Chapter IV: Segregation, collection and transportation of waste

This chapter covers status of segregation of solid waste at source, door-to-door collection (DTDC) of solid waste from households and secondary transportation of waste to landfill sites.

Brief snapshot of the Chapter:

- Test-checked ULBs were collecting and transporting mixed waste to the waste processing plant, landfill or dumpsite and no instances of source segregation were found during the public survey of 495 households conducted by audit in the test-checked ULBs.
- In 38 test-checked ULBs (84 *per cent*), Material Recovery Facility centre for sorting of recyclable wastes could not be made functional despite the passage of more than three years since the release of fund.
- Inadequate coverage of DTDC facility for households was noticed in test-checked ULBs. Further, 61 *per cent* respondents of the public survey were not satisfied with DTDC in test-checked ULBs.
- Audit also noticed excess payment/avoidable payments amounting to ₹ 4.06 crore to firms engaged for DTDC in two ULBs. Besides, four ULBs incurred unfruitful/avoidable expenditure of ₹ 58.75 lakh on purchase of bins for collection/secondary storage of waste.
- Weighbridges were not installed at processing facilities/landfill sites to ensure accurate monitoring of transportation and disposal of solid waste by the test-checked ULBs, except in case of three ULBs.
- ULBs were using vehicles without partition/open vehicles for transportation of waste. Further, majority of ULBs were not using GPS technology for tracking of movements of waste transportation vehicles to improve the transportation and collection efficiency.

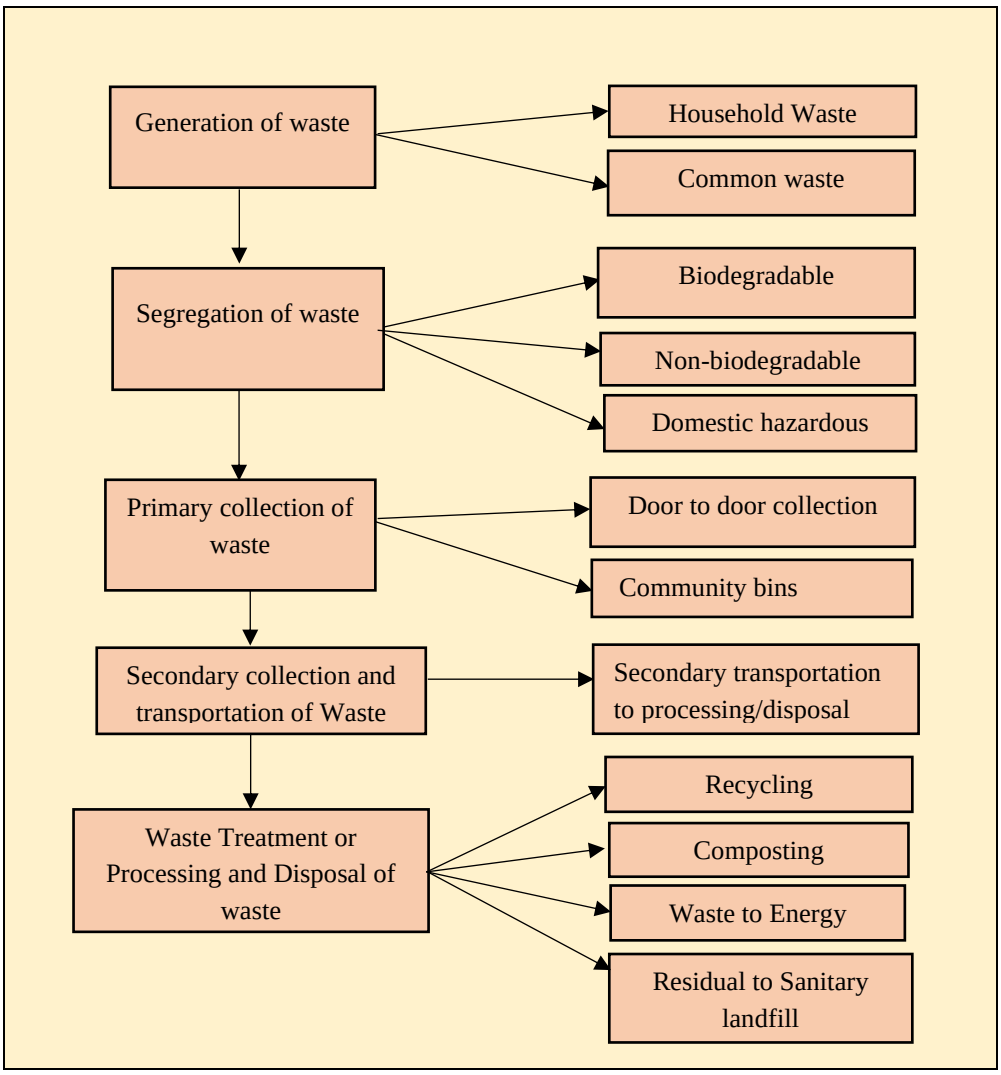
4.1 Segregation

SWM Rules, 2016 has made every waste generator responsible for segregation of waste. Segregation refers to the process of sorting and separating various components of solid waste, *viz*., biodegradable waste or wet waste, non-biodegradable waste or dry waste (including recyclable waste, combustible waste, sanitary waste, and non-recyclable inert waste), domestic hazardous waste, e-waste and construction and demolition waste.

Collection of segregated municipal waste is an essential step in Municipal Solid Waste Management (MSWM). Waste collection services are divided into primary and secondary collection. Primary collection refers to the process of collecting, lifting and removal of segregated solid waste from source of its generation. Secondary collection includes picking up waste from community bins, waste storage depots or transfer stations and transporting it to waste processing sites or to the final disposal site.

The process of SWM is detailed in **Chart 4.1**:

Chart 4.1: Process of SWM



(Source: SWM Rules, 2016 and MSWM Manual 2016)

4.1.1 Segregation of waste

Rule 4 (a) of SWM Rules 2016 stipulates that every waste generator shall segregate and store the waste generated by them into three separate streams, *viz*., biodegradable, non-biodegradable and domestic hazardous waste (DHW)[1], using suitable bins. Rule 15 (i) of SWM Rules 2016 stipulates that ULBs shall establish waste deposition centres for domestic hazardous waste and direct waste generators to deposit DHW at these centres for safe disposal.

As per information provided by 44 out of 45 test-checked ULBs during the performance audit, waste was not being segregated at source by households/generators in separate bins for biodegradable, non-biodegradable and DHW, whereas one ULB (NN Lucknow) informed that

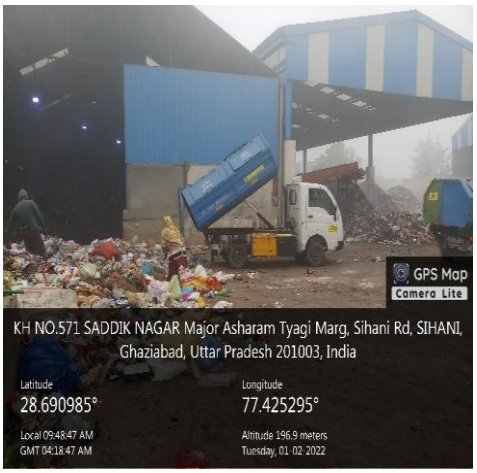
[1] DHW includes discarded paint drums, pesticide cans, CFL bulbs, tube lights, expired medicines, broken mercury thermometers, used batteries, used needles, gauge and syringes, *etc.* generated at the household level.

waste was partly segregated at source. Audit further noticed that 12 test-checked ULBs had distributed bins for encouraging household for source segregation of wastes whereas no such effort was made by 22 ULBs and remaining 11 ULBs did not provide related information to Audit. Further, waste deposition centres for DHW were not set up in any of the test-checked ULBs.

In the Joint Physical Verification of 45 test-checked ULBs, audit noticed that test-checked ULBs were collecting and transporting mixed waste including DHW to waste processing plants, landfill or dumpsites. Further, in public survey involving 495 HHs conducted in test-checked-ULBs, audit noticed that 32 *per cent* respondents did not use dustbin for storing waste whereas no instance of source segregation was found. Thus, there was no monitoring to ensure collection of segregated waste at source. Some instances are indicated in the following photographs:

Photograph 4.1

Unsegregated waste was being dumped at solid waste processing plant site in Lucknow



Unsegregated waste was being dumped at Material Recovery Facility (MRF) centre in Ghaziabad

Domestic hazardous waste segregated at MRF centre from mixed waste transported in NP Saidpur Ghazipur

Domestic hazardous waste segregated at MRF centre from mixed waste transported in NP Khanpur Bulandshahr

In reply (June 2023), the State Government stated that all ULBs have been funded to procure collection and transportation vehicles equipped with

different components for collecting segregated waste. To improve and ensure 100 *per cent* segregated waste collection, a State-wide campaign based on persuasion and penalties had been launched. State Government further stated that Ghaziabad Nagar Nigam (GNN) was making continuous effort for source segregation of waste through IEC activities, school programmes, rallies on days of national importance, *etc*. It further stated that segregation is a civic responsibility and it failed whenever some households during the process of door-to-door collection mix the waste in segregated waste. In respect of DHW, State Government stated that DHW collected was being stored at the MRF centers in two[2] ULBs whereas collection of DHW was being ensured at household level through additional bins attached to DTDC vehicles in GNN.

Fact remains that concerted efforts for educating waste generators is required through IEC for behavioural changes to ensure source segregation of waste. Further, failure of ULBs to frame and implement SWM bye-laws also led to non-levy of penalty for violation of SWM Rules, 2016 regarding source segregation of waste.

4.1.2 Status of establishment of Material Recovery Facility (MRF) centre

As per clause 15(h) of SWM Rules 2016, it is the duty and responsibility of the local authority to establish MRF centre or secondary storage facilities with sufficient space for sorting recyclable materials. These facilities should enable informal or authorized waste pickers and waste collectors to separate recyclables from the waste. MRF centre should also provide easy access for waste pickers and recyclers to collect segregated recyclable waste, such as paper, plastic, metal, glass and textile either from the source of generation or from MRF centre itself.

Audit observed that SMD had released funds amounting to ₹ 247.48 crore[3] to 734 Urban Local Bodies (ULBs) for the construction of 735 MRF centres[4] under SBM (Urban) scheme. Additionally, ₹ 83.35 crore was released (November 2021) to 491 ULBs for the procurement of machinery, such as weighing scale machines, conveyor belts, shredders, *etc.*, for the operation of MRF centres. However, out of these, civil work was not commenced for 124 MRFs centre whereas 127 MRF centres were under construction. In case of 439 MRF centres, civil work was completed but these MRF centres were not functional. Further, as per information provided by SMD, only 45 MRF centres were functional[5] in the State,

[2] NPP Bulandshahr and NP Khanpur (Bulandshahr).

[3] ₹ 219.5284 crore was released to 651 ULBs in August 2019 and ₹ 27.95 crore was released to 83 ULBs in November 2021.

[4] Amount released to NN Prayagraj and NP Jhunsi for establishment of MRF centres while later NP Jhunsi was merged with NN Prayagraj.

[5] List of 45 functional MRF centres provided by SMD included five MRF centres in five test-checked ULBs. However, audit noticed that MRF centres in only two ULBs (NN Kanpur and NN Lucknow) out of these five test-checked ULBs were functional. Remaining three MRF centres in NN Ghaziabad, NP Jewar GB Nagar and NP Saidpur Ghazipur were yet to be made functional as detailed in *Appendix 4.1*.

where sorting of recyclable waste/material was being carried out as of March 2022.

SMD informed (March 2024) that utilization certificates are submitted by ULBs after consolidating expenditures from various sub-components of SWM, therefore, it was not possible to provide information of the funds utilised for the civil construction of MRF centres separately. As a result, utilization status of fund released for establishment of MRF centres in the State could not be examined in Audit.

Stages of MRF centres such as availability of land, status of construction, purchase and installation of machinery and functional position, *etc.*, in 45 test-checked ULBs are detailed in ***Appendix 4.1*** and summarised in **Table 4.1**.

Table 4.1: Status of establishment of MRF centres in test-checked ULBs as on March 2022*

Sl. No.	Description	No of ULBs	Name of ULBs
1	Land not available for construction of MRF centre	5	NPPs: Chitrakootdham Karwi Chitrakoot, Raebareli. NPs: Jarwal (Behraich), Bakewar (Etawah), Chitbaragaon (Ballia)
2	Land available but civil work not started	3	NPPs: Utraula (Balarampur), Ramnagar (Varanasi). NP: Katra (Shahjahanpur)
3	Civil work in progress	8	NPPs: Etah, Shamli, NPs: Bithoor (Kanpur Nagar), Bilsanda (Pilibhit), Jhalu. (Bijnor), Anandnagar (Maharajganj), Reoti, (Ballia), Rajapur (Chitrakoot)
4	Construction work started but was stopped	3	NPPs: Dataganj (Budaun), Sikandra Rao (Hathras), Loni (Ghaziabad).
5	Civil work completed but machinery was not purchased	12	NN: Ghaziabad; NPPs: Mahoba, Hathras, Pilibhit Shahabad (Hardoi), Baheri (Bareilly), Muzaffarnagar, Auraiya, NPs: Saidpur (Ghazipur), Rudhauli Bazar (Basti), Kulpahar (Mahoba) Jahanabad (Pilibhit).
6	Civil work completed and machinery purchased but not installed	2	NPP: Deoria; NP: Baldeo (Mathura)
7	Civil work completed and machineries were installed but MRF centre was not functional	5	NPP: Mahmudabad (Sitapur), NP: Khanpur (Bulandshahr) Jewar (GB Nagar), Sahaspur (Bijnor), Tikri (Bagpat)
8	Functional MRF centre	7	NNs: Lucknow, Kanpur; NPP: Deoband (Saharanpur), Bulandshahr NP: Kaptanganj (Kushinagar), Usawan (Budaun), Jiyanpur (Azamgarh)

(Source: Information provided by test-checked ULBs)

** Status updated as per State Government reply (June 2023) and information received (July 2024) from ULBs.*

In reply (June 2023), the State Government provided status of establishing MRF centres in 14 ULBs and further updated information was received (July 2024) from ULBs according to which seven MRF centres were functional.

Thus, despite the passage of more than three years since the release of funds, MRF centres in 38 test-checked ULBs could not be made functional.

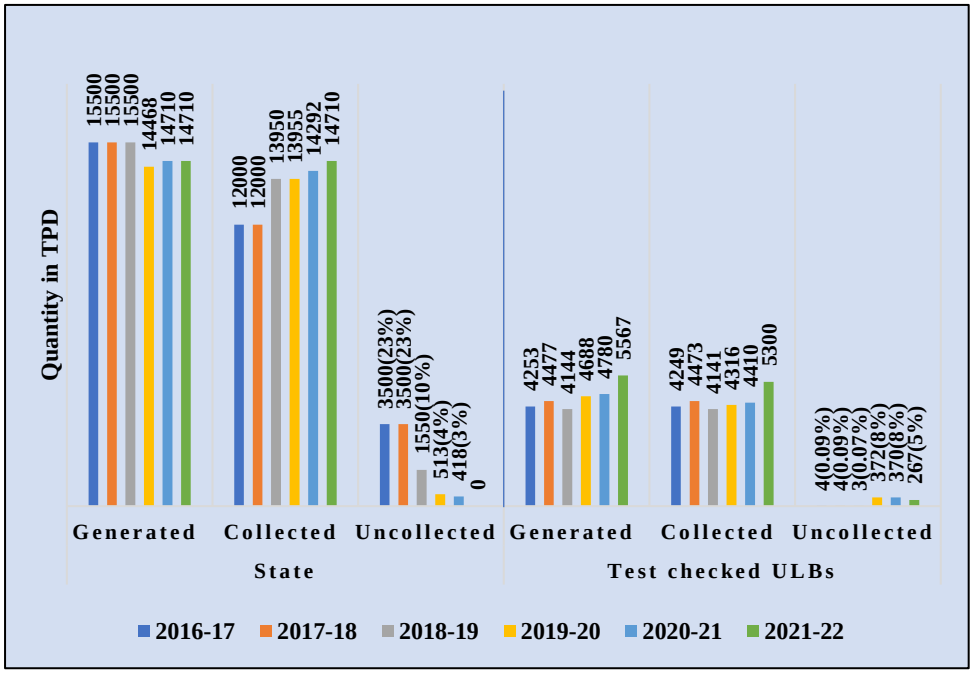
4.2 Collection

Section 2.3.2 of the MSWM Manual 2016 stipulates that the collection of segregated municipal waste is a crucial step in Municipal Solid Waste Management (MSWM). Inefficient waste collection services can have negative impacts on public health and the aesthetics of towns and cities. The separate collection of wet, dry and domestic hazardous waste enables maximum recovery of recyclables. It also enhances the potential for cost-effective treatment of such waste.

4.2.1 Status of waste collection

The quantum of waste generated and collected during the period 2016-22 in the State and in the test-checked ULBs is detailed in **Appendices 4.2 (A)** and **4.2 (B)** and also depicted in **Chart 4.2**.

Chart 4.2: Quantum of waste generated and collected in the State and the test-checked ULBs during 2016-22



(Source: Information provided by Director LB and test-checked ULBs)

Chart 4.2 indicates that the collection of generated waste in the State had improved over the years between 2016-22. However, as discussed in Paragraph 2.6, the data on generation of waste was not reliable as ULBs forecasted similar figures of waste generation over multiple years. In test-checked ULBs, the data on waste generation and collection were same in

41 out of the 45 test-checked ULBs (excluding NN Kanpur, NPP Bulandshahr, NP Katra, Shahjhanpur, and NP Bilsanda, Pilibhit) in the year 2021-22, as detailed in ***Appendix 2.2*** and ***Appendix 4.2(A)***. Further, the public survey carried out during the performance audit revealed that 46 *per cent* of households were not provided door-to-door waste collection facility. Thus, the data provided by the State Government and test-checked ULBs on waste collection was not realistic.

In reply (June 2023), State Government stated that all ULBs had been funded for purchasing collection and transportation vehicles. However, the reply did not address the audit observation on unreliable data on waste collection.

4.2.2 Absence of weighbridge

According to section 1.4.3.3.1 of the MSWM Manual 2016, waste generated from households, markets and other commercial establishments and institutions should be quantified. The entire waste collected from the city should be weighed at weighbridges established at transfer stations or along the route to processing and disposal facilities.

Audit observed that out of 45 test-checked ULBs, only five[6]ULBs had weighbridges for weighing the waste. Additionally, the ULBs did not quantify the collected waste based on the volume of the vehicle multiplied by the number of trips made per day. Due to absence of weighbridges, the authenticity of the quantity of waste transportation and disposal provided by ULBs could not be verified during the audit.

In reply (June 2023), the State Government stated that weighbridges were being installed at all processing facilities to ensure accurate monitoring. State Government further stated that Form IV reports[7] were prepared using CPHEEO norms for per capita waste generation based on proven studies.

The reply is not acceptable, as waste collection data should be based on weighing of actual collection rather than on waste generation norms as per CPHEEO guidelines.

4.2.3 Door-to-door collection (DTDC) of waste

Rule 15 (b) of the SWM Rules 2016 stipulates that the local authorities are responsible for arranging DTDC of segregated solid waste from all households, including slums and informal settlements, as well as commercial, institutional and other non-residential premises. In the case of multi-storied buildings or apartments, large commercial complexes, malls, housing complexes, *etc.*, the waste may be collected from the entry gate or any other designated location.

Ten[8] out of the 45 test-checked ULBs had partially outsourced DTDC services. In public survey involving 495 HHs conducted in test-checked

[6] In NN Lucknow, NN Kanpur NN Ghaziabad, NPP Muzaffarnagar (non-operational) and NPP Raebareli (non-operational).

[7] Annual report on SWM to be submitted by ULBs.

[8] NN Lucknow, NN Kanpur, NN Ghaziabad, NPP Raebareli, NPP Muzaffarnagr, NPP Baheri, NPP Loni, NPP Hathras, NPP Shamli and NPP Mahoba.

ULBs, audit noticed that 61 *per cent* respondents were not satisfied with DTDC in test-checked ULBs indicating insufficient service by these ULBs. Audit observations on DTDC of waste in test-checked ULBs are discussed in succeeding paragraphs.

4.2.3.1 Inadequate coverage of DTDC facility

Nagar Nigam Lucknow

Audit observed that in March 2017, a tripartite agreement was executed among NN Lucknow, Construction and Design Services (C&DS) Jal Nigam and M/s Eco Green Private Limited for DTDC, transportation and processing of waste in Lucknow city. The firm was to receive a tipping fee of ₹ 1,604 per metric ton[9] for the services. However, as per information provided by NN Lucknow, all households in the city were not covered by the DTDC facility during 2017-22 (***Appendix 4.3***). The coverage of households under DTDC ranged improved from 47 *per cent* in 2017-18 to 79 *per cent* in 2021-22. Thus, 21 *per cent* of households in the city were deprived of the DTDC facility as of March 2022.

In reply (July 2023), the State Government stated that as per the concessionaire agreement, the concessionaire was supposed to cover 100 *per cent* households, but due to failure of the concessionaire in performing the duties, legal action is taken against the concessionaire. State Government further stated that the new plan for DTDC is ready.

Fact remains that DTDC was not fully covered in the city.

Nagar Nigam Kanpur

NN Kanpur selected (October 2016) M/s JTN Service Private Limited, Kanpur for DTDC services to 5.22 lakh households across 110 wards in six zones of Kanpur city. However, audit observed that DTDC service was only partially covered in certain wards during the period from 2017 to 2022. DTDC coverage was in 75 wards (68 *per cent*) during 2017-18, 74 wards (67 *per cent*) during 2018-19, 77 wards (70 *per cent*) during 2019-20, 66 wards (60 *per cent*) during 2020-21 and 44 wards (40 *per cent*) during 2021-22. Thus, the firm did not provide DTDC services in 30 to 60 *per cent* of the wards during the period from 2017 to 2022.

In reply (June 2023), the State Government stated (June 2023) that presently for the year 2022-23, DTDC was being done in 100 *per cent* wards. State Government further added that NN Kanpur had issued notices to the firm for partial door-to-door collection in previous years.

[9] ₹ 1,439 per MT for DTDC and ₹ 165 per MT for processing of the waste.

Nagar Palika Parishad Raebareli

According to the records provided by NPP, DTDC of waste in the city was carried out by three firms[10] intermittently during 2016-21[11]. The NPP did not have information regarding the number of households covered by these firms under DTDC. Further, the firms had collected user charges of ₹ 22.19 lakh[12]. NPP stated (February 2022) that user charges were not collected from all households, but NPP was not aware of the number of defaulters. However, all 34 wards were covered under DTDC during 2021-22.

In reply (June 2023), the State Government stated that DTDC facility is provided in all 34 wards. State Government further stated that user charges were collected from households by the firm and deposited in NPP accounts which was returned to the firm for expenditure in DTDC and IEC work.

The reply is not acceptable, as NPP Raebareli did not ensure coverage of all households under DTDC during 2016-21. The NPP did also not monitor the realisation of user charges for DTDC by private firms engaged for the DTDC service. As a result, NPP was not aware of the actual recovery of user charges by these firms and the number of defaulting households from whom the outstanding user charges could not be recovered.

Nagar Palika Parishad Muzaffarnagar

Audit noticed that DTDC of waste was not carried out in any of the 50 wards of NPP Muzaffarnagar during the period from 2016 to 2020. For the year 2020-21, an agreement was executed (March 2020) between the NPP and a contractor for DTDC and road cleaning from commercial establishment in the city area. As per the agreement, vehicles for DTDC was to be provided by the NPP and the contractor was to collect user charges from commercial shops/establishment. However, the contractor only partially performed the work in the year 2020-21 as only three vehicles were provided by the NPP and also no user charge was recovered by the contractor. The contractor had stopped work since March 2021.

Additionally, an agreement was executed (June 2020) between the NPP and another contractor for DTDC services in 10 wards of the city. The contractor carried out DTDC in these wards in the year 2020-21 and 2021-22. Thus, no ward in the city was covered under DTDC facility from 2016-20 and households in only 10 out of 50 wards were covered during 2020-22.

[10] M/s Accord Hydro Air Private Limited, M/s Intance Security and Facility Private Limited and M/s Prakriti Paryavarn Sanrakshan Sansthan.

[11] Wards covered: 15 out of 31 wards (48 *per cent*) in 2016-17, 14 out of 31 wards (45 *per cent*) in 2017-18, 20 out of 31 wards (65 *per cent*) in 2020-21 and 34 out of 34 wards (100 *per cent*) in 2021-22.

[12] ₹ 14.12 lakh in 2017-18, ₹ 4.85 lakh in 2020-21 and ₹ 3.22 lakh in 2021-22.

In reply (June 2023), the State Government stated that NPP Muzaffarnagar published a bid for DTDC in 2022-23 on the GeM portal. However, no firm participated in the bidding process.

The fact remains that despite these efforts, DTDC facility was not provided in all wards of the city during the period from 2016-22.

Nagar Palika Parishad Hathras

Municipal Board of NPP Hathras granted (February 2019) administrative and financial approval for DTDC of waste in all 27 wards of the city. Subsequently, an agreement was executed (February 2020) between NPP and M/s Arva Associates Jhansi for DTDC of 27 wards. However, NPP issued (August 2020) work order to the firm for DTDC in 17 wards. As a result, 10 wards of the city remained uncovered by DTDC service. NPP did not provide reason for not covering remaining wards under DTDC.

Audit further observed that the firm submitted monthly bills during October 2020 to March 2022 claiming coverage of varying numbers of households ranging from 16,950 to 19,483 and commercial properties ranging from 4,399 to 5,056. NPP made payments to the firms as per claims submitted in the monthly bills. However, as per information provided (March 2022) by NPP, there were 15,716 households and 2,503 commercial properties in these 17 wards during 2020-21 and 15802 households and 2571 commercial properties in 2021-22. This resulted in an overpayment of ₹ 30.22 lakh to the firm, as detailed in ***Appendix 4.4 (A***).

Further, according to the agreement, the firm was required to collect a minimum of 40 *per cent* of the user charges from serviced households in the first year, with a subsequent 10 *per cent* increase from the second year onwards. Further, NPP was to made payment to the firm based on the bills submitted, covering 60 *per cent* of the charges claimed in the bills plus the actual user charges collected and deposited by the firm. Audit noticed that instead of the mandated minimum collection of ₹ 75.44 lakh, the firm only collected ₹ 12.34 lakh (16 *per cent*) from September 2020 to March 2022. Audit further noticed that payments were made to the firm as per contract in the first year. However, during the second year, the NPP deducted only 40 *per cent* from the bills submitted by the firm instead of required deduction of 50 *per cent*. This led to an overpayment of ₹ 7.29 lakh between September 2021 and March 2022 as detailed in ***Appendix 4.4 (B)***.

In reply (June 2023), the State Government stated that verification of residential/commercial properties were carried out by the firm in supervision of Sanitary Inspector/Safai Nayak.

Reply is not tenable, as payment was made for higher number of HHs/commercial establishments as per details of HHs/commercial properties provided by NPP to audit. Further, payment during the second year was not made after required deduction for adjustment of higher mandatory collection of user charges.

4.2.3.2 Avoidable payment of ₹3.68 crore due to over provisioning of vehicles and sweepers for DTDC in NPP Loni

Section 2.3.5, Table 2.3 of MSWM Manual, 2016 states that one light commercial vehicle (LCV) can cover 1,000 households (in case LCV having 500 to 700 kg capacity) or 1,500 to 2,000 households (in case LCV having more than 700 kg capacity) with one driver and two helpers. Based on this parameter, State Government had also delineated (August 2019) that on an average, LCV can cover 1,200 to 1,500 households.

NPP Loni entered into an agreement (August 2018) with a firm, M/s Aryan Group of Guard Services, Lucknow for DTDC in all wards with an agreed monthly payment of ₹ 1.54 crore. According to the firm's accepted proposal[13], 33,000 households were supposed to be covered using 55 TATA Ace tippers with one driver and three sweepers assigned to each tipper. The payment rates for the tipper, driver and sweeper were ₹ 18,000, ₹12,762 and ₹9,162 per month respectively.

The proposal submitted by the firm contradicted the aforementioned prescribed norms in MSWM Manual, 2016, as only 600 households were proposed to be covered using one LCV with one driver and three sweepers against the norms of minimum 1,200 households with one driver and two helpers. However, the NPP did not consider this overestimation of required LCV and manpower while evaluating the proposal from the outsourced firm. Consequently, NPP missed the opportunity to cover an additional 600 households per tipper and an extra sweeper was provisioned for each tipper.

Audit observed that estimated coverage of 33,000 households required 55 tippers, 55 drivers and 165 sweepers as per the accepted proposal of the firm, whereas this could have been covered[14] with only 28 tippers, 28 drivers and 56 sweepers. This excess provision of 27 tippers, 27 drivers and 109 sweepers for the coverage of 33,000 households led to an avoidable payment of ₹ 3.68 crore[15] made by the NPP to the firm for DTDC services between November 2018 and November 2020, as detailed in ***Appendix 4.5(A) and (B)***.

In reply (June 2023), State Government stated that the response of NPP Loni was awaited.

[13] 55 TATA Ace tippers x 3 sweepers =165 sweepers x 200 Households (HHs) = 33,000 HHs; 110 E-Rickshaw trolley x 2 sweepers = 220 sweepers x 200 HHs = 44,000 HHs; 13 tractor trolley x 10 sweepers = 130 sweepers x 200 HHs = 26,000 HHs (Total 1,03,000 HHs).

[14] Required number of tippers= (No of HHs/HHs covered with each tipper) = 33000/1200 =28; Drivers = 28 and sweepers= 28 x 2 sweepers per tipper = 56.

[15] Sum of excess payment of ₹ 98.46 lakh on hiring tippers and excess payment of ₹ 269.23 lakh on excess deployed manpower.

4.2.4 Irregularities in purchase of community bins/storage bins

Audit observed that test-checked ULBs purchased bins for collection of wastes and secondary storage of waste in which following irregularities were noticed:

4.2.4.1 Unfruitful expenditure on purchase of twin bin in Nagar Palika Parishad Dataganj Budaun

SMD (SBM) sanctioned (October 2018) procurement of 250 green and blue color twin bin dustbins with stand and released ₹13.13 lakh to NPP Dataganj Budaun. These dustbins were intended for separate collection of wet and dry waste from households and commercial establishments.

Audit observed that NPP Dataganj Budaun placed supply order (January 2020) for 250 dustbins to M/s Capital Reseller Kasganj through GeM portal. The supply of 188 dustbins was received in March 2020. NPP released (April 2020) payment of ₹ 12.78 lakh to the firm after the supply was certified (April 2020) as satisfactory by Junior Engineer, Construction Division, Public Works Department Budaun and Jalkal Abhiyanta, NPP Budaun. However, the supplied dustbins were found to be of substandard quality in an enquiry conducted (January 2021) on the direction of District Magistrate (DM) Budaun following a complaint (May 2020) regarding the supply of substandard dustbins in the NPP. Subsequently, with reference to the directions (January 2021) of DM Budaun, Executive Officer, NPP Dataganj issued (January and May 2021) notices to the responsible officers and the firm to deposit ₹ 12.78 lakh[16] in the NPP's bank account in view of supply of substandard dustbins. However, as of June 2023, the amount had not yet been deposited.

Audit further noticed that the purchased dustbins were not used and these were dumped in an open area on the office roof leading to their deterioration and rusting as depicted in the following photographs:

Photograph 4.2

Dustbins lying on the roof of the office of NPP Dataganj Budaun

[16] M/s Capital Reseller: ₹ 6,39,200; Junior Engineer, Construction Division, PWD Budaun: ₹ 4,79,400 and Jalkal Abhiyanta, NPP Budaun: ₹ 1,59,800.

Thus, expenditure of ₹ 12.78 lakh on purchase of twin bin dustbins in Nagar Palika Parishad Dataganj Budaun remained unfruitful.

In reply (June 2023), the State Government and the NPP acknowledged that 170 dustbins were not used so far and recovery for purchase of substandard dustbins was pending.

4.2.4.2 Unwarranted procurement of storage dustbins

Section 2.3.12 of the MSWM Manual 2016 outlines indicative models for the deployment of different equipment and vehicles based on the quantity of Municipal Solid Waste (MSW) as shown in Tables 2.4 and 2.5 of MSWM Manual, 2016. According to these tables, ULBs with a population of up to 1,00,000 should procure three to four cubic meter containers for secondary collection of waste. These containers should be provided at a rate of four per square kilometer of area or one per 5,000 population.

Audit observed that NP Chitbaragaon Ballia, NP Reoti Ballia and NPP Hathras did not adhere to the aforementioned guidelines for procurement of storage bins for secondary collection which led to avoidable expenditure of ₹ 45.97 lakh, as discussed below.

- NP Chitbaragaon Ballia purchased (May 2020) 15 metal bins with a capacity of 4.5 cubic meters, which was in excess of the required five bins according to the norms delineated in Section 2.3.12 of the MSWM Manual 2016. Similarly, NP Reoti Ballia purchased (December 2019 and April 2020) 18 bins exceeding the required six bins. As a result, an avoidable expenditure of ₹ 24.52 lakh was incurred on the excess purchase of bins as detailed in ***Appendix 4.6***. Further, the NP Reoti Ballia did not have motorised vehicle to handle this bin, raising question on its use for the intended purpose.

In reply (June 2023), the State Government stated that NP Reoti Ballia required extra secondary dustbins with compare to MSWM Manual 2016 due to limited availability of land for secondary waste collection.

The reply was not acceptable, as the waste generation depends on population and criteria for the number of secondary dustbins has been given in MSWM Manual 2016 considering population in a city.

- The estimated population of NPP Hathras was 1.58 lakh in the year 2021. As per the norms delineated in Section 2.3.12 of the MSWM Manual 2016, 32[17] bins of 3-4 cubic meter capacity were required to accommodate estimated waste generated by the current estimated population. Audit noticed that NPP had purchased 170[18] metal bins with a capacity of 1.1 cubic meters during 2019-21. Thus, the total available capacity of storage dustbin in the NPP was 84.15 metric tons[19] which was

[17] Required bins=158461/5000= 32 Nos.

[18] 120 bins purchased in 2019-20 and 50 purchased in 2020-21.

[19] Total available capacity=170 x 1.1 cum = 187 cum = 187 x 0.450 MT/cum = 84.15 MT (assuming the density of solid waste 450 Kg/cum as per MSWM Manual, 2016).

261 *per cent* of 32.25 metric tons per day solid waste being generated in the NPP during 2020-21 and 114 *per cent* of 74 metric tons per day solid waste being generated in the NPP during 2021-22. Despite this, NPP purchased (March 2022) additional 25 metal bins with a capacity of 4.5 cubic meters each at a cost of ₹ 21.45 lakh, which could have been avoided.

In reply (June 2023), State Government stated that the population of NPP increased in 2021 due to delimitation, which resulted in an increase in waste generation and the need for additional bins. State Government further stated that NPP Hathras purchased 4.5 cubic meter bins due to lack of awareness of the rules and such occurrences would be avoided in the future.

The reply is not acceptable, as the delimitation of NPP Hathras was notified by the State Government in November 2022[20] whereas the additional secondary storage bins were purchased in March 2022. Thus, the reply of NPP Hathras was an afterthought.

4.3 Transportation

Transportation of waste plays a vital role in SWM services. Depending on the local conditions and location of landfill site, ULBs use different types of vehicles, such as pushcarts, auto tippers, tractors, tipper trucks and compactors for collection and transportation of waste.

4.3.1 Use of vehicles without partition/open vehicles for transportation of municipal solid waste

Source segregation is considered successful only when the segregated waste streams remain separate throughout the entire transportation process, whether directly to the processing or disposal facility or through a transfer station. Additionally, Section 2.3.2 of MSWM Manual, 2016 specifies that vehicles used for waste transportation should be covered to prevent waste from being visible to the public and equipped with measures to prevent waste spillage.

Audit observed that out of the 1,659 tippers used for waste collection in the test-checked ULBs, only 1,118 tippers (67 *per cent*) had partitions for the collection of segregated waste as detailed in ***Appendix 4.7***. Additionally, these ULBs utilised 362 tractors for waste collection and transportation, out of which 324 tractors were lacking partitions and 334 tractors were uncovered. The mixed waste was being transported by open vehicles as shown in the following photographs, thereby defeating the very purpose and the entire exercise of waste segregation.

[20] *vide* notification No /9-1-2022-56 Pari./22 dated 04 November 2022 issued by Urban Development Department.

Photograph 4.3

NPP Chitrakootdham Karwi Chitrakoot

NN Ghaziabad

4.3.2 Use of transportation vehicles without authorisation

Rule 39, 56, and 146 of the Motor Vehicle Act specify that all motor vehicles must possess a registration certificate, a fitness certificate, and valid insurance for their operation.

Information furnished by 45 test-checked ULBs ***(Appendix 4.8)*** as of March 2022 showed that vehicles used for transportation of MSW were deficient in:

(i) **Fitness certificate from Regional Transport Office (RTO)** - Out of 2350 vehicles, 1620 vehicles (69 *per cent*) were without fitness certificate; and

(ii) **Registered vehicles from RTO** – 529 (23 *per cent*) were not registered with RTO; and

(iii) **Valid insurance for the vehicles** – 1441 (61 *per cent*) vehicles were without valid insurance.

Thus, ULBs were found to be using vehicles for SWM purposes without fitness certificates (69 *per cent*), registration (23 *per cent*) and insurance (61 *per cent*) indicating a general lack of internal control on the part of test-checked ULBs. These deficiencies underscore the absence of an internal control mechanism within the department and a violation of the Motor Vehicle Act.

4.3.3 Monitoring of transportation vehicles

MSWM Manual, 2016 stipulates that communication technologies, such as the global positioning system (GPS), should be integrated into the monitoring of the SWM system.

Information provided by the test-checked ULBs revealed that out of the 2350 transportation vehicles in 45 test-checked ULBs, 1677 vehicles (71 *per cent*) were equipped with GPS devices in 12 ULBs (27 *per cent* ULBs) as detailed in ***Appendix 4.9***. In case of NN Kanpur, all 178 vehicles were GPS enabled. However, test-checked ULBs, except NN Ghaziabad and NN Lucknow, did not provide documentary evidence, such as

monitoring reports, to the audit in support of the effective monitoring of the GPS system installed on vehicles.

Audit further noticed that in NPP Etah, 50 GPS devices were procured (July 2020) at a cost of ₹ 4.14 lakh, but these devices were not installed in the transportation vehicles and were lying in store. As a result, NPP was not tracking waste transportation vehicles despite GPS devices.

In reply (June 2023), the State Government stated that installation of GPS devices were in progress in NPP Etah. State Government further informed that NN Lucknow, NN Kanpur, NN Ghaziabad, NPP Deoband Saharanpur, NPP Sahabad Hardoi, NPP Utraula Balarampur and NP Kaptanganj Kushinagar had GPS enabled vehicles which were monitored.

Fact remains that even as per reply of the State Government, GPS devices were installed in vehicles of only 11 ULBs, partially installed in vehicles of two ULBs and not installed in any vehicles of 18 ULBs, whereas the remaining 14 ULBs did not provide the status of GPS enabled vehicles. Thus, majority of ULBs were not using communication technology for tracking of movements of waste transportation vehicles to improve the transportation and collection efficiency.

4.3.4 Erroneous gap analysis for assessment of Vehicles

4.3.4.1 Erroneous gap analysis of vehicles for primary transportation at SMD level

Section 2.3.12, Table 2.5 of the MSWM Manual 2016 specifies that 75 *per cent* of DTDC should be carried out using LCV and the remaining 25 *per cent* should be done using tricycles based on the specified criteria[21].

During the year 2019-20, SMD carried out a gap analysis of transportation vehicles in ULBs to assess the current vehicle requirements. Audit observed that the gap analysis for tricycles and LCV in seven out of the 45 test-checked ULBs was incorrect as detailed in ***Appendix 4.10***, as the existing infrastructure during 2018-19 in these ULBs was not taken into consideration for the gap analysis. As a result, SMD had made excess provision for tricycles and LCV ranging from 12 *per cent* to 252 *per cent* and 55 *per cent* to 182 *per cent* respectively. Audit further noticed that out of these seven ULBs, there were excess number of LCVs in six ULBs ranging from 87 *per cent* to 173 *per cent* and excess number of tricycles in two ULBs ranging from 82 *per cent* to 117 *per cent* as of March 2022, as detailed in ***Appendix 4.11***. During the JPV, two out of the 15 LCVs purchased (March 2020) in NPP Sahabad Hardoi were not being used and were kept idle in the NPP premises.

In reply (June 2023), the State Government stated that the additional tippers were being used to transport waste collected by rickshaws to the processing site. State Government further stated some ULBs were funded for extra rickshaws on their demand as they had more narrow lanes than

[21] Section 2.3.5, Table 2.3 of MSWM Manual, 2016 provides estimated population expected to be served using various types of DTDC vehicles.

average. However, the reply does not address the issue of erroneous gap analysis without taking into account existing number of vehicles in ULBs.

4.3.4.2 Erroneous gap analysis for estimation of vehicles for secondary transportation

As per Section 2.3.12, Table 2.4 and Table 2.5 of MSWM Manual, 2016, a refuse compactor should be used for the secondary transportation of waste in ULBs with a population of more than one lakh.

Audit observed that in three[22] out of 45 test-checked ULBs with a population less than one lakh, SMD released fund for one refuse compactor in each ULB at the rate of ₹ 30.00 lakh per compactor during 2019-20, as detailed in ***Appendix 4.12***. Out of these, two ULBs (NPP Shahabad Hardoi and NPP Sikandara Rao Hathras) purchased compactors at a cost of ₹ 59.76 lakh in March 2020 and January 2021 respectively. Further, in joint physical verification during audit[23], both compactors were found lying unused since their purchase indicating erroneous gap analysis by SMD.

In reply (June 2023), State Government stated that both compactors were being used in ULBs.

The reply is not acceptable, since both ULBs had accepted that compactors were not in use. Further, State Government did not respond to issue raised in the audit observation on sanction and purchase of compactor for ULBs having population less than one lakh.

To sum up, mixed waste including domestic hazardous waste and sanitary waste was collected and transported to the solid waste processing plant, landfill or dumpsite defeating the entire purpose and exercise of waste segregation. Material Recovery Facility centres could not be made functional. The vehicles procured by the ULBs were not suitably designed to collect and transport segregated waste efficiently. Inadequate coverage of door-to-door collection facility for households was noticed in test-checked ULBs.

Recommendation 7: *The State Government should encourage segregation of waste at source by devising a system for incentivising waste generators and collectors for segregation of waste and should prevent mixing of segregated waste during various stages of SWM through strict monitoring and implementation regime.*

Recommendation 8: *Use of Material Recovery Facility centres should be ensured with proper functioning and weighbridge facilities.*

Recommendation 9: *The State Government should ensure that there is proper arrangement for door-to-door collection of solid waste and all the households in the ULBs are covered by door-to-door collection services.*

[22] NPP Shahabad (Hardoi) NPP Sikandara Rao (Hathras) and NPP Utraula (Balrampur).
[23] May 2022 in NPP Sahabad (Hardoi) and March 2022 in NPP Sikandara Rao (Hathras).