (August and September 2017) to M/s. Alter Energy System, Madurai for an amount of ₹ 22.38 lakh and ₹ 28.78 lakh for Puducherry and Karaikal respectively to complete the works in 4 months. Due to delay in obtaining electricity and water connection, the plants at Puducherry and Karaikal were commissioned in June 2018 and October 2018 respectively.

Audit noticed that though the plant was commissioned in June 2018, the Oulgaret Municipality had purchased the electrical generator required for conversion of gas into electricity only in January 2022 after a delay of four years. Further, street lights to be illuminated by the electricity produced from the plant were yet to be installed in the yard. During the joint inspection made by the Audit, it was seen that the Bio-methanation plant was in a damaged condition and hence was not operational. As such the Municipality had foregone an electricity savings of ₹ 9.23 lakh[12] (from June 2018 to March 2023).





Pictures 4.11 and 4.12: Bio-Methanation plant at Puducherry and Karaikal

In respect of Karaikal Municipality, the plant was also not functional due to damages in the equipment which was confirmed during the joint inspection by the Audit. Due to non-operation, both the plants installed at a cost of ₹ 51.16 lakh were infructuous.

In reply, Government stated that the proposal for illumination of the dumpsite through energy produced from the plant in Puducherry is under process and same will be implemented in due course.

4.4 Sanitary landfill

As per Rule 3(40) SWM Rules, 'sanitary landfilling' means the final and safe disposal of residual solid waste and inert wastes on land in a facility designed with protective measures against pollution of ground water, surface water and fugitive air dust. Further, as per Rule 22 of SWM Rules, ULB should stop

[12] 57 months x 30 days x 90 kw x ₹ 6.

landfilling or dumping of mixed waste within three years of the notification of SWM Rules, *i.e.*, April 2019 and only the non-usable, non-recyclable, non-combustible wastes from waste processing facilities were to be filled in sanitary landfill. The landfills are designed to minimise the impact of the waste on the environment by containment of the waste.

However, in UT of Puducherry, no sanitary landfills was created in any of the ULBs. In respect of PUAA and Yanam, there were no processing facilities set up and the solid wastes were dumped in the open dumpsite without any sanitary landfill. In Karaikal, though segregation and processing of waste was carried out from November 2016 onwards, the residual inert waste was dumped over the legacy waste due to non-availability of sanitary landfill. This would result in avoidable additional expenditure of ₹ 2.03 crore[13] towards clearance of inert waste through bio-mining.

In Mahe, only non-biodegradable wastes were collected and processed and no sanitary landfill was available.

Thus, due to non-availability of sanitary landfill sites in any of ULBs, all the ULBs disposed the waste in open grounds which was violation of SWM rules and would also lead to ground water contamination due to leachate generation.

4.4.1 Status of dumpsites

As per Rule 3(20), 'dumpsites' means a land utilised by local body for disposal of solid waste following the principles of sanitary land filling. The SWM Rules, 2016 stipulate that waste processing facilities were to be created and only the inert wastes to be landfilled and the old dumpsites were to be rehabilitated by bio-remediation or bio-capping within five years from the date of notification of the Rules. In UT of Puducherry, there were three dumpsites in operation *viz.,* in Puducherry, Karaikal and Yanam and no dumpsite was available at Mahe as detailed below:

Table 4.1: Details of dump yards in UTP

Name of the Municipality	Solid Waste Generated (TPD)	Dump yard capacity (acres)
Puducherry	350	23.6
Oulgaret		
Karaikal	40	10
Mahe	8	--
Yanam	34	1.5

[13] Inert waste dumped during 2017-22: 26,427 tonne x ₹ 770= ₹ 2.03 crore.

4.4.1.1 Present conditions of dumpsites in UT of Puducherry

As per Section 4.5.7 of SWM Manual, open solid waste dumpsites without an engineered liner system, leachate collection system or an appropriately designed cover system should be immediately closed to minimise their impact on land, groundwater and surface water quality and on air quality in the vicinity of the dumpsite. In this regard, Audit observed the following:

(i) Dumping of mixed waste in Kurumbapet dumpsite, Puducherry

The dumping of solid wastes collected in PUAA was done at Kurumbapet dumpsite in an extent of 23.6 acres for the past eleven years since July 2011 without segregation. As such, 1,27,750 tonne (350 tonne x 365 days) of municipal solid waste are being dumped in the said dumpsite every year. In December 2021, the department commenced the clearance of dumped legacy waste and reclaim the land through bio-mining. Though bio-mining was to be carried out as an onetime measure, fresh waste was continued to be dumped over the legacy waste, thereby making the bio-mining a futile exercise.




Pictures 4.13 and 4.14: Dumpsite at Kurumbapet, Puducherry

(ii) Poor management of leachate in dumpsites at Puducherry and Karaikal

As per Rule 16(4) read with Schedule I (D) (iii) of SWM Rules, provisions for management of leachates including its collection and treatment shall be made. In no case, leachate shall be released into open environment.




Pictures 4.15 and 4.16: Leachate flow from dumpsite at Puducherry

However, during the joint inspection of dumpsite at Kurumbapet, Puducherry it was observed that the leachate generated was allowed to stagnate around the dumpsite and flow over the approach road and around the dumpsite. At the dumpsite in Paravaipet, Karaikal, though unsegregated wastes were dumped for decades together, no leachate management facilities were available.

Further, the results of analysis of water sample collected from in and around the dumpsite at Kurumbapet and Paravaipet in October 2020 by PPCC had revealed that the parameters of the water samples were above the prescribed limit due to leachate formation. Thus, it was evident that leachate had contaminated the ground water and environment at the dumpsites of Puducherry and Karaikal.

(iii) Non-formation of buffer zone at dumpsites in Puducherry and Karaikal

As per Rule 11(l) and Schedule I of SWM Rules, the ULB has to notify buffer zone[14] for the solid waste processing and disposal of more than five tonnes per day in consultation with the State Pollution Control Board. The guidelines issued by CPCB clarified that as the practice of dumping of crude waste in the dump yard is still being followed, maintenance of green belt of minimum 10 metres around the dumpsite is essentially required to protect people living in the surroundings from exposure and impacts of pollutants.

Accordingly, in respect of PUAA, UTP had notified (February 2020) the buffer zone by demarcating the area along the periphery of the existing dump yard in Kurumbapet with the approval of PPCC. However, the required green belt with necessary plants *viz.,* babul, neem, etc., has not been created till date (December 2022).

In respect of Karaikal, the required buffer zone is yet to be notified thereby putting the nearby residents at risk of exposure to pollutants.

[14] "Buffer zone" means zone of no development to be maintained around solid waste processing and disposal facility, exceeding 5 TPD of installed capacity.



Picture 4.17: Aerial view of dumpsite at Kurumbapet, Puducherry

(iv) Dumping mixed wastes in water channel at Yanam

As per Schedule I (A) (vii), the dumpsite should be 100 metres away from river, 200 metres from a pond, Highways, habitations, public parks and water supply wells.

In Yanam, the dumpsite was in Government poramboke land. Consequent on the implementation of SWM Rules, the Yanam Municipality approached the Revenue Department for transfer of land for setting up of the required solid waste management facilities. The Revenue Department declined the request as the same was categorised as water channel. However, Yanam Municipality continued the dumping of waste for the past 14 years and dumped a quantity of approximately 90,000 tonnes of mixed solid waste in the land categorised as water channel. Audit noticed that PPCC had also issued annual authorisation as a matter of routine for the dumpsite without ascertaining the ground reality.

In reply, Government stated that it has been proposed to clear the legacy waste through the concessionaire who will be operating the MRF facility at Yanam. The reply was not tenable as bio-mining was not part of the agreement entered with the concessionaire and the said work cannot be carried out through them.

4.5 Improper disposal of Construction and Demolition Waste

As per Rule 15(s) of SWM Rules 2016 and Rule 6(4) C&D Rules 2016, the construction and demolition waste were to be handled separately without mixing up with municipal solid waste. The local bodies were to identify land for collection and processing C&D waste within 18 months and establish and make C&D waste processing plant functional within 24 months for cities from the date of notification of the Rules.

However, it was noticed that UTP had not prepared separate policy for C&D waste management even after a lapse of more than six years from the date of notification of these rules.

In Puducherry region, it was noticed that the C&D waste was collected by the concessionaire engaged for collecting the municipal solid waste. Though the land for setting up of C&D waste processing facilities was notified (January 2019), the concessionaire was not given suitable instruction for dumping the C&D waste at the designated place. Consequently, the concessionaire continued to dump the C&D waste along with other municipal wastes in Kurumbapet dump yard. During the period covered in Audit, 230.25 tonnes of C&D waste was collected and dumped in the Kurumbapet dumpsite. If the wastes were dumped separately, the same could be utilised in a profitable manner for construction purposes.

It is pertinent to note that, as the bio-mining is being carried at ₹ 770 per tonne, dumping of C&D waste along with the municipal waste would only result in additional cost in disposing the same.

In respect of other ULBs, though land for setting up of processing facility for C&D waste were earmarked, the same was yet to be notified and hence the C&D waste processing facility could not be established so far.



Picture 4.18: Identified place for C&D at Mettupalayam



Picture 4.19: C&D Waste dumped at Kurumbapet

In its reply, the Government stated that a separate land has been identified for dumping of C&D waste and facilities required as under the SWM Rules will be created in due course.

4.6 Improper disposal of slaughterhouse waste

As per Section 7.6 of SWM Manual, 2016, scientific processing and disposal of slaughterhouse waste is essential to recover useful fractions and for safe disposal of residual pathogenic biological waste. In absence of a proper

slaughterhouse waste processing or disposal facility, ULBs could practice deep burial of carcasses with adequate precaution.

It was observed that, except in Karaikal, slaughterhouse was not functional in any of the ULBs and the slaughtering of animals for food were done in the respective retail mutton/chicken/fish shops. The waste generated from these shops were collected by the concessionaire and dumped along with the municipal solid waste, thereby making unhygienic disposal of slaughterhouse waste.

Thus, the ULBs, except Karaikal, failed to manage slaughterhouse waste effectively, causing unhygienic conditions and contamination of environment, besides possible threat to human health.

4.7 Conclusion

As against the total collected waste of 350 TPD in PUAA, the Municipality had created only one TPD waste processing facility and in Yanam no waste processing facility was made available. The concessionaire deployed for Bio-mining at Kurumbapet was extended an undue benefit of ₹ 6.27 crore as he was paid for undisposed waste and unreclaimed land. The old dump yard at Karuvadikuppam was not capped or bio-remediated scientifically despite orders of NGT, for more than six years. Though legacy waste had to be cleared by March 2021, the project for the same at Karaikal was taken up only in March 2023 and in Yanam the same was still at tender stage. Non-creation of Material Recovery Facility in PUAA and Yanam, fresh waste was continued to be dumped thereby defeating the process of clearing the legacy waste through bio-mining. Though the work order for creation of MRF at Yanam was awarded in December 2021, the land for establishing the MRF was handed over by the municipality only in March 2023, resulting in wasteful expenditure of ₹ 77.11 lakh towards processing and also resulted in continued dumping of unsegregated waste. The Bio-methanation plants of 1 TPD each installed at Puducherry and Karaikal at cost of ₹ 51.16 lakh were not functional. In UTP, no sanitary landfills were created in any of the ULBs resulting in dumping of waste in open ground leading to ground water contamination. Leachate management facility and buffer zone were not available in any of the dumpsites. Thus, non-compliance of SWM Rules, despite orders of NGT resulted in continued dumping up of unsegregated waste in the dumpsite which coupled with non-operation of the treatment plants had defeated the objective of effective processing and treatment of the solid waste.

4.8 Recommendations

- The Government should ensure collection of segregated waste and establish Material Recovery Facility in PUAA and Yanam to avoid dumping of fresh waste.
- The Government should ensure clearance of legacy waste at Puducherry, Yanam and Karaikal dumpsite.
- The Government should ensure functioning of the bio-methanation plant installed at Puducherry and Karaikal.
- The Government should ensure establishment of sanitary landfill and leachate management facility to avoid ground water contamination.

CHAPTER 5

MONITORING

CHAPTER 5: MONITORING

The State Level Advisory Body (SLAB) constituted (November 2016) as per SWM Rules conducted periodical meetings. However, SLAB did not review the State Policy and strategy on SWM.

As per the agreement entered into for collection and transportation of solid waste in PUAA, concessionaire had installed Global Positioning System (GPS) in all the vehicles to monitor their movement. However, neither PUDA nor the Municipalities had verified the log of the vehicles before making the payment to the concessionaire.

Due to non-compliance of SWM Rules, the NGT had levied Environmental compensation amounting to ₹ 96 lakh for the period April 2020 to December 2022. However, the amount was not claimed by PPCC from the municipalities.

The analysis of quality of ground water in the dumpsites by Audit through Pondicherry University revealed that the water quality was poor and parameters such as TDS, chloride, iron, lead, etc., were beyond permissible limit.

5.1 Monitoring by Apex Bodies

Section 6.1 of the SWM Manual stipulates that institutionalising appropriate quality assurance systems is essential to ensure a continuous and efficient Municipal Solid Waste Management (MSWM) system. The performance of all components of MSWM system, from collection to processing and disposal should be monitored on a daily basis.

5.1.1 Monitoring by Local Administration Department

As per Rule 23 of SWM Rules, a State Level Advisory Body (SLAB) should be constituted within six months from the date of notification of these Rules *i.e.*, April 2016 by the Department in-charge of local bodies. The SLAB shall meet at least once in every six months to review the matters related to implementation of these rules, state policy and strategy on solid waste management and give advice to State Government for taking measures that are necessary for expeditious and appropriate implementation of these rules.

The SLAB was constituted in November 2016 and meetings were conducted regularly and issues *viz*., management of plastic wastes, conducting awareness programmes on segregation of wastes, etc., were discussed.

However, the State policy/action plan prepared by UTP for SWM did not contain any strategy for implementation of their mandatory activities *viz*., segregation of waste at source, collection and transportation of segregated waste, processing and scientific disposal as required under the SWM Rules.

Thus, though the State Policy was not comprehensive and the mandatory activities were not carried out even after the lapse of timelines, the SLAB had not seriously reviewed these issues and report to Government and PPCC for taking necessary corrective action.

5.1.2 Non-functioning of GPS in vehicles used for waste transportation

As per Clause 2(1)(15) of Agreement for collection and transportation of Solid Waste in PUAA, the concessionaire has to make sure that all the vehicles deployed for collection and transportation of Solid Waste has to be fitted with Global Positioning System (GPS) to monitor their movement and generation of Management Information System (MIS) reports on daily basis, failing which suitable penalty will be imposed.

In this connection, it was noticed that the Swachatha Corporation engaged in PUAA since 2015 had deployed 34 vehicles (compactors, tippers and trucks) which were fitted with GPS. On scrutiny of the real-time log of the GPS monitoring system, it was seen that GPS log could be viewed only for the latest 62 days and the log for previous period were not available for review. It is pertinent to note that neither PUDA nor the Municipalities had verified the log before passing the bills for payment to the concessionaire. On a further scrutiny of the log for the period from 15 November 2022 to 10 January 2023, it was seen that the GPS in respect of 12 vehicles were not functional and hence no log was available.

This proved that the GPS fitted with vehicle were either not functional or even if functioning, the date was not used for verification and payment of transport charges to the concessionaire.

The above instance shows lack of monitoring in the operation of the vehicles by the competent authority, thereby defeating the very purpose of installing GPS in these vehicles.

5.2 Monitoring by Puducherry Pollution Control Committee

5.2.1 Ineffective enforcement of SWM Rules

As per Rule 16 of SWM Rules, the Puducherry Pollution Control Committee has to enforce these rules in UT of Puducherry through local bodies in their respective jurisdiction and review implementation of these rules at least twice a year in close co-ordination with concerned Directorate of Municipal Administration or Secretary-in-charge of State Urban Development Department.

However, it was noticed that even after a lapse of more than six years, the required activities for compliance of SWM Rules in UT of Puducherry remained unexecuted especially in three out of five Municipalities *viz*., Puducherry, Oulgaret and Yanam. But PPCC failed to review and monitor the inaction of LAD and the municipalities. To a specific query regarding the mechanisms adopted for enforcing and reviewing implementation of SWM Rules, it was replied by PPCC that SLAB was constituted in November 2016 and periodical convening of meetings was reviewed. However, it was observed that SLAB had not taken any concrete action for implementation of SWM Rules as discussed in paragraph 5.1. Thus, the monitoring activities by the authorities remained ineffective.

5.2.2 Non-levying of Environmental Compensation

Due to non-compliance of SWM Rules and directions of NGT even after the expiration of the statutory timelines, NGT ordered all State/UT Pollution Control Boards/Committees to levy Environmental Compensation (EC) for continued failure after 31 March 2020. Accordingly, every Local Body was liable to pay compensation at the rate of ₹ 1 lakh per month from 01 April 2020 for non-compliance of SWM Rules and directions of NGT.

Consequently, PPCC had levied EC of ₹ 36 lakh[1] on ULBs of UT for non-compliance of SWM Rules for the period from April 2020 to December 2020. Out of these, only ₹ 9 lakh from one ULB was recovered by PPCC. Moreover, the EC had to be levied on ULBs till compliance of SWM Rules. However, though the ULBs had not complied with the requisite provisions till date (December 2022), the PPCC had not levied EC for the period from January 2021 to December 2022 which worked out to an amount of ₹ 96 lakh[2].

Thus, the non-execution of requisite activities for solid waste management was viewed seriously by NGT, but there were no significant change in complying the provisions of SWM Rules due to laxity and ineffective monitoring.

5.2.3 Issue of improper authorisation for Dumpsite in Yanam

As per Schedule I (A)(vii) and (viii), the landfill site shall be 200 metres away from water bodies. As per 16(1)(e) of SWM Rules, the PPCC shall issue authorisation to the local body or an operator of a landfill facility stipulating compliance criteria and environmental standards as specified in Schedules I and II of SWM Rules.

In Yanam, unsegregated waste were dumped for the last 14 years at the site identified in UKV Nagar, Yanam which was situated on Government poramboke land categorised as water channel. Despite the same, PPCC had issued authorisation for operation of dumpsite, which was not in order. Dumping of unsegregated waste on water bodies would only result in further environmental deterioration.

In reply, Government stated that it has been proposed to clear the legacy waste through the concessionaire who will be operating the MRF facility at Yanam.

5.2.4 Deficiencies in monitoring of environmental impacts

As per Rule 16 (1) (b) read with Schedule I and II of SWM Rules, the PPCC has to monitor environmental standards for waste processing and disposal sites maintained by the ULBs.

---

1 ₹ 1 lakh per month for nine months on four ULBs *viz*., Puducherry, Oulgaret, Karaikal and Yanam.

2 ₹ 1 lakh per month for 24 months on four ULBs *viz*., Puducherry, Oulgaret, Karaikal and Yanam.

5.2.4.1 Ground water quality

As per Schedule I (E) (i) of SWM Rules 2016, 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 metres of the periphery of landfill site shall be periodically monitored covering summer, monsoon and post-monsoon period to ensure that the ground water is not contaminated. Usage of groundwater in and around landfill sites for any purpose (including drinking and irrigation) shall be considered only after ensuring its quality.

In UT of Puducherry, there are three sites[3] for dumping of solid wastes. In Mahe no dumpsite was available, as only non-biodegradable waste was collected and processed through MRF.

In respect of PUAA and Karaikal, it was noticed that PPCC had not maintained any baseline data of ground water quality of the dumpsites. Audit further noticed that from 2017-22, the base line data was collected once in a year in respect of one dumpsite *viz*., Kurumbapet (shared by Puducherry and Oulgaret Municipalities). In respect of dumpsite in Karaikal, ground water quality was analysed only once in September 2020. Thus, the maintenance of base line data of water quality by UTP was not in conformity with the criteria fixed in SWM Rules.

5.2.4.2 Ground water analysis by Audit

As stated in the previous para, the PPCC had not conducted periodical analysis of quality of ground water in the dumpsites as required. Audit collected samples of ground water from the dumpsites at Kurumbapet, Karuvadikuppam in Puducherry and at Paravaipet in Karaikal and tested them through the Centre for Pollution Control and Environmental Engineering, Pondicherry University. The results of the same are as given below:

[3] Each one at Puducherry (shared by Puducherry and Oulgaret Municipalities), Karaikal and Yanam.

Table 5.1: Results of ground water analysis

Sl. No.	Test Parameters	Acceptable limit	Permissible limit	Kurumbapet	Karuvadi kuppam	Paravaipet
1	pH @25^{0}C	6.5-8.5	No relaxation	6.37	6.67	7.30
2	Chloride (as Cl) mg/L	250	1,000	256.85	100.59	1,023.13
3	Total Dissolved Solids (TDS) mg/L	500	2,000	1,496.67	876.67	2,168
4	Total Hardness (as $CaCO_3$) mg/L	200	600	348.33	364.44	1,036.67
5	Iron (as Fe) mg/L	0.3	No relaxation	0.56	1.12	0.68
6	Total Arsenic (as As) mg/L	0.01	0.05	< 0.05	0.11	< 0.05
7	Lead (as Pb) mg/L	0.01	No relaxation	1.25	2.33	1.64
8	Total Chromium (as Cr)	0.05	No relaxation	0.33	0.61	0.42
9	Total coliform	Shall not be detected		Not detected	Not detected	> 20 CFU
10	E. coli	Shall not be detected		Not detected	Not detected	4 MPN

Permissible Limit Beyond permissible limit

Based on the results, it could be observed that the ground water quality at Paraivaipet, Karaikal was poor as the parameters *viz*., TDS, Chloride, Hardness, Iron, Lead and Chromium were beyond the permissible limits. There was presence of coliform and E. coli in the sample at Paravaipet dumpsite making the water unfit for human consumption. Thus, it was evident that the continued dumping of unsegregated waste had polluted the ground water around the dumpsite, but the same was not monitored by the PPCC.

5.2.4.3 Ambient Air quality

As per the Schedule I (F) (iv) of SWM Rules, ambient air quality at the landfill site and at the vicinity shall be regularly monitored. However, it was noticed

that during the period covered in Audit, only in Kurumbapet dumpsite air quality was regularly monitored. In respect of Karaikal dumpsite, the same was monitored in 2020-21. In Yanam dumpsite, the air quality was not monitored as prescribed in SWM Rules.

5.3 Inadequate Information, Education and Communication activities

The Rule 15(zg) of the SWM Rule, stipulates that the ULBs have to create public awareness through information, education and communication campaign and educate the waste generators on various issues *viz*., (i) not to litter; (ii) minimise generation of waste; (iii) reuse the waste to the extent possible; (iv) practice segregation of waste into bio-degradable, non-biodegradable (recyclable and combustible), sanitary waste and domestic hazardous wastes at source; (v) handover segregated waste to waste pickers and (vi) pay monthly user fee or charges to waste collectors or local bodies for sustainability of solid waste management. ULBs should therefore plan for effective Information, Education and Communication (IEC) campaign to minimise waste generation, etc., and bringing of behavior change among public for waste management.

Regarding PUAA, as per the agreement with the concessionaire identified for collection and transportation of solid wastes, the concessionaire should organise and conduct public awareness programs. It was noticed that during the period covered under Audit the concessionaire had conducted IEC activities on source segregation, coordinating the residential welfare associations in four wards out of 81 wards under PUAA. In Yanam, no IEC activities were conducted.

During Joint household survey conducted by Audit in PUAA and Yanam, all the households covered in the survey replied that no IEC was carried out in their locality.

Thus, due to inadequate IEC activities, intended benefits of IEC activities on community participation and behaviour change could not be availed.



Picture 5.1: Incorrect usage of bins for wet waste and dry waste

In reply, the Government stated that necessary IEC programmes will be carried out to ensure segregation of waste at source through behavioral change among the public.

Good Practice

In Karaikal, the agreement included door-to-door collection of segregated wastes and conduct of IEC activities for inculcating behaviour change among public. Accordingly, the concessionaire had conducted awareness programmes every month covering all kinds of waste generators. During the survey conducted, 95 out of 125 persons (76 *per cent*) surveyed had informed that regular awareness meetings were conducted in effective manner by the concessionaire on source segregation.

5.4 Conclusion

The State Level Advisory Board for SWM did not review the State policy and strategy on solid waste management resulting in non-implementation of scientific SWM methods mandated under SWM Rules. As such, the ULBs became liable to pay ₹ 1 lakh per month towards environment compensation. Payments were made to the concessionaire for transportation of waste without verifying the GPS log of the vehicles. Even though, the Yanam dump yard was located on water channel, PPCC had issued authorisation for the same which was irregular. The ground water quality analysis near the dumpsites in Puducherry and Yanam revealed presence of heavy metals and drinking water parameters were beyond permissible limits. No air quality monitoring was done in Yanam dumpsite. Due to inadequate IEC activities, there were no community

participation towards segregation of waste in PUAA and Yanam. Thus, non-compliance to the SWM Rules defeated the objective of effective monitoring and evaluation of solid waste management system.

5.5 Recommendations

- The Government should ensure that PPCC installs a system of continuous monitoring of water and air in and around the dumpsites so as to take remedial action.
- The Government should encourage community participation and strengthen IEC activities to ensure proper segregation and disposal of waste.

Chennai
The 08 July 2024

(K.P. ANAND)
Principal Accountant General (Audit-II),
Tamil Nadu and Puducherry

Countersigned

New Delhi
The 24 July 2024

(GIRISH CHANDRA MURMU)
Comptroller and Auditor General of India

Glossary of abbreviations

Abbreviations	Full form
C&D	Construction & Demolition
CPCB	Central Pollution Control Board
CSR	Corporate Social Responsibility
DBOT	Design, Build, Operate and Transfer
DPR	Detailed Project Report
EC	Environmental Compensation
EPR	Extended Producer Responsibility
GoI	Government of India
GPS	Global Positioning system
IEC	Information, Education and Communication
ISWM	Integrated Solid Waste Management
LAD	Local Administration Department
MIS	Management Information System
MOU	Memorandum of Understanding
MRF	Material Recovery Facility
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
NGT	National Green Tribunal
NULM	National Urban Livelihood Mission
PPCC	Puducherry Pollution Control Committee
PUAA	Puducherry Urban Agglomeration Area
PUDA	Puducherry Urban Development Agency

Abbreviations	Full form
PSCDL	Puducherry Smart City Development Limited
PWD	Public Works Department
RDF	Refuse Derived Fuel
RFP	Request For Proposal
RRP	Resource Recovery Park
SDG	Sustainable Development Goals
SBM-U	Swachh Bharat Mission-Urban
SLAB	State Level Advisory Board
STP	Sewage Treatment Plant
SWM	Solid Waste Management
TDS	Total Dissolved Solids
TPD	Tonne per day
ULB	Urban Local Body
UTP	Union Territory of Puducherry