

Chapter-3
Collection, Segregation, Storage,
Transportation and Disposal of
Municipal Solid Waste

CHAPTER-3

Collection, Segregation, Storage, Transportation and Disposal of Municipal Solid Waste

On an average, five to eight per cent of the waste generated statewide and eight to 16 per cent in the sampled ULBs remained uncollected. Only 3.13 per cent of the collected waste was segregated in the sampled ULBs. Transfer stations were situated near residential areas, highways, canals, or open grounds. The roles of rag pickers were not officially recognized, and registration processes had not commenced. Only two Sanitary Landfill (SLF) sites were operational, leading to waste being dumped in open sites, primarily located near highways, rivers, or agricultural lands. Sixty four per cent of waste collection vehicles were left uncovered. Analysis of the Service Level Benchmark (SLB) indicators stipulated by the Ministry of Housing & Urban Affairs (MoHUA) showed that in majority of the test checked ULBs, the achievement of the performance indicators was significantly below the fixed targets.

3.1 Collection of Municipal Solid Waste

The unattended waste lying around attracts flies, rats, and other creatures that in turn spread disease. Further, wet waste decomposes and releases a bad odour. This leads to unhygienic conditions and to the health problems. The Sanitary Inspector, Supervisor, Executive Officer, Medical Health Officer/Municipal Commissioner of the respective ULBs were responsible for monitoring of collection and unattended Municipal Solid Waste.

The quantum of waste generated and collected during the period 2017-18 to 2021-22 in the State and in the test checked Urban Local Bodies (ULBs) was as shown in the **Table-3.1** below:

Table-3.1: The status of quantum of waste generated & collected per day in the State and in the test checked 13 ULBs (in Tons Per Day)

Period	In Uttarakhand State			Test checked 13 ULBs		
	Generated	Collected	Uncollected (Percentage)	Generated	Collected	Uncollected (Percentage)
2017-18	1,099.00	1,099.00	00	511.00	428.00	83.00 (16)
2018-19	1,527.46	1,437.40	90.06 (06)	792.00	681.00	111.00 (14)
2019-20	1,610.94	1,481.06	129.88 (08)	833.00	757.00	76.00 (09)
2020-21	1,458.46	1,378.99	79.47 (05)	845.00	762.00	83.00 (10)
2021-22	1,585.39	1,451.59	133.80 (08)	895.00	823.00	72.00 (08)

Source: Information provided by the Department and Uttarakhand Pollution Control Board.

As can be seen from the above table, on an average, five to eight per cent of waste generated was not collected in the State and eight to 16 per cent in the test checked ULBs.

It was stated by the Additional Secretary in the Exit Conference (September 2023) that a plan is being prepared for 100 per cent collection of MSW and it's execution will be ensured in future. The State Government further intimated (December 2023) that

door-to-door collection of solid waste is being done in all 1,242 wards of 102 municipal bodies in the State and source segregation is being done in 1,055 wards.

3.1.1 Door-to-door collection of Solid Waste

Rule 15 (b) of Solid Waste Management Rules 2016 envisages that the local authorities shall arrange door-to-door collection of segregated solid waste from households etc.

Scrutiny of records revealed that in 11 out of 13 test checked ULBs¹, private concessionaires conducted door-to-door collection of solid waste for most of the period during 2017-18 to 2021-22. Review of the functioning of Private Concessionaire revealed following deficiencies:

A) Lack of Source Segregation: Across multiple concession agreements, a common issue was the failure to segregate waste at the source into biodegradable and non-biodegradable waste. Instead, mixed solid waste was collected undermining recycling efforts and overall waste management processes. The same was also confirmed during joint physical verification of door-to-door collection of waste in different ULBs. This can be seen in the following photographs-



Photo-3.1: Door-to-door collection of waste in Nagar Palika Parishad Mussoorie (11 October 2022)



Photo-3.2: Door-to-door collection of waste in Nagar Palika Parishad Tehri Garhwal (03 March 2023)



Photo-3.3: Door-to-door collection of Mixed waste in NN Rudrapur, U.S. Nagar (16 January 2023)



Photo-3.4: Collected door-to-door waste unloaded in dumping ground of NN Rudrapur (16 January 2023)

¹ NP-Naugaon and NP-Agustmuni the collection of waste was done by the ULB officials.



Photo-3.5: Collected door-to-door waste unloaded in vehicle in Nagar Panchayat Swargashram Jonk (11 January 2023)



Photo-3.6: Collected door-to-door waste unloaded in dumping ground of Nagar Panchayat Swargashram Jonk (11 January 2023)

- B) Deficient Monitoring and Reporting:** In various agreements, shortcomings in monitoring and reporting mechanisms were noticed. Project Engineers of NN Haldwani and Dehradun were tasked with overseeing operations. However, Project Engineer of NN Haldwani often failed to produce monthly reports, hindering effective oversight. In addition, irregularities such as incomplete household mapping, lack of vehicle weighing, inconsistent user charge collection and door-to-door collection discrepancies were reported but inadequately address in all test checked ULBs.
- C) Misuse of Funds:** In the case of the MSWM services agreement with the private concessionaire of Nagar Palika Parishad Mussoorie, user charges collected amounting to ₹ 87.46 lakh were not deposited as stipulated in the agreement. Instead, the private concessionaire diverted these funds to address its own financial liabilities, specifically related to Employees Provident Fund (EPF) and Employee State Insurance (ESI).

The above showed that the Private Concessionaires appointed for door-to-door collection of Municipal Solid Waste (MSW) were not working as per the terms of Concession agreements and the waste was being transported to the landfill/dumping sites without segregation.

During Exit Conference (September 2023), the Additional Secretary informed that interface has been developed with ULBs in last three months to ensure coverage of 100 *per cent* wards and notices have been issued to 36 ULBs for failing to cover all wards in door-to-door collection. Further, segregation of MSW was a challenge and efforts will be made to improve the current situation. The State Government further stated (December 2023) that door-to-door collection of 8.7 lakh (95 *per cent*) and source segregation of 6.3 lakh (69 *per cent*) is being done against a total of 9.07 lakh households/ shops/ institutions/ schools etc. in the ULBs. Third party verification of solid waste management works of some selected bodies is proposed to be initiated in the next two-three months to validate the said works being done by the bodies.

While acknowledging government initiatives, the Audit underscores the need for full compliance with SWM Rules and effective enforcement of concession agreements.

3.1.2 Personal protection equipment not used by workers handling solid waste

Rule 15 (zd) of SWM Rules 2016 mandates that the operator of a facility shall provide personal protection equipment including uniform, fluorescent jacket, hand gloves, raincoats, appropriate footwear and masks to all workers handling solid waste. It was the responsibility of the Sanitary Inspector, Supervisor and Medical Health Officer for providing personal protection equipment to workers handling solid waste.

Records in the test checked 13 ULBs revealed as under:

- As of March 2022, uniforms to only 3,647 out of 6,009 persons engaged in waste management had been provided.
- Three ULBs² did not provide any uniform and one ULB³ did not provide any footwear to the waste handlers.

The above findings were corroborated in joint physical verification where workers handling solid waste were found not to be using personal protection equipment except in isolated cases. Results of physical verification can be seen in following photographs:



Photo-3.7: Nagar Palika Parishad Khatima, U. S. Nagar (13 December 2022)



Photo-3.8: Ward No. 08, Nagar Palika Parishad, Mussoorie (13 October 2022)



Photo-3.9: Nagar Palika Parishad-Barkot (02 March 2023)



Photo-3.10: Nagar Palika Parishad Tehri (03 March 2023)

² NPP-Badkot, NPP-Nainital and NP-Naugaon.

³ NPP-Nainital.

While accepting the facts, the Additional Secretary in the Exit Conference (September 2023) stated that instructions will be issued in this regard. The State Government further replied (December 2023) that it is being ensured that Personal Protection Equipment (PPE) kit will be made available to Paryavaran Mitras of all the ULBs.

3.1.3 No system established for inclusion of Informal waste workers

Rag picker's⁴ role in Waste Management -

- i. Role of rag pickers in collection of recyclable and reusable material from source to dumping site reduces the burden of space in dumping site and passively reduces the amount of carbon and resources in undesirable shape.*
- ii. The removal of waste material from roads and other localities makes a clean neighbourhood.*
- iii. These wastes can be reused for other purposes or they can be melted and recycled into something new.*
- iv. Rag picker checks on the accumulation of wastes in an area, thus having a check on it becoming the breeding ground for disease-causing such as mosquito, flies etc.*
- v. Rag pickers separate the biodegradable & non-biodegradable wastes.*

Rule 15 (c) of SWM Rules 2016 describes to establish a system to recognise organisations of waste pickers or informal waste collectors and promote and establish a system for integration of these authorised waste-pickers and waste collectors to facilitate their participation in solid waste management including door-to-door collection of waste. The responsibility for recognition of informal waste workers lies with Sanitary Inspector, Supervisor and Medical Health Officer. Executive Officer, Medical Health Officer/ Municipal Commissioner were responsible for authorisation of waste collectors in the respective ULB. Records of test checked ULBs revealed that in two⁵ out of 13 ULBs the Self-Help Group (SHG) were registered and waste pickers of these SHGs were involved in segregation of MSW at transfer stations/dump sites. In rest of the 11 test checked ULBs, neither the roles of rag pickers were recognised nor the registration process had been started.

During physical verification of the transfer station/dump site in ULBs where waste pickers were involved, the waste pickers were working without using safety equipment. (Photo 3.11).

While accepting the facts, the Additional Secretary said in the Exit Conference (September 2023) that efforts will be made for inclusion of informal waste workers within a year and instructions will be issued in this regard.



Photo-3.11: Rag pickers in dumping site of Nagar Nigam Haldwani (14 December 2022)

⁴ A rag picker is a person who collects wastes in a bag from the dumpsite, street and locality such as polythene bags, toothbrushes, used plastic items, empty tins, bottles, papers etc.
⁵ NPP-Mussoorie, NN- Haldwani.

The State Government further stated (December 2023) that it is being ensured that rag pickers are identified in Urban Local Bodies and formally included in the Solid Waste Management Action Plan.

While acknowledging recent governmental initiatives, the Audit emphasizes the urgency of streamlining the recognition and registration process for rag pickers.

3.2 Segregation of Municipal Solid Waste

"Segregation" means sorting and separate storage of various components of solid waste namely biodegradable wastes including agriculture and dairy waste, non-biodegradable wastes including recyclable waste, non-recyclable combustible waste, sanitary waste and non-recyclable inert waste, domestic hazardous wastes and construction and demolition wastes.

SWM Rules 2016 envisage that every waste generator shall segregate and store the waste generated by them in three separate streams namely bio-degradable, non-bio-degradable and domestic hazardous wastes and handover segregated wastes to authorised waste pickers. Further, the Service Level Benchmarks (SLB) recommended by GoI envisage that the extent of segregation of Municipal Solid Waste should be 100 per cent. The Sanitary Inspector, Supervisor, Executive Officer and Medical Health Officer/Municipal Commissioner of the respective ULB were responsible for monitoring of segregation at source and transfer station of Municipal Solid Waste.

The details of total waste collected and waste segregated at various stages for the period from 2017-18 to 2021-22 in test checked ULBs is shown in the **Table-3.2** below:

Table-3.2: Details of Segregation of MSW in test checked ULBs (in MT)

Year	Collected ⁶	Segregated				Mixed Waste deposited in Landfill/dumping site ⁷
		At source	At transfer station	At processing/landfill site	Total	
2017-18	1,56,106	18	2,190	2,346	4,554	1,51,552
2018-19	2,48,529	59	1,460	6,381	7,900	2,13,433
2019-20	2,76,269	164	2,154	4,783	7,100	2,07,176
2020-21	2,78,276	219	2,154	8,455	10,828	2,25,686
2021-22	3,00,286	697	2,193	6,111	9,001	2,36,119
Total	12,59,466	1,157 (0.09)	10,151 (0.81)	28,076 (2.23)	39,382 (3.13)	10,33,966

Source: Information provided by the ULBs.

It is clear from above Table that only 3.13 per cent (0.09 per cent at source, 0.81 per cent at transfer station, 2.23 per cent at processing station) of collected waste was segregated in test checked ULBs against the requirement of 100 per cent.

While accepting the facts, the Additional Secretary stated in the Exit Conference (September 2023) that segregation is a big challenge for them and efforts will be made to improve the current situation. Further, the State Government stated (December 2023)

⁶ Collected Waste was of 13 test checked ULBs. However, Segregated Waste- 0.39 lakh MT, Mixed Waste-10.34 lakh MT includes data of three non-test checked ULBs i.e. NPP-Herbertpur, NPP-Vikas Nagar & NP-Selaqui which was received at SLF Dehradun for disposal. SLF Dehradun shows 2.35 lakh MT of waste as Dries.

⁷ Mixed waste shown in above table includes 2.23 lakh MT of Refused Derived Fuel (RDF) of Nagar Nigam Dehradun, which was dumped at the landfill site.

that to validate their efforts done by the ULBs a third-party verification of solid waste management works of some selected bodies is proposed to be initiated in the next 2-3 months. Extensive publicity is constantly done for public participation and public co-operation for source segregation.

3.3 Storage of Municipal Solid Waste

Rule 15 (h) SWM Rules 2016 describes to setup material recovery facilities or secondary storage facilities with sufficient space for sorting of recyclable materials to enable informal or authorised waste pickers and waste collectors to separate recyclables such as paper, plastic, metal, glass and textile from the waste. For identification, procurement and setting up of transfer stations in the respective ULB the Municipal Commissioner, Executive Officer and District Magistrate were responsible.

3.3.1 Establishment of Transfer stations

Records revealed that there were Secondary Storage⁸/transfer stations⁹ in only four¹⁰ out of 13 test checked ULBs. The physical verification of the transfer stations in said four ULBs revealed as under:

- Transfer stations were set up near the residential areas, National Highways, Canals and in open grounds of the ULBs (Photo 3.12 to 3.19).
- Weigh bridge machine was available only in NN Dehradun for small vehicles.



Photo-3.12 Secondary Storage facility in open place near National Highway at Kargi, Nagar Nigam Dehradun (29 October 2022)



Photo-3.13: Geo tagging of Secondary Storage facility in open place near National Highway in Kargi, NN Dehradun (27 March 2023)

⁸ **"Secondary storage"** means the temporary containment of solid waste after collection at secondary waste storage depots or MRFs or bins for onward transportation of the waste to the processing or disposal facility.

⁹ **"Transfer station"** means a facility created to receive solid waste from collection areas and transport in bulk in covered vehicles or containers to waste processing and, or disposal facilities.

¹⁰ Three in NN Dehradun, Four in NN, Haridwar, Seven in NN Haldwani and one in NPP Mussoorie.



Photo-3.14: Secondary Storage facility in residential area at Shyam Nagar, Haridwar (02 February 2023)

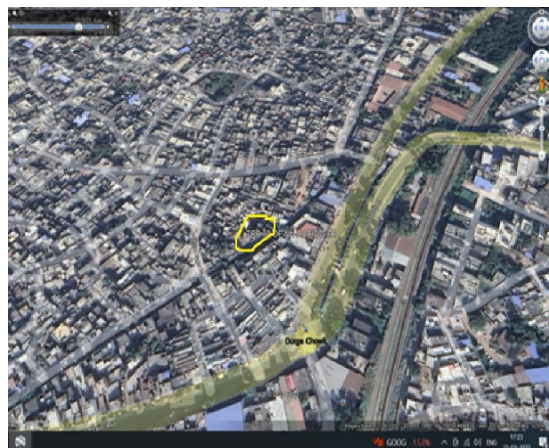


Photo-3.15: Aerial view (Geo tagging) of Secondary Storage facility at Shyam Nagar, Haridwar in residential area (02 February 2023)



Photo-3.16: Secondary Storage facility in open area near new developing residential colony at Bairagi Camp, Haridwar (03 February 2023)

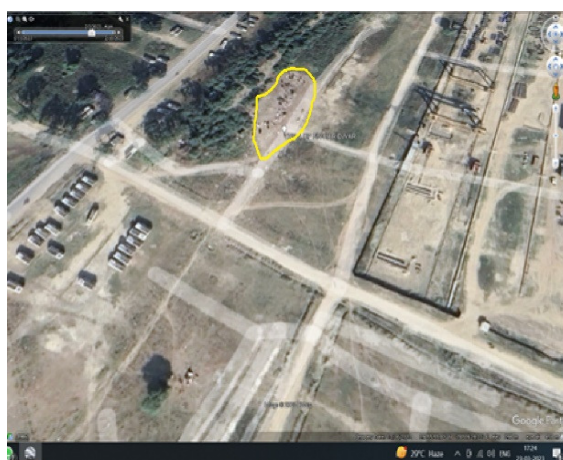


Photo-3.17: Aerial view (Geo tagging) of Secondary Storage facility in open area near new developing residential colony at Bairagi Camp, Haridwar (03 February 2023)



Photo-3.18: Secondary Storage facility NPP, Mussoorie near residential building (10 October 2022)



Photo-3.19: Aerial view of Secondary Storage facility NPP, near residential building Mussoorie (29 March 2023)

The Geo tagged pictures clearly indicate that the Transfer Stations/Secondary Storage were located near the residential areas, National Highways, Canals and in open grounds of the ULBs.

3.3.2 Unavailability of Sanitary Landfill sites resulted in Municipal Solid Waste stored at Open Dumping sites

Open dumps can cause soil and water contamination, plant and wildlife habitat damage. Engineered liner systems in regulated landfills protect soil and water from contamination when waste is disposed of properly. Unsightly waste piles can spoil the aesthetic appeal of landscape, decrease community quality of life, lower property values of surrounding homes, negatively affect tourism and cost municipalities money for clean-ups. Municipal Commissioner, Executive Officer and District Magistrate were responsible for identification, procurement of land and monitoring of Open dumping sites in respective ULB.

Audit noticed that-

- Only two Sanitary Landfill¹¹ (SLF) sites were available in the State¹². In the absence of SLF the maximum waste was dumped in open sites available with the concerned ULBs.
- In nine out of 13 test checked ULBs, MSW was dumped in open sites¹³. Scientific Landfill sites were available only in two ULBs (NN-Dehradun and NN- Haridwar).
- Most of the dump sites were located near the National Highways or rivers or in agriculture lands etc.

The Status of dump sites of the test checked ULBs during the period 2017-18 to 2021-22 was as in the **Table-3.3** below:

Table-3.3: Status of Dump sites in Test checked ULBs during the period 2017-22

Name of the ULB	Number of dump sites during the period	Size of the Land (in sq. meter)	Landowner (If the Land is not owned by the ULB)	Waste deposited during 2017-18 to 2021-22	
				Mixed waste (MT)	Period
NN, Rudrapur	01	6,070	Nagar Nigam Rudrapur	1,20,815	Till 2021-22
NPP, Khatima	02	1,500	Electricity Department	6,570	2020-21
		8,094	Public Associate Pvt. Ltd	6,570	2021-22
NP, Dineshpur	05	300	NP, Dineshpur	6,570	2017-22
		2,023	Raj Singh		
		1,394	Ritik		
		2,023	Ajit Singh		
		3,000	Vijay Munjal		
NPP, Badkot	01	890	NPP Badkot	2,191	Till 2021-22
NP, Naugaon	01	280	NP Naugaon	2,920	2017-22

¹¹ Nagar Nigam, Dehradun and Nagar Nigam, Haridwar.

¹² It was further found that the MSW was transported by the Nagar Palika Parishad, Nainital to the dump site of Nagar Nigam, Haldwani and Nagar Palika Parishad, Mussoorie at Sanitary Landfill- Nagar Nigam, Dehradun.

¹³ Dump sites means a land utilised by local body for disposal of solid waste without following the principles of sanitary land filling.

Name of the ULB	Number of dump sites during the period	Size of the Land (in sq. meter)	Landowner (If the Land is not owned by the ULB)	Waste deposited during 2017-18 to 2021-22	
				Mixed waste (MT)	Period
NN, Haldwani	01	40,000	Forest land	1,72,500	2017-22
NPP, Nainital				27,375	2017-22
NPP, Tehri	01	1,500	NPP Tehri	14,823	2017-22
NP, SwargashramJonk	01	8,000	NP Swargashram Jonk	2,685	2017-22
Total	13	75,074		3,63,019	

Source: Information provided by the test checked ULBs.

It is clear from above Table that 3.63 lakh tons of waste (equivalent to 36,302 trucks¹⁴) was lying in dumpsites measuring 75,074 sq meter (equivalent to 17 football fields¹⁵) during 2017-22 causing risk to public health. The physical verification of the dumping sites revealed instances of burning and flowing of waste into nearby river (Photo 3.20, 3.21 and 3.22). Some dumping sites were on agricultural land (Photo 4.3 and 4.4). Further, 54 per cent of dumping sites were taken on rent raising doubts over long term sustainability of those sites.

• Burning of waste

When household waste, like wood and leaves, are burned, they produce smoke, which contains vapours and particulate matter (solid and liquid droplets suspended in the air). Air pollution from smoke can impact human health. Other chemicals released while burning plastic include benzo(a) pyrene (BAP) and polyaromatic hydrocarbons (PAHs), which have both been shown to cause cancer. If agricultural bags or containers are contaminated with pesticides or other harmful substances, those will also be released into the air.



Photo-3.20: Burning of Municipal Solid Waste in Dumping site of Nagar Nigam Haldwani (14 December 2022)

People exposed to these air pollutants can experience eye and nose irritation, difficulty breathing, coughing and headaches. People with heart disease, asthma, emphysema or other respiratory diseases are especially sensitive to air pollutants. Other health problems aggravated by burning include lung infections, pneumonia, bronchiolitis and allergies. Burning trash can cause long-term health problems.

¹⁴ TATA 22 feet (size- 22 L x 7.5 W x 7 H) truck carry maximum of 10 tons. 3.63 lakh tons equivalent to 36,302 trucks.

¹⁵ The surface area of a football field is 4,462.3 m².

• ***Municipal Solid Waste dumped near the rivers***

When the garbage is dumped into the rivers or water bodies, they cannot be degraded and get accumulated in the bodies. The degradation of these materials results in the release of toxic compounds which kill the plants and aquatic animals. The water becomes polluted and is not fit for drinking. The inlets of the fresh water and the sources of ground water gets blocked which results in the accumulation of contaminants in the same water body and lack of water resources.



Photo-3.21: Dumpsite near the river at Nagar Nigam Rudrapur (12 January 2023)

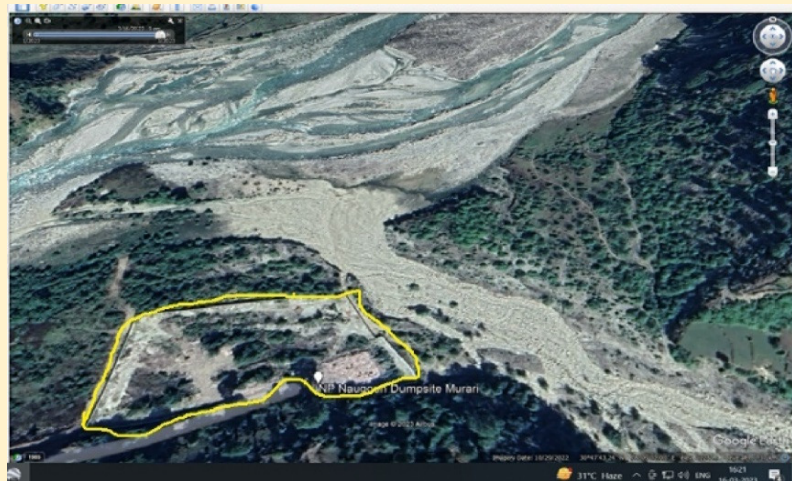


Photo-3.22: Aerial view (Geo tagged) of dumpsite at NP-Naugaon near river (16 March 2023)

Thus, as can be seen from above instances, open dumps were causing soil and water contamination and damaging plant & wildlife habitat.

During Exit Conference (September 2023) the Additional Secretary stated that the matter will be looked into and the Government was trying to prepare Detailed Project Reports of such waste lying in the Open dump sites by treating it as legacy waste.

3.3.3 Inefficient collection of MSW resulted into dumping at roadside

Failure to enforce efficient and effective door-to-door collection resulted in littering/dumping of Municipal Solid Waste/food waste on roadside. Roadside dumping effects the environmental conditions of the area leading to negative effect on health of local people besides attracting the stray animals, as can be seen in the pictures below taken during physical verification:



Photo-3.23: Roadside dumping of waste in Nagar Palika Parishad Khatima (13 December 2022)



Photo-3.24: Roadside dumping of waste in Nagar Nigam Rudrapur (16 January 2023)

During Exit Conference (September 2023), the Additional Secretary stated that a plan is being prepared for 100 *per cent* collection of Municipal Solid Waste. The execution of such plan will be ensured.

The State Government replied (December 2023) that Uttarakhand being a hilly state (about 72 *per cent* forest land), land selection for Solid Waste Management plants is a major problem, however, every effort is being made to set up waste transfer stations away from residential areas. Further, 781 Garbage Vulnerable Points (GVPs) have been removed in the State and efforts are being made that again new GVPs are not developed. 30 cities/ULBs have been declared as Bin Free City.

However, the response evidently failed to address crucial issues, such as the failure to acquire land even after seven years since the notification of the SWM rules in 2016.

3.4 Transportation of Municipal Solid Waste

3.4.1 Uncovered vehicles used for transportation of MSW

MSW Manual (Part-II), Para 2.3.2- General Principles, describes that the vehicles used for transportation should be covered and waste should not be visible to public. It should have a facility to prevent spillage of waste and leachate en-route to the processing or disposal facility. Sanitary Inspector, Supervisor, Executive Officer, Medical Health Officer/Municipal Commissioner of the respective ULB were responsible for monitoring of transportation of vehicles in the respective ULB.

It was noticed in the test checked ULBs that out of 425 vehicles, 272 (64 *per cent*) used for door-to-door collection were uncovered. This confirmed in Joint Physical Verification as well (photos 3.25 to 3.28).



Photo-3.25: Municipal Solid Waste transported by uncovered vehicle in Nagar Nigam Dehradun (29 October 2022)



Photo-3.26: Municipal Solid Waste transported by uncovered vehicle in Nagar Nigam Rudrapur (16 January 2023)



Photo-3.27: Uncovered vehicle used for transportation of Municipal Solid Waste, Nagar Nigam Haldwani (14 December 2022)



Photo-3.28: Uncovered vehicle used for transportation of Municipal Solid Waste, Nagar Palika Parishad, Nainital (30 November 2022)

Thus, ULBs failed to monitor the private concessionaries and ensure covered vehicles for transportation of MSW.

The Additional Secretary stated in the Exit Conference (September 2023) that notice will be issued to the respective ULBs. Further, the State Government stated (December 2023) that every effort is being made to use covered vehicles for transportation of solid waste.

3.4.2 Use of transportation vehicles without authorisation

The ULBs should ensure that the vehicles procured comply with the statutory requirements of registration, obtaining authorisation, insurance, *etc.*

Records of test checked ULBs revealed that out of 573 vehicles used for waste transportation in the test checked 13 ULBs, 45 (08 *per cent*) and 109 (19 *per cent*) vehicles were running without registration and insurance respectively.

Thus, ULBs were using the vehicles for SWM purposes without adhering to the statutory requirements.

The State Government stated (December 2023) that remedial measures are being taken.

3.4.3 Monitoring of transportation vehicles

Transportation of MSW from source of generation to the authorised destination is important to ensure its proper disposal. MSWM Manual, 2016 stipulates that communication technologies such as Global Positioning System (GPS) are to be integrated as part of monitoring of SWM system. This also helps in tracking of the vehicles.

Records revealed that in test checked 13 ULBs, no GPS system installed in 228 (54 *per cent*) vehicles of eight ULBs used for collection of door-to-door MSW. Thus, in absence of GPS, the ULBs failed to adopt an effective tracking mechanism.

The Additional Secretary stated in the Exit Conference (September 2023) that notice will be issued to the respective ULBs. Further, the State Government stated (December 2023) that as on date, GPS has been installed in 701 vehicles against a total of 915 vehicles in the State.

3.5 Disposal of Municipal Solid Waste

3.5.1 Construction, operation and maintenance of Sanitary Landfill Site

Rule 15 (w) of SWM Rules 2016 undertake on their own or through any other agency construction, operation and maintenance of sanitary landfill and associated infrastructure as per Schedule 1 for disposal of residual wastes in a manner prescribed under these rules. For identification, procurement and setting up of Scientific Landfill (SLF) Disposal sites in respective ULB Municipal Commissioner, Executive Officer and District Magistrate were responsible.

There were two Scientific Landfill (SLF) Disposal sites in the State. The following points relating to construction, operation and maintenance of scientific landfill disposal system at Sheeshambada, Dehradun is illustrated below:

Nagar Nigam Dehradun decided to set up a Solid Waste Processing and Disposal system at Sheeshambada, Dehradun on Built, Operate and Transfer (BOT) basis. A Concession Agreement between Nagar Nigam Dehradun and the concessionaire, RAMKY Enviro Engineers Ltd. was signed in August 2016 for the period of 15 years. The project was operationalised in December 2017 and Consent to Operate was given by Uttarakhand Pollution Control Board in March 2018. As per Para 4.1 (a) of Concession agreement NND shall appoint an Independent Project Engineer. The project engineer monitors the Operation & Maintenance (O&M) activities undertaken by the Concessionaire so as to ensure compliance with the O&M requirements. The project engineer certified the quantity of MSW collected, processed in the processing facility and at landfill site by the Concessionaire.

Reports submitted by the Project Engineer's revealed that:

- The Sheeshambada plant received a total of 5,14,268.05 MT of MSW from December 2017 to March 2022. The by-products of the MSW were: 2,23,117 MT of Refused Derived Fuel (RDF), 19,163 MT of Compost, and 33,799.85 MT of Inert waste.
- The concessionaire was shifting the waste from the tipping floor directly to the landfill site, including unprocessed waste being dumped there.
- Applying soil cover on the waste is essential to prevent wind blow, odors, deter scavengers, birds, and vermin, and improve the site's visual appearance. However, the concessionaire is violating the Concession agreement and MSW Rules 2016 by not applying the soil cover on the waste daily.
- The sanitary landfill has already reached a height of around 20-25 meters within the first five years of plant operation. If the same practice continues, the lifespan of the landfill will be shorter than proposed. The sanitary landfill site is designed for 15 years as per the concession agreement.
- The leachate generated at all stages during waste processing/storage in the plant is not being treated and disposed of according to the terms and conditions of Environmental Clearance (EC). Additionally, it may degrade groundwater/surface water and create foul smells in the surrounding area of the processing plant.

No serious action was taken by the Nagar Nigam Dehradun (NND) except issuing letters time to time for non-compliance of the Concessionaire agreement and directing to take necessary actions in above matters. Instead of complying with the directions given by the Nigam, the Concessionaire gave a preliminary notice of termination (June 2022) to NND and the agreement was finally terminated in the month of November 2022.

Dumping of Refused Derived Fuel (RDF) in Landfill site

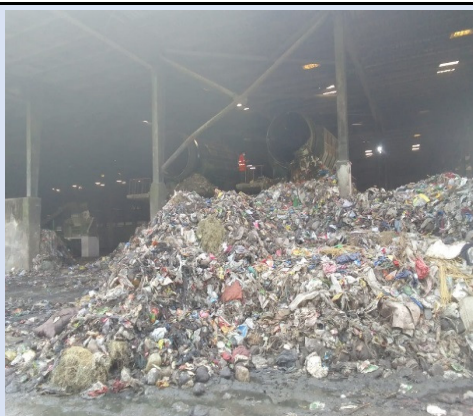
Para 5.13.6 of the Concessionaire agreement stipulated that the concessionaire must ensure the removal of all processed waste products from the waste processing facility within six months through sales. However, records revealed that 2.23 lakh MT of Refused Derived Fuel (RDF) was not disposed of and was instead dumped in the landfill site. The National Green Tribunal (NGT) also noted this dumping of RDF at the plant and highlighted in December 2018 that "RAMKYs running the SWM plant were not dispatching the RDF to the Cement Units as prescribed by Central Public Health & Environmental Engineering Organisation (CPHEEO) guidelines; instead, it was being dumped at the landfill." The NGT further remarked that there was a functional cement plant of CCI in Sirmaur District of Himachal Pradesh, just 60 km away from Dehradun.

As no action was initiated by the concessionaire for disposal of RDF, NND finally decided to withhold an amount equivalent to 20 *per cent* from monthly tipping fee till concessionaire ensured, disposal of RDF as per the terms of concession agreement. An amount of ₹ 4.01 crore was hold by NND till June 2022 in this regard.

Joint Physical Verification of SLF at the Sheeshambada plant:

A joint physical verification of the plant site was conducted by the Audit team along with Project Engineer nominated by Nagar Nigam Dehradun and Manager, Sheeshambada Processing Plant on 29 October 2022. During Physical verification the following points were noticed which also authenticated the lacunas and lapses discussed in the report:

- i. Mixed Municipal Solid Waste was being received at Processing Plant.
- ii. RDF was dumped at Landfill site.
- iii. In landfill site only inert material was allowed to be dumped but RDF, plastic materials were also being dumped which was gross violation of concession agreement terms and MSW Rules, 2016.
- iv. Only four out of installed 21 cameras were functional.
- v. Leachate Water was accumulated around the Processing Shed flooring and near Sanitary Landfill Site area which affects the surrounding environment by creating foul smell in the area.
- vi. It was also seen that Medical Waste (Sanitary Napkin/Diaper) was also mixed with MSW.
- vii. The boundary wall of Processing Plant was partially damaged.



*Photo-3.29: RDF at processing plant
(29 October 2022)*



*Photo-3.30: RDF and inert at SLF
(29 October 2022)*

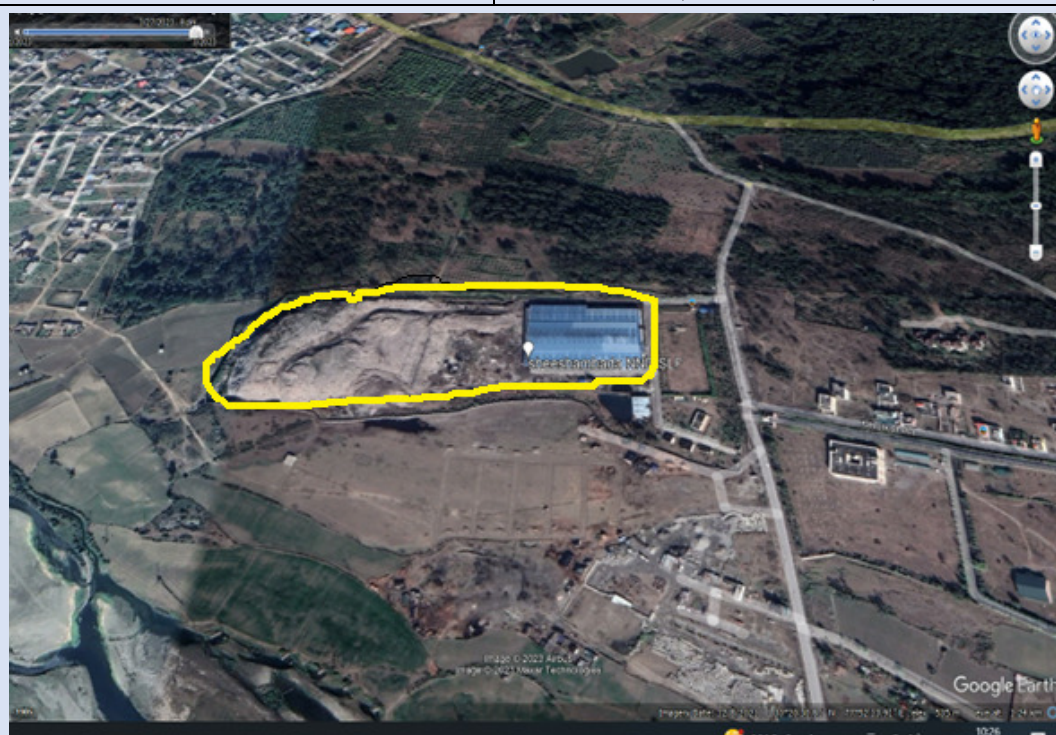


Photo-3.31: Aerial View (Geo tagged) of SLF Dehradun (27 February 2023)

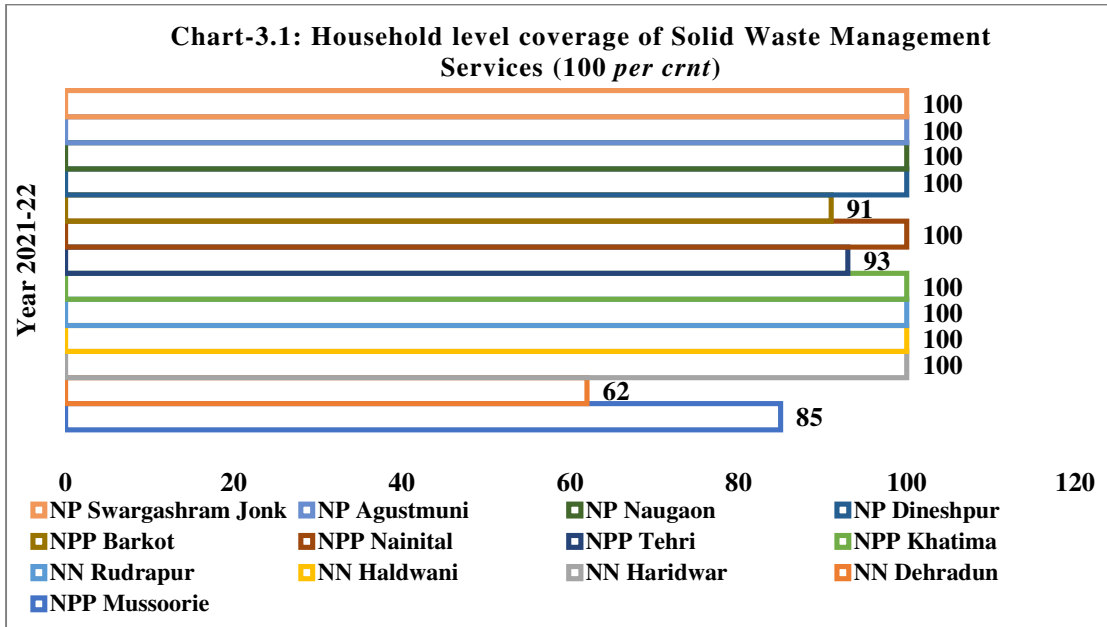
While accepting the facts it was informed by the Additional Secretary in the Exit Conference (September 2023) that an estimate for removal of RDF from the Landfill site has been prepared and after approval of the same RDF will be removed. The State Government further replied (December 2023) that 62 Solid Waste Management Action Plans/ DPRs have been approved by the Government of India covering 89 Municipal Bodies of the State, out of which seven Solid Waste Management Plants have been completed and in the remaining works are in progress.

3.6 Targets and achievement against Service Level Benchmarks (SLBs)

As per MSWM Manual, 2016- Part I, Para 7.1-Monitoring of Municipal Solid Waste Management Plan Implementation envisaged the assessment of Service Level Benchmarks (SLBs). Targets and achievement in test checked Urban Local Bodies against the SLB indicators stipulated by the Ministry of Housing & Urban Affairs (MoHUA) were as below-

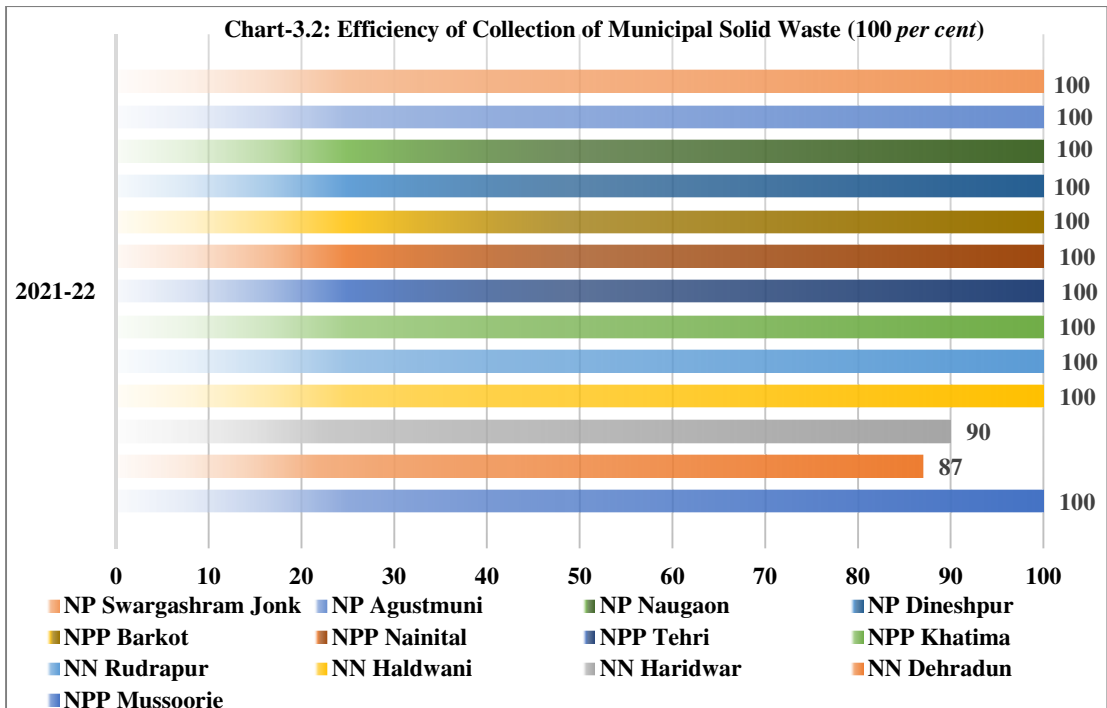
• **Household level coverage of Solid Waste Management Services:**

As per SLB, the Household level coverage of SWM services should be 100 per cent. Records of test checked ULB ending March 2022 revealed that the household level coverage percentage is more than 90 per cent in 11 out of the 13 ULBs which is commendable as shown in the **Chart-3.1** below. However, coverage in the large ULB – NN Dehradun, is very poor.



• **Efficiency of Collection of Municipal Solid Waste**

As per SLB, the Efficiency of Collection of Municipal Solid Waste should be 100 per cent. Records of test checked ULBs ending March 2022 revealed that the efficiency of collection ranged is 100 per cent in 11 out of 13 ULBs which is commendable as shown in the **Chart-3.2** below:



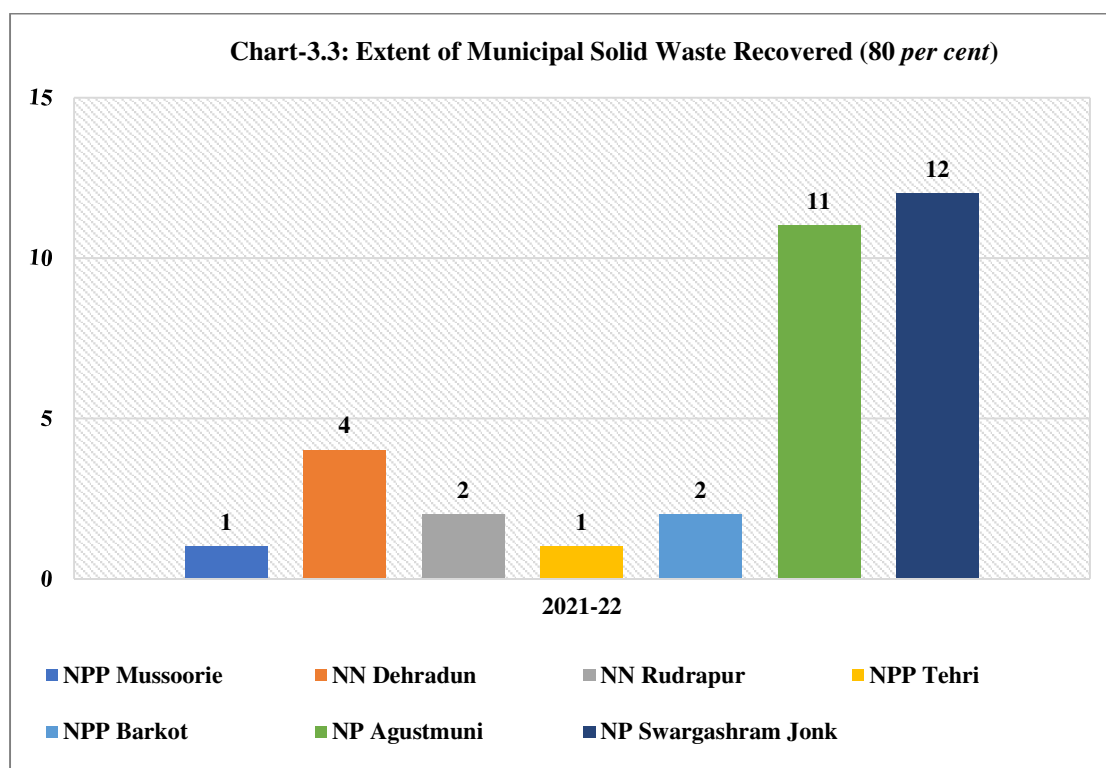
The efficiency of collection of municipal solid waste in two out of 13 test checked ULBs were not as per the service level benchmark i.e., 100 per cent.

• **Extent of Segregation of Municipal Solid Waste:**

As per SLB, the extent of segregation of municipal solid waste should be 100 per cent. Records of test checked ULBs ending March 2022 revealed that the extent of segregation was not as per SLB in the test checked ULBs. While in two ULBs namely in NPP Barkot it was 67 per cent and in NN Haridwar it was 0.05 per cent. In rest of the 11¹⁶ ULBs there was no source segregation.

• **Extent of Municipal Solid Waste Recovered:**

As per SLB, the extent of municipal solid waste recovered should be 80 per cent. Records of test checked ULB ending March 2022 revealed that the extent of municipal solid waste recovered was minuscule as per the SLB as shown in the **Chart-3.3** below:



During 2021-22 out of 13 test checked ULBs, while in six¹⁷ ULBs there were no MSW recovered, it was mere one to 12 per cent in rest of the seven ULBs as can be seen from the above chart.

• **Extent of Scientific disposal of Municipal Solid Waste:**

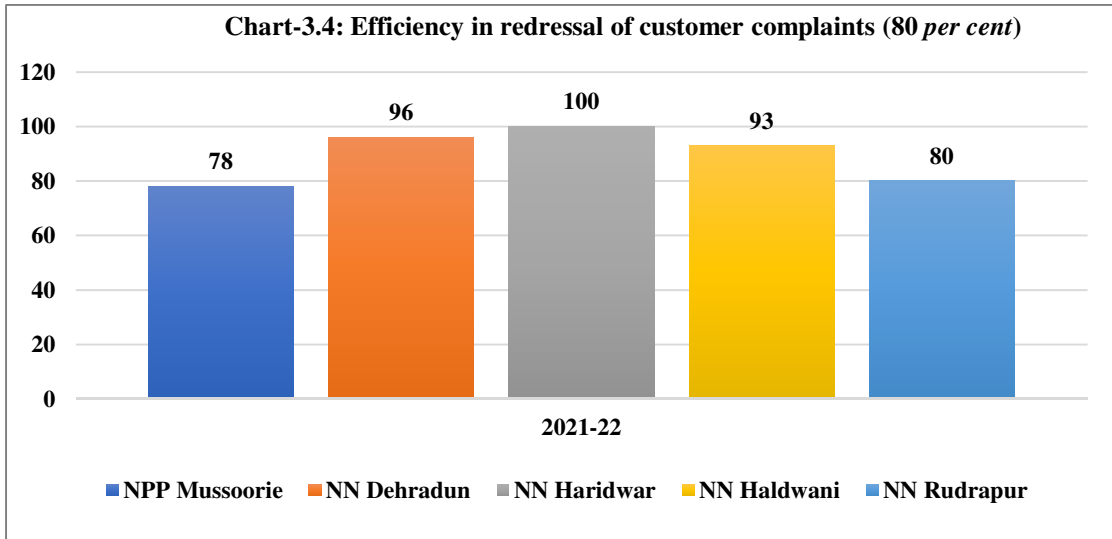
As per SLB, the extent of scientific disposal of municipal solid waste should be 100 per cent. Records of test checked ULB ending March 2022 revealed that the extent of scientific disposal of municipal solid waste was nil in all the test checked ULBs except NN Dehradun where it was four per cent.

¹⁶ NN Dehradun, NN Rudrapur, NN Haldwani, NPP Mussoorie, NPP Khatima, NPP Tehri, NPP Swargshram Jonk, NPP Nainital, NP Dineshpur, NP Augustmuni, NP Naugaon.

¹⁷ NN Haridwar, NN Haldwani, NPP Khatima, NP Dineshpur, NP Naugaon & NPP Nainital.

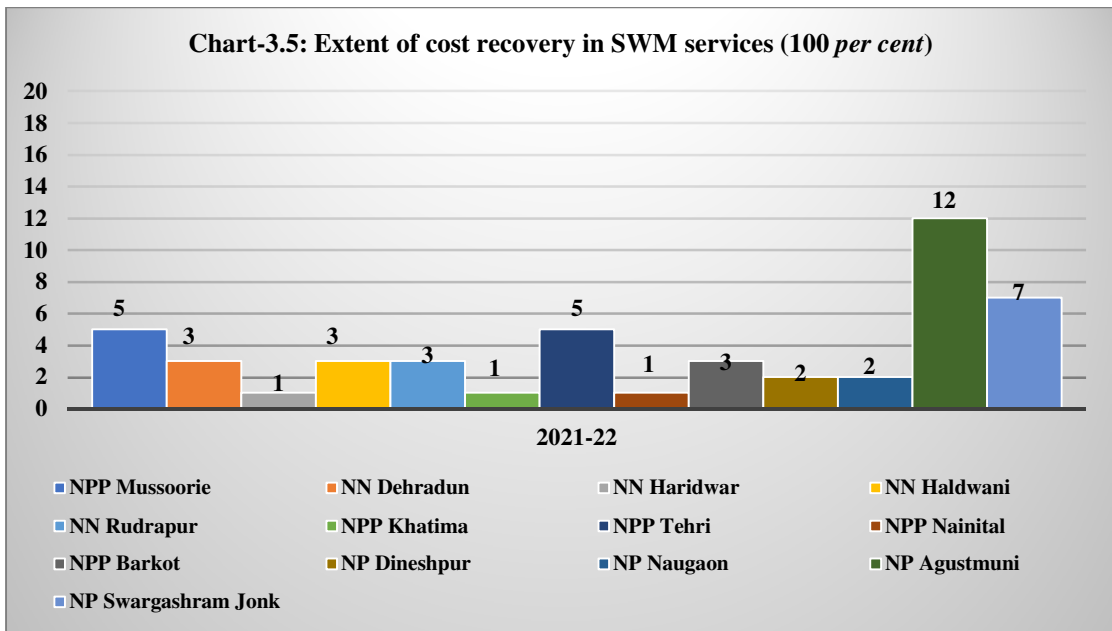
• **Efficiency in redressal of customer complaints:**

As per SLB, the efficiency in redressal of customer complaints of municipal solid waste should be 80 per cent. Records of test checked ULB ending March 2022 revealed that the efficiency in redressal of customer complaints of municipal solid waste was achieved by only five out of 13 test checked ULBs. Rest of the eight¹⁸ ULBs did not maintain data regarding customer complaints as shown in the **Chart-3.4** below:



• **Extent of cost recovery in Solid Waste Management (SWM) services:**

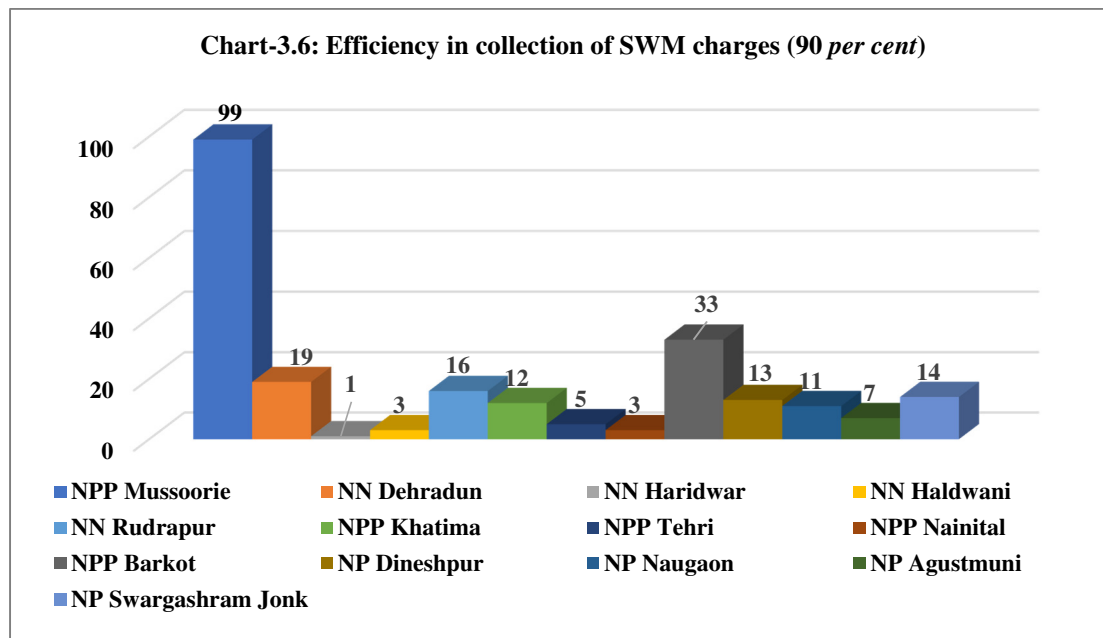
As per SLB, the extent of cost recovery in SWM services should be 100 per cent. Records of test checked ULB ending March 2022 revealed that the cost recovery in SWM services ranged between one to 12 per cent as shown in the **Chart-3.5** below:



¹⁸ NPP Khatima, NPP Tehri, NPP Swargashram Jonk, NP Dineshpur, NP Augustmuni, NP Naugaon, NPP Barkot and NPP Nainital.

• **Efficiency in collection of SWM charges:**

As per SLB, the efficiency of collection of solid waste management charges should be 90 *per cent*. Records of test checked ULB ending March 2022 revealed that the efficiency in collection of SWM charges ranged between one to 33 *per cent* except NPP Mussoorie¹⁹ as shown in the **Chart-3.6** below.



Analysis of the service level benchmark (SLB) indicators stipulated by the Ministry of Urban Development showed that in the test checked ULBs, the achievement of the majority performance indicators was significantly below against the fixed targets.

The State Government intimated (December 2023) that in view of the available resources, efforts are being made to achieve the set targets as much as possible.

3.7 Recommendations

- *The State Government should encourage segregation of waste at source by devising a system and should prevent mixing of segregated waste during various stages of SWM;*
- *The State Government should ensure setting up of Processing & Disposal sites of Municipal Solid Waste at each ULB;*
- *The ULBs should ensure that the vehicles procured for waste transportation are covered and comply with the statutory requirements;*
- *It should be ensured that waste is not dumped or stored in open area or near residential areas/canals/highways;*
- *The State Government may draw a time-bound plan for ULBs to achieve the preferred level of reliability of Service Level Benchmark (SLB) data.*

¹⁹ All user charges were retained by the private concessioner against the agreement (Refer para 3.1.1 (C)).