SUPREME AUDIT INSTITUTION OF INDIA
लोकहितार्थ सत्यनिष्ठा
Dedicated to Truth in Public Interest

Report of the Comptroller and Auditor General of India on Solid Waste Management in Urban Local Bodies for the year ended 31 March 2022

उत्तराखण्ड शासन

Government of Uttarakhand
Report No. 4 of 2024
(Performance Audit - Civil)

Report of the
Comptroller and Auditor General of India on
Solid Waste Management in Urban Local Bodies
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Preface

This Report of the Comptroller and Auditor General of India for the year ended 31 March 2022 has been prepared for submission to the Governor of the State of Uttarakhand under Article 151(2) of the Constitution of India.

The Report contains the results of the Performance Audit on 'Solid Waste Management in Urban Local Bodies', covering the period 2017-22.

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

Executive Summary

EXECUTIVE SUMMARY

Why CAG did this Audit?

Municipal Solid Waste Management (MSWM) in urban areas has emerged as one of the biggest challenges today. The situation is aggravated by rapid urbanisation. Inadequate management of waste has significant negative externalities in terms of public health and environmental outcomes. Besides, it has an adverse impact on the aesthetic appearance of the surroundings. The Solid Waste Management (SWM) Rules, 2016 provide a legal framework for the disposal and management of Solid waste and entrusts responsibilities at the State level, ULBs and on the generators of waste. Audit was taken up to assess the implementation of these rules by ULBs.

Major Audit Observations

The Detailed Project Reports (DPR) of SWM projects were not prepared by following the guidelines. Baseline waste analysis was ineffective and outdated, instances of duplication of DPRs was found. Planning was virtually absent, as it is evident from the fact, that none of the test checked ULBs had prepared MSWM plan and Contingency plan. Audit observed poor management of domestic hazardous waste (DHW) and construction and demolition (C&D) in most of the ULBs.

Even though DPRs was approved and funds were available, the infrastructure projects were not created, in any of the test checked ULBs, in the given time limit, prescribed under SWM Rules. In two ULBs, the preliminary step of identification/ procurement of suitable sites for the project was yet to be done. Bioremediation or capping of old and abandoned dump sites were done only in one, out of five ULBs, resulting in accumulation of legacy waste and consequent environmental issues.

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. Only 3.13 *per cent* (0.09 *per cent* at source, 0.81 *per cent* at transfer stations and 2.23 *per cent* at processing sites) of the collected waste was segregated. Ragpickers were not recognized and integrated in waste management process in most of the ULBs. Sixty four *per cent* of the vehicles used for waste transportation were not covered, uniforms and personal protection equipment were not being given/used by workers handling solid waste in majority of ULBs.

Secondary Storage/transfer stations were set up near the residential areas, National Highways, Canals and in open grounds of the ULBs. Sanitary Landfill (SLF) sites were available in only two ULBs. In absence of SLF, the maximum waste was dumped in open sites. There were 13 dumpsites covering 75,074 sq. meter area and having 3,63,019 tons of waste which were lying in an open dumpsite area of the ULBs. Physical verification of the dumping sites revealed instances of waste was seen flowing in river, burning of waste, and dumping in agricultural land.

The standard of environment, maintained by the ULBs, was very poor, which was noticed by the audit during the physical inspection of dump sites of the ULBs. The State Pollution Control Board (SPCB) failed to ensure compliance of provisions of SWM Rules from ULBs. In last five years, 88 *per cent* of the ULBs were not reviewed even

once by SPCB. Inter-State movement of waste was underway in two out of 13 test check ULBs without intimation to SPCB. Complaints relating to lack of daily picking up of municipal waste or improper picking up were observed in audit.

What CAG Recommends?

- ***The State Government needs to devise systems to assist ULBs in preparation of Solid Waste Management plans/action plans for effective implementation of waste management and monitor their effective implementation.***
- ***The State Government should ensure timely creation of the infrastructure of Solid Waste Management projects to avoid adhoc approaches adopted in the collection, storage, transportation, and disposal of the solid waste to save the damaging environment. Responsibility must be fixed at all levels for inordinate delays in preparation, approval, and establishment of SWM projects.***
- ***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 ULBs should ensure that the vehicles procured for waste transportation are covered and comply with the statutory requirements.***
- ***The State Government may draw a time-bound plan for ULBs to achieve the preferred level of reliability of Service Level Benchmark (SLB) data.***
- ***The State Pollution Control Board needs to ensure that all concerned, involved in Solid Waste Management functioning, obtain necessary authorisation for their functioning and should enforce adherence to prescribed standards by reviewing implementation as per norms.***
- ***The State Government may scientifically assess workload of each ULB and accordingly sanction/deploy human resources.***

Management's response to audit recommendations

During the 'Exit conference' (September 23), the draft material and recommendations made there in, were discussed with concerned Additional Secretary in detail and it was assured that the Department will take needful action, wherever it is required. An updated and revised draft performance report was again issued to the State Government Department in March 2024 to seek their views/input. However, no response had been received till April 2024.

Chapter-1

Introduction

CHAPTER-1

Introduction

1.1 Solid Waste Management in Urban Local Bodies

Wastes are materials that the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. Wastes are generally classified into municipal solid waste (MSW), bio-medical waste (BMW), construction and demolition (C&D) waste, e-waste, plastic waste, slaughterhouse waste, industrial waste and hazardous waste by virtue of their nature. They are also classified as biodegradable, non-biodegradable, combustible, dry and inert based on their characteristics.

Municipal solid waste management (MSWM) in urban areas has emerged as one of the biggest challenges. The situation is aggravated by rapid urbanisation. Although MSWM is an essential service and a mandatory function of municipal authorities across the country, it is still being managed inefficiently resulting in significant negative externalities in terms of public health and environmental outcomes. Besides, it has an adverse impact on the aesthetic appearance of the surroundings.

1.2 Hierarchy and Process of waste management

Solid waste management covers hierarchy of– 5Rs (Reduce, Reuse, Recycle, Recover and Remove).

Reduce: The first choice of measures in waste management is avoidance and waste reduction. This step aims for goods to be designed in a manner that minimises their waste components. Also, the reduction of the quantity and toxicity of waste generated during the production process is important.

Reuse: Re-using an article removes it from the waste stream for use in a similar or different purpose without changing its form or properties.

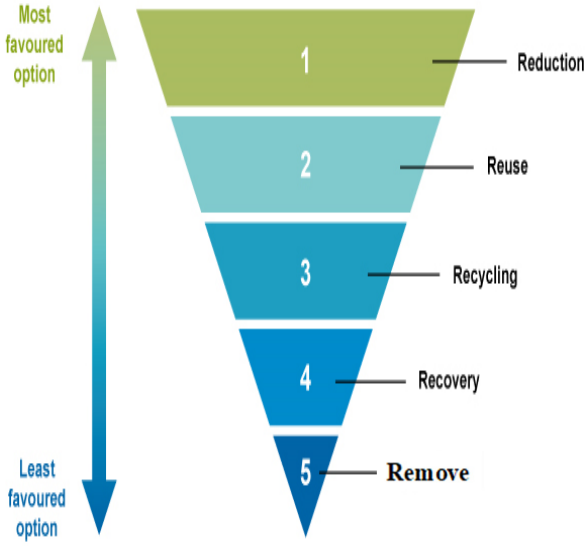


Chart-1.1: The Hierarchy and Process of waste management

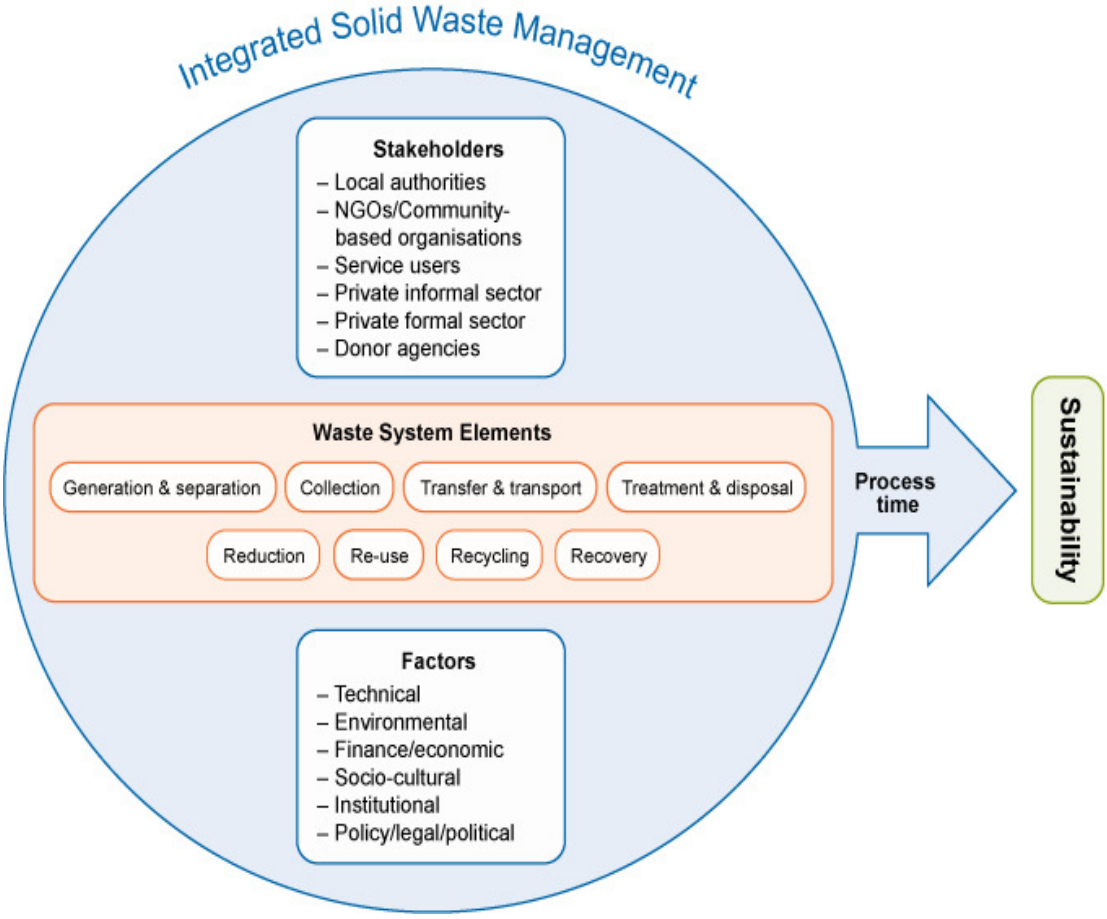
Recycle: Recycling is process of transforming materials into secondary resources for manufacturing new products. Promotion of waste recycling sector and providing it with an institutional support can motivate all the stakeholders to segregate at source of generation. The recycling of waste involves separating articles from the waste stream and processing them as products or raw materials. This approach seeks to recycle a product when it reaches the end of its life span.

Recover: Recovery involves reclaiming components or materials or using the waste as a fuel. Material recovery involves a variety of mechanical or biological processes that remove a variety of materials from the waste stream.

Remove: Remove refers to residuals management or the management of materials which remain after the previous 4Rs have been applied. The last step of the waste management is wherein the quantity of waste cannot be reduced during production. The purpose of implementing the waste management hierarchy is to use waste as a resource and divert these potential resources from dumpsites/landfill.

The integrated process of solid waste management is depicted in **Chart-1.2** below:

Chart-1.2: Integrated Solid Waste Management



Processing Technologies

Integrated solid waste management (ISWM) plants typically have pre-processing facilities to separate organics from recyclables and other high calorific waste. The organic waste is usually composted aerobically to produce manure or processed anaerobically (in absence of air) for production of energy. Recyclables are separated and sent to wholesalers for further supply to recycling facilities. High calorific wastes are then baled or processed and can be used as fuel or co-processed in cement plants. The processing technologies are detailed in ***Appendix-1.1***.

1.3 Regulatory framework governing Management of Waste

The Solid waste management (SWM) rules 2016, provides a legal framework for disposal and management of solid waste and entrusts responsibilities at State level and Urban Local Bodies (ULBs) level. Apart from above, the Constitution (seventy fourth amendment) Act 1992, which came into effect on 1 June 1993, provided a constitutional status to Urban Local Bodies. Article 243 w of the Constitution of India provides that the legislature of the state may by law endow the municipalities with such powers and authority as may be necessary to enable them to function as institutions of self-governance. The twelfth schedule of the Constitution enumerates 18 specific functions to be devolved to Urban Local Bodies**.** The State Government devolved the function "Solid Waste Management" to the Urban Local Bodies.

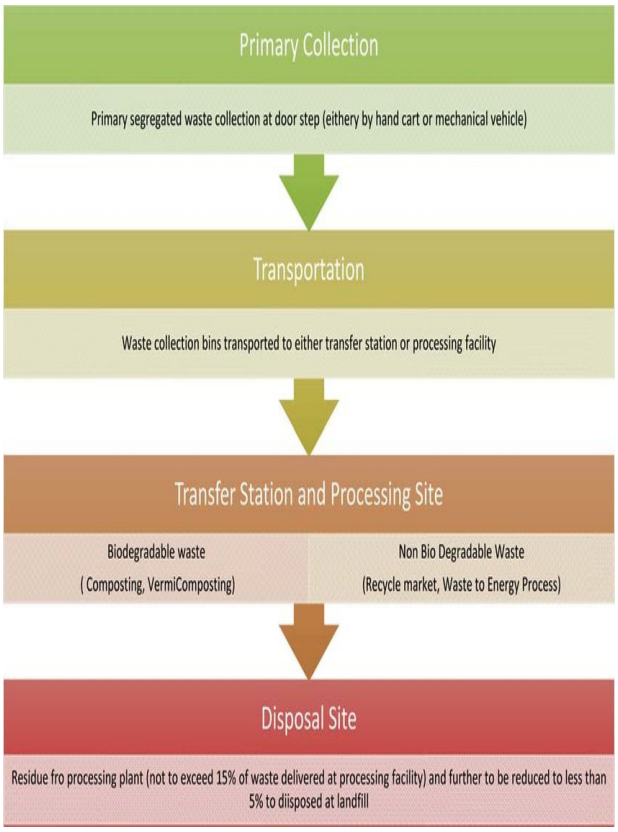
The solid waste management rules 2016, places certain duties and responsibilities on the generators of waste.

(i) Waste generators are responsible for segregating and storing waste in three separate streams - biodegradable or wet waste, non-biodegradable or dry waste and domestic hazardous wastes (DHW), to be handed over to waste collectors.

(ii) Waste generators are not allowed to burn, bury or throw waste in street drains and water bodies.

(iii) All resident welfare associations, gated communities and institutions with more than 5,000 sq. meter area and market associations are required to ensure segregation of waste at source in biodegradable and non-biodegradable and treat bio-degradable waste through decentralized treatment process within their facility as far as possible.

Chart-1.3: Flow Chart of Municipal Solid Waste Management Chain



(iv) Construction and demolition waste are to be stored separately and disposed in accordance with construction and demolition waste management Rules 2016.

(v) Biodegradables are to be processed through composting/ bio-methanation, while residual are to be handed over separately.

1.4 Municipal Solid Waste in Uttarakhand

As per the annual reports of Uttarakhand Pollution Control Board (UKPCB) the MSW generated, collected and processed by the ULBs during the years 2017-18 to 2021-22 in the State is depicted in **Table-1.1**:

Table-1.1: Municipal solid waste generated, collected & treated by the ULBs

Solid Waste Ton per Day (TPD)	2017-18	2018-19	2019-20	2020-21	2021-22
Generated in the State	1,099.00	1,527.46	1,610.94	1,458.46	1,585.39
Collected in the State	1,099.00	1,437.40	1,481.06	1,378.99	1,451.59
***Percentage* of waste collection in comparison to generation**	***100***	***94***	***92***	***95***	***92***
Treated in the State	Nil	524.00	716.64	779.85	1,050.00
***Percentage* of waste treated in comparison to collection**	***Nil***	***36***	***48***	***57***	***72***

Source: Annual Reports of UKPCB.

As evident from above, on an average 95 *per cent* of the waste was collected and 43 *per cent* was processed during the years 2017-18 to 2021-22 and a major portion of the remaining MSW was dumped at landfills/dumping grounds which would have a harmful impact on health and environment.

1.4.1 Administrative control and monitoring of Solid Waste Management

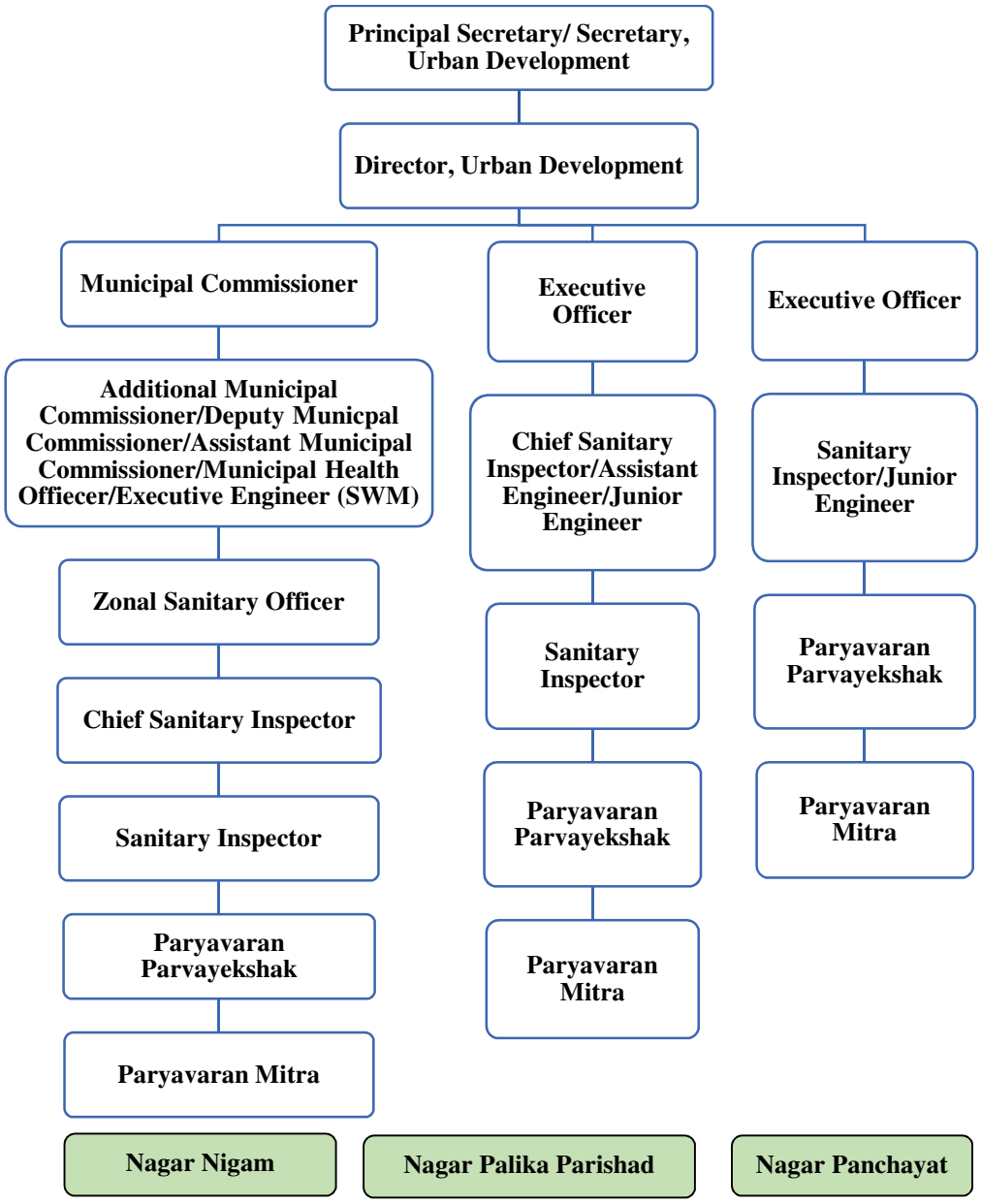
The role of various authorities at all levels in planning, execution and monitoring of municipal solid waste management is depicted in the **Table-1.2** below:

Table-1.2: Roles of Authorities

Level	*Planning, Execution and Monitoring*	*Authority*	*Role of Authorities*
State	*Policy framing, Monitoring & Evaluation*	*Urban Development Department*	• *Framing policies & draft Action-Plans, Handholding of ULBs in preparation of Detailed Project Reports (DPRs), Request for Proposals (RFPs) & other statutory compliances related to SWM Projects*
		Uttarakhand Pollution Control Board	• *Authorisation to the operator of a facility or urban local authority, or any other agency responsible.* • *Enforcement of SWM Rules in the State through local bodies in their respective jurisdiction and review implementation of these rules in close coordination with Directorate or Secretary-in-charge of State Urban Development Department.* • *Monitor environmental standards and adherence to conditions as specified under the Schedule-I and Schedule-II for waste processing and disposal sites.*
District	*Implementation*	*Urban Local Bodies- Nagar Nigam, Nagar Palika Parishads and Nagar Panchayats*	
	Monitoring & Evaluation	*Regional Pollution Control Offices*	

1.4.2 Organisational set up

The Organisational Set-up of Solid Waste management is given in the Chart below:



Uttarakhand Pollution Control Board (UKPCB) has been entrusted with the responsibility of enforcing Acts and Rules of municipal solid waste. The Member Secretary, UKPCB at State level and four Regional Officers at regional level are responsible for enforcing/reviewing the implementation of SWM Rules 2016 at ULBs level.

1.5 Funding for Urban Local Bodies

The sustainable financing is paramount to ensure discharge of any function. The management of solid waste can be carried out effectively by the ULBs only when they are supported with sufficient financial resources.

1.5.1 Sources of funds

The ULBs execute MSWM activities using grants released by the Central and State Governments, as well as revenue from their own sources. Paragraph 1.4.5.6.2 of the SWM 2016 manual states that SWM services must be financially viable on a stand-alone basis for sustainability. Therefore, assessing financial viability is crucial in SWM planning. Following the recommendations of the 15th Central Finance Commission, grants (Tied-(60 *per cent*) and Untied-(40 *per cent*)) needs to be allocated to Local Bodies for cities with populations less than a million. Tied Grants are distributed for Drinking Water (50 *per cent*), including rainwater harvesting and recycling, and Solid Waste Management (50 *per cent*). The various source of funds received by the ULBs for management of solid waste are indicated in the **Table-1.3** below:

Table-1.3: Sources of finance in ULBs for waste management

Sl. No.	Source	Particulars
1	**Central Grants**	• 14th Finance Commission • 15th Finance Commission • Swachh Bharat Mission • Special Assistance to States for Capital Investment
2	**State Grants**	• State Finance Commission
3	**Own Resources (Municipal Fund)**	• SWM user charges, • Sale of products and by-products (compost, *etc*.), • Sale of recyclables • Penalties

Source: Information provided by the Department.

1.5.2 Expenditure on SWM against total available funds

Rule 15(x) of the SWM Rules 2016 mandates Urban Local Bodies (ULBs) to allocate sufficient funds in their annual budget for capital investment, as well as for the operation and maintenance of Solid Waste Management (SWM) services. This requirement ensures that funds for discretionary functions of local bodies are allocated only after fulfilling the necessary funding requirements for SWM and other obligatory functions. The details of total expenditure incurred on solid waste management vis-à-vis total expenditure against total available fund of the test checked ULBs is shown in the **Table-1.4** below:

Table-1.4: Details of expenditure under SWM of test checked ULBs

(₹ in crore)

Year	Total available fund	Total Expenditure	Expenditure on SWM	Percentage of expenditure on SWM over Total expenditure
2017-18	434.91	298.15	111.09	***37.26***
2018-19	538.64	329.25	128.54	***39.04***
2019-20	650.47	334.59	144.89	***43.30***
2020-21	783.46	471.20	174.68	***37.07***
2021-22	744.58	528.04	192.68	***36.48***
Total		**1,961.23**	**751.88**	***38.34***

Source: Information provided by the test checked ULBs.

The table shows that the expenses on solid waste management activities accounted for 38.34 *per cent* of total expenditures between 2017 and 2022, among the sampled ULBs. The details of total allotment and expenditure incurred from various sources during the period 2017-18 to 2021-22 by the test checked ULBs is given in ***Appendix 1.2***.

1.6 Audit Framework

1.6.1 Audit Objectives

This performance audit was conducted to assess whether:

- "Strategy and Planning" of solid waste management in ULBs was effective in dealing with the wastes generated and concurrent with the prevailing legal framework;
- Municipal tasks associated with solid waste management including collection, segregation, storage, transportation, and disposal 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 were adequate and effective.

1.6.2 Scope and Methodology of Audit

The performance audit covered management of municipal solid waste for the period 2017-18 to 2021-22. Audit collected data and information available with the Urban Development Directorate, Urban Local Bodies (ULBs) and Uttarakhand Pollution Control Board (UKPCB). Joint physical inspection of solid waste management sites was also conducted along with the officials of ULBs.

An entry conference with the Additional Chief Secretary, Urban Development Department (UDD) was held on 12 October 2022 in which the audit objectives, criteria, scope and methodology were discussed. An exit conference to discuss the draft observations was held on 06 September 2023 with Additional Secretary, UDD and Member Secretary, UKPCB. The views expressed by the concerned officers during the exit conference have been included, wherever necessary.

1.6.3 Audit Criteria

The criteria for evaluating the performance of SWM was derived mainly from:

- Manual of municipal solid waste management, 2016.
- The solid waste (Management and Handling) rules, 2016.
- Construction and demolition waste management rules, 2016.
- Performance parameters set out in service level benchmarking (SLB) guidelines; and
- Uttarakhand Pollution Control Board (UKPCB) guidelines.

1.6.4 Sampling

The waste is managed in the State by 102 ULBs (nine Nagar Nigams, 42 Nagar Palika Parishads and 51 Nagar Panchayats). In each tier of ULBs (Nagar Nigams, Nagar Palika Parishads and Nagar Panchayats)- two Nagar Nigams, 10 *per cent* Nagar Palika Parishads and five *per cent* Pagar Panchayats from each region had been selected. The audit units were selected by applying simple random sampling (region wise) using IDEA application software.

Apart from above, one Nagar Palika Parishad and one Nagar Panchayat of char dham route were also selected to check the management of solid waste in these areas. Further, apart from ULBs, Regional Offices of UKPCB of both the regions had also been selected. Overall, 17 units, 13 ULBs[1] and four regional offices[2] of State Pollution Control Board were selected for performance audit. Selected ULBs are depicted in the map below:

Photo-1.1: Map of Selected ULBs

1.7 Acknowledgement

Audit acknowledges the cooperation of the Government of Uttarakhand (GoU), Member Secretary, Uttarakhand Pollution Control Board and appreciates the assistance provided by the field functionaries of these departments for smooth conduct of the audit.

[1] Four Nagar Nigams: Dehradun, Haridwar, Haldwani & Rudrapur; Five Nagar Palika Parishads: Mussoorie, Khatima, Barkot, Nainital & New Tehri; Four Nagar Panchayats: Dineshpur, Naugaon, Swargashram Jonk & Augustmuni.

[2] Dehradun, Roorkee, Haldwani & Kashipur.

1.8 Structure of the report

This performance audit report has been structured keeping in mind the major components of solid waste management i.e. collection, segregation, transportation, storage and disposal of waste, human resources, functioning of regulatory bodies in respect of relevant acts and rules.

Audit findings relating to the deficiencies and gaps noticed in the test-checked Urban Local Bodies have been discussed in detail in the respective chapters.

Chapter-2

Planning and Operationalization of Projects under Solid Waste Management (SWM) in Urban Local Bodies (ULBs)

CHAPTER-2

Planning and Operationalization of Projects under Solid Waste Management (SWM) in Urban Local Bodies (ULBs)

Municipal Solid Waste Management (MSWM) is essentially a municipal function and it is mandatory for all municipal authorities to provide this service efficiently to keep the cities and towns clean, process the waste and dispose of the residual Municipal Solid Waste (MSW) in an environmentally acceptable manner. Audit noticed in the test checked ULBs that, the Detailed Project Reports (DPRs) were prepared without adherence to guidelines and accurate baseline data. MSWM plans and Contingency plans (CPs) were not prepared. Except for Nagar Nigam Dehradun, ULBs did not establish waste deposition centers for Domestic Hazardous Waste (DHW). Similarly, test checked ULBs, except Nagar Nigam Dehradun did not have information on Construction and Demolition (C&D) waste. The sampled ULBs did not establish infrastructure projects within the prescribed time frame, and many projects are yet to be completed. Only one out of five ULBs carried out bioremediation of capping of old and abandoned dump sites. Despite DPR approval and fund transfers, the test checked ULBs remained pending in initiating project establishment.

Solid waste management projects are infrastructure projects necessary for processing and disposal of collected waste. Nature of projects differ according to the nature of waste generated in an urban local body (ULB). For example, projects to be set up are for Composting, Material Recovery Facility, Waste to Energy, Biomethanation and Refused Derived Fuel etc. MSWM manual, 2016 prescribe conduct of a baseline study to understand the nature of waste, to ensure set up of right kind of projects and to prepare the Detailed Project Report (DPR) by ULB. Further, to ensure timely completion of projects, timelines are prescribed in the SWM Rules 2016 as per **Table-2.1** below:

Table-2.1: Prescribed Timelines for activities to be done as per SWM Rules

Sl. No.	Activity	Time limit
1.	Identification of suitable sites for setting up solid waste processing facilities	01 year
2	• Procurement of suitable sites for setting up solid waste processing facility and sanitary landfill facilities. • Enforcing waste generators to practice segregation of wastes at source. • Ensure door to door collection of segregated waste and its transportation in covered vehicles to processing or disposal facilities. • Ensure separate storage, collection and transportation of construction and demolition waste.	02 years
3	Setting up solid waste processing facilities by all local bodies.	03 years
4	Bioremediation or capping of old and abandoned dump sites.	05 years

The status of detailed project reports (DPRs) of solid waste management in 102 Urban Local Bodies of Uttarakhand was as per the **Table-2.2** below:

Table-2.2: Status of Detailed Project Reports

Particulars	Total DPRs	Number of ULBs covered
Total DPRs prepared	65	92
DPRs approved	62	89
DPRs at different stage of approval	03	03

Source: Information provided by the department.

DPRs for 10 newly formed ULBs were yet to be prepared.

Audit observed various lacunae in the activities related to SWM Planning and timely completion of Projects in the test checked ULBs as discussed in the following sections.

2.1 Municipal Solid Waste Management (MSWM) and Contingency Plans

2.1.1 MSWM Plan

Solid Waste Management Rules 2016 {Para 15 (a)}and MSWM Manual 2016 (Section 1.4.6) emphasised the need for ULBs to prepare a detailed SWM plan with short term (five years) and long-term (20-25 years) actions. The short-term plan should lead to the achievement of the long-term plan. Each short-term plan should be reviewed every 2-3 years, to ensure higher success of implementing all plan activities. Short-term plan should cover aspects of institutional strengthening, community mobilisation, waste minimisation initiatives, waste collection and transportation, treatment and disposal. The responsibility for preparation and implementation of the plan lies with Municipal Commissioner/Executive Officer of the respective ULB.

Audit noticed that none of the sampled units prepared the Municipal Solid Waste Management Plans. The State Government in its reply stated (December 2023) that it has currently formulated the Solid Waste Management Action Plan 2022-25. The reply itself clarifies that no Solid Waste Management Action Plan was implemented for the audit period.

2.1.2 Contingency Plan

MSWM Manual, 2016 (Section 5.4) stipulated that ULBs should prepare contingency plans for appropriate storage of waste, to tide over situations of non-performance of processing, treatment and disposal facilities. The Municipal Commissioner/Executive Officer of the respective ULBs were responsible for the plan preparation and implementation.

In test checked 13 ULBs, records revealed that none of the ULBs had prepared contingency plans. The impact of not-preparing of contingency plan was reflected in adoption of adhoc approach as illustrated through two case studies below:

Nagar Palika Parishad (NPP) Mussoorie:

Records of NPP Mussoorie revealed that:

- NPP Mussoorie was disposing its MSW in sanitary landfill site at Nagar Nigam (NN) Dehradun till July 2022. Thereafter, NN Dehradun denied receiving and disposing MSW of NPP Mussoorie.

- In the absence of a contingency plan, NPP Mussoorie contracted (November 2022) a firm to dispose of its MSW. However, the details of site where the firm was disposing off the municipal solid waste were not available with the Palika. On enquiry, the NPP Mussoorie stated that the firm was disposing MSW in Ghaziabad and that the firm will provide relevant certificate after six months. The reply confirms that the Palika was unaware about the actual disposal of MSW and relied solely on the firm for such information.
- As per Rule 16 (6) of solid waste management rules 2016, the duties of State Pollution Control Board (SPCB) were to regulate inter-state movement of waste. However, SPCB was not intimated about transferring of MSW from one State to another by the NPP Mussoorie. In Exit conference (September 2023), the Member Secretary, Uttarakhand Pollution Control Board (UKPCB) stated that ULBs had not informed Pollution Control Board (PCB) regarding transfer of waste. However, the matter will be investigated.

Nagar Panchayat Dineshpur:

The Nagar Panchayat Dineshpur faced a challenge in disposing of MSW as it didn't have its own land for the purpose. To address this, it rented four sites for dumping MSW between 2017-18 and 2021-22. However, due to the absence of a contingency plan, the Panchayat had to repeatedly change the rented land in response to public protests. The details of land taken during the period on rent were as per ***Appendix-2.1***. The aerial view of dumping of MSW in rented lands is shown in the photographs 2.1 & 2.2 below.

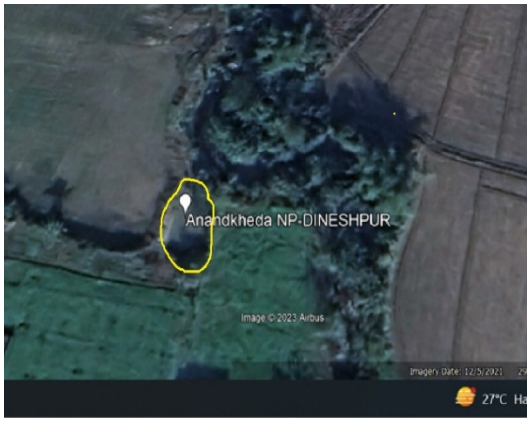


Photo-2.1: Aerial view of dumping of MSW in Anandkheda (03 February 2023)

Photo-2.2: Aerial view of dumping of MSW in Ramkot (03 February 2023)

During Exit Conference (September 2023), the Additional secretary assured that instructions will be issued to all the urban local bodies to prepare a contingency plan and the issues of NPP Mussoorie and Nagar Panchayat Dineshpur will be looked into. Further, the State Government emphasized (December 2023), that in situations where land is not readily accessible for solid waste management (SWM) purposes, alternative measures have been implemented. Specifically, 630 NADEP[1] Pits and 73 plastic

[1] NADEP (National Agribusiness Development Programme) composting is a natural process by which biomass wastes, soil wastes and animal wastes are biologically degraded and decomposed into an organic compost.

compactors have been strategically installed or constructed across multiple urban local bodies (ULBs) within the State. These installations serve as decentralized resources facilitating the efficient disposal of both organic waste and plastic waste.

While appreciating recent initiatives by the Government, the Audit re-affirms the need for immediate preparation of Contingency Plan by all ULBs in the State.

2.2 Data regarding generation, collection and disposal of Domestic Hazardous Waste not maintained

Rule 15 (i) of Solid Waste Management Rules 2016 prescribes to establish waste deposition centres for domestic hazardous waste[2] and to give direction for waste generators to deposit domestic hazardous wastes at this centre for its safe disposal. Such facility shall be established in a city or town in a manner that one centre is set up for the area of twenty square kilometres or part thereof and the timings of receiving domestic hazardous waste at such centres should be notified. It was the responsibility of the Sanitary Inspector/Medical Health Officer (MHO) to maintain data and Municipal Commissioner/Executive Officer were responsible for establishment of deposition centre of the respective ULBs.

None of the test checked ULBs had maintained records/data relating to generation, collection and disposal of domestic hazardous waste. Further, no waste deposition centres were established by the test checked ULBs except Nagar Nigam Dehradun, which established it in 2020-21.

While accepting the facts, the Additional Secretary stated in the Exit Conference (September 2023) that instruction will be issued in this regard and timely review will also be done. The State Government further stated (December 2023) that the establishment of deposition centres for domestic hazardous waste is under process. Instructions have been issued to all the ULBs for collection and disposal of domestic hazardous waste along with bio medical waste.

2.3 Management of Construction & Demolition (C&D) Waste

The Construction & Demolition (C&D) waste normally contains inert material, but some harmful materials could also be present which can be detrimental to its immediate surroundings. C&D waste also leads to air pollution as it may carry dust, particulate matter like PM10, asbestos and other pollutants that may get mixed with air. To prevent air pollution the C&D waste should be kept in containers and its timely removal should be ensured.

Rule (6) of construction and demolition waste management Rules, 2016 describes the duties of local authority (Municipal Commissioner/Executive Officer). The local authority shall issue detailed directions regarding proper management of C&D waste, shall make arrangements and place appropriate containers for collection of waste, shall get the collected waste transported to appropriate sites for processing and disposal, shall

[2] "Domestic Hazardous Waste" means discarded paint drums, pesticide cans, CFL bulbs, tube lights, expired medicines, broken mercury thermometers, used batteries, used needles and syringes and contaminated gauge, etc., generated at the household level.

keep track of the generation and establish a data base and update once in a year and shall create a sustained system of information, education and communication for C&D through collaboration with expert institutions and civil societies and also disseminate through their own website.

Records of the test checked ULBs revealed that-

- Byelaws were not framed for C&D waste, resulting in absence of the legal authority to enforce penalties or fines by ULBs.
- Appropriate sites were to be identified/demarcated for processing & disposal. However, it was noticed that the site for C&D waste was available only in Nagar Nigam Dehradun. In rest of the 12 test checked ULBs, there were no sites available for C&D waste.
- Data regarding C&D waste generated, collected and disposed was available only in Nagar Nigam Dehradun (from November 2020). No data was available in rest of 12 test checked ULBs.
- A sustained system of information, education and communication for C&D waste through collaboration with expert institutions and civil societies was neither created nor disseminated through their own website.

In the absence of appropriate collection, transportation, processing and disposal of C&D waste in most ULBs, the adverse consequences on environment and human health cannot be ruled out. Further, ULBs even failed to keep track of the generation of C&D waste within their jurisdiction.

The State Government replied (December 2023) that three C&D waste processing plants are being proposed in National Clean Air Program Cities viz. Dehradun, Rishikesh & Kashipur. The facilities established in the said cities can be used by the nearby ULBs. The reply is self-explanatory that these facilities are yet to be installed.

2.4 Framing of Byelaws

Rule 15 (e) of the Solid Waste Management Rules 2016, stipulate to frame byelaws[3] incorporating the provisions of these rules within one year from the date of notification of these rules. Timely implementation must be ensured, as one of the duties and responsibilities of local authorities. It was the responsibility of the Municipal Commissioner/Executive Officer of the respective ULB for preparation and Municipal Board for approval of Byelaws.

Records revealed that only five[4] out of 13 ULBs test checked had framed and notified byelaws. Thus, the failure of ULBs in framing byelaws showed non-compliance with the SWM Rules 2016.

The State Government stated (December 2023) that Byelaws have been prepared in 92 municipal bodies of the State and the process of preparing byelaws in 10 newly formed municipal bodies is in progress.

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[3] "Byelaws" means regulatory framework notified by local body, census town and notified area townships for facilitating the implementation of these rules effectively in their jurisdiction.

[4] NN-Haldwani, NPP-Mussoorie, NPP-Barkot, NPP-Tehri, NP-Augustmuni.

2.5 Shortcomings in the preparation of DPRs

2.5.1 Ineffective Baseline waste analysis

Clause 1.4.3 of Municipal Solid Waste Management Manual (MSWM) 2016, Vol. II states the main objective of a baseline study[5] is to understand the existing solid waste system as accurately as possible and utilise that information for further planning, implementation and monitoring processes. Local conditions are to be considered while assessing the inadequacy of existing service and planning for the future. The baseline data is the critical aspect of DPRs as type of MSWM systems to deploy depend on composition, quantity and seasonality of waste.

Section 1.4.3.3.1 of Manual on MSWM 2016, stipulated that for the purpose of long-term planning, the average amount of waste disposed by a specific class of generators may be estimated only by averaging data from several samples. These samples were to be collected continuously for a period of seven days at multiple representative locations within the jurisdiction of the ULB, in each of the three main seasons viz. summer, winter and rainy season.

In none of the test checked ULBs, the samples were collected continuously for a period of seven days at multiple representative locations within the jurisdiction of the ULB. Hence, the baseline study conducted for the said purpose was not based on actual waste generated in the ULBs.

2.5.2 Doubtful conduct of Waste Analysis

Waste analysis involves determining the exact composition of a waste product. This process includes conducting several tests to identify determinants such as water content, pH levels, presence of heavy metals and bacterial content. It is essential for each ULB (Urban Local Body) to assess the quantity and composition of waste generated to effectively plan and design municipal solid waste management (MSWM) systems. The quantity and composition of MSW generated in the ULB determine the collection, processing and disposal options that could be adopted. They depend on factors such as the population, demographic details, principal activities in the city or town, income levels and lifestyle of the community.

The examination of the DPRs of four[6] ULBs for waste analysis revealed the following shortcomings:

- ULBs did not base DPRs on actual waste generated since they did not document or have specific data sheets or supporting records available.
- Weighbridges were unavailable in these ULBs during the period 2017-22, so the collected waste could not have been weighed. Consequently, an inflated assumption of waste generation was made in the preparation of DPRs.

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[5] The study is for assessment of the current situation or status and gap analysis and to analyse system deficiencies with due consideration of local demography, physical location, growth objectives as well as social and environmental conditions.

[6] NPP-Barkot, NPP-Tehri, NP-Naugaon, NP-Augustmuni.

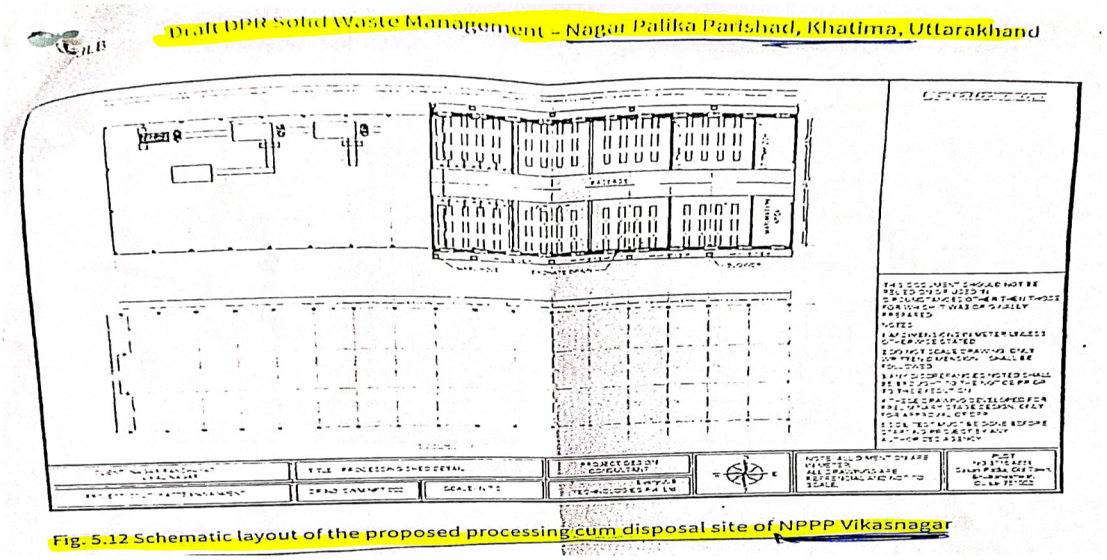
- DPRs were prepared using data from the Central Pollution Control Board's waste survey in 2004-05 in selected Indian cities and population figures from Census 2001 and hence clearly outdated.

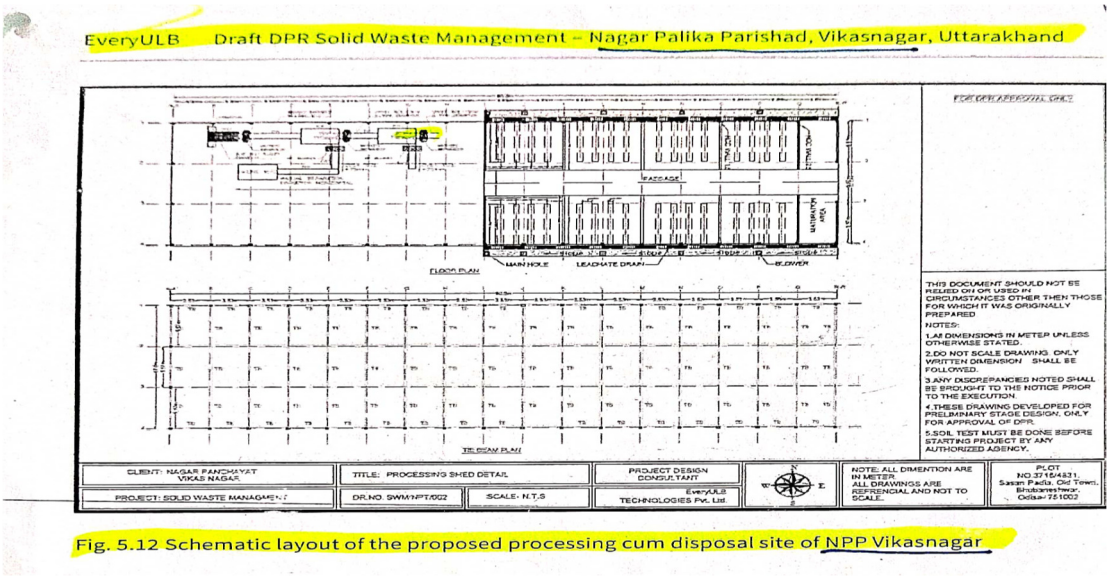
2.5.3 Duplication of critical parameters in DPRs

MSW composition and characteristics vary considerably, not only between ULBs but also within a ULB. The DPRs are to be prepared keeping the local conditions and geography in mind. The Municipal Commissioner/Executive Officer is responsible for preparation and Director UDD is responsible for scrutiny of DPRs.

The schematic layout of the proposed processing cum disposal site of NPP Vikas Nagar (Garhwal region) and that of NPP Khatima were the same. Similarly, environmental conditions of two different cities, namely Naugaon and Barkot were shown as the same in DPRs of said cities. These deficiencies raise doubts over the quality of the DPRs. The poor quality of DPRs in turn has serious implications for the implementation of the SWM projects.

Photo-2.3: The Schematic layouts of the proposed processing cum disposal sites of NPP Vikas Nagar and NPP Khatima are depicted in below:





2.5.4 Photograph of one ULB was used for another ULB (Description of the Environment)

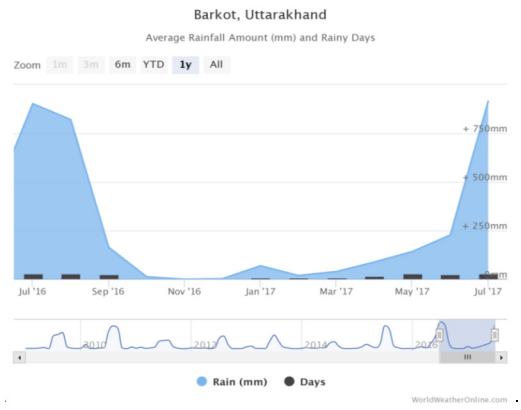


Photo-2.4: Description of Environment photo given in the Draft DPR of Nagar Palika Parishad Barkot

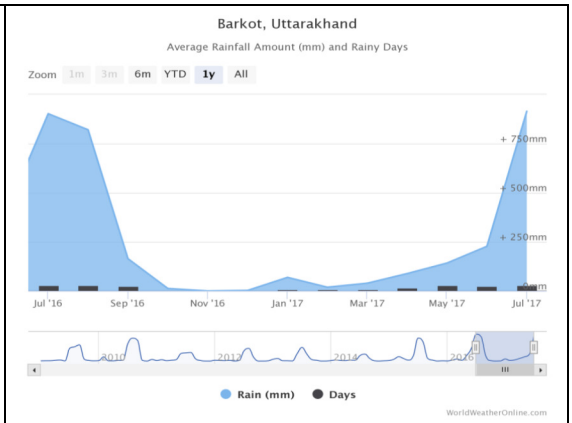


Photo-2.5: The same picture (Photo-2.2) is also given in the Draft DPR of Nagar Panchayat Naugaon

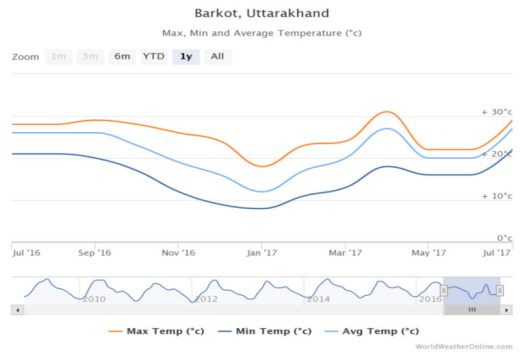


Photo-2.6: Description of Environment chart given in the Draft DPR of Nagar Palika Parishad Barkot

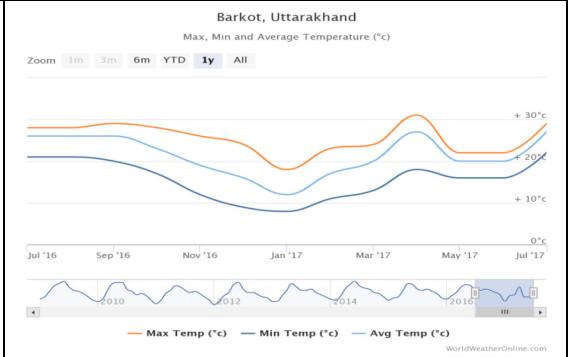


Photo-2.7: The same picture (Photo-2.4) is given in the Draft DPR of Nagar Panchayat Naugaon

The duplication of DPRs indicate that the most important aspect of planning MSWM systems is not undertaken responsibly.

In Exit conference (September 2023), the Additional Secretary assured that the points observed by the audit will be looked into and corrective measures will be taken as per projects requirement. The State Government further stated (December 2023) that Solid Waste generation changes in Uttarakhand in different months and waste generation increase/decreases/fluctuate as per Char dham yatra, kanvar, different Snan etc. Besides, every effort is made by ULBs to procure land for SWM processing and disposal facility. As the forest cover is more than 72 *per cent*, getting land for SWM purpose is a big challenge. The reply itself confirms that no action plan is either in place or available with the government to mitigate the problems.

2.5.5 Status of Projects against approved DPRs

Status of projects in test checked ULBs revealed that though the DPRs were approved and the funds were transferred to the ULBs, the main work of establishment of projects were yet to be initiated in 11 out of 13 projects. The status of project work of test checked ULBs as of March 2022 was as per the ***Appendix-2.2***.

The following points were noticed in the test checked ULBs-

- DPRs were prepared and approved without availability of land in two ULBs at NPP Khatima and NP Augustmuni.

- Work was under progress in four ULBs at Mussoorie, Nainital, Dineshpur and Barkot.
- Processing plant was running but Refused Derived Fuel (RDF) & mixed waste was being dumped at SLF sites in two ULBs at Haridwar and Dehradun.
- Processing plant (MRF centre, compost pits) was established but sanitary landfill yet to be established at NPP Barkot.
- In NP Dineshpur, no action initiated after demise of contractor engaged for the work.

While accepting the facts it was stated by the Additional Secretary in the exit conference (September 2023) that the matter will be examined. 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.

2.5.6. Case studies of DPRs of test checked ULBs

(a) Nagar Palika Parishad Nainital

A DPR titled as "A multidimensional remediation and innovative tailoring of materialistic waste (AMRITAM) was prepared jointly by Municipal Board Nainital and Kumaon University with an innovative approach[7] for the collection, segregation and upcycling of solid waste". The DPR was approved by the National Mission of Himalayan Studies, Almora (NMHS) which sanctioned (October 2019) a grant of ₹ 3.50 crore to be utilized within a period of three years. The land about 0.884 acres was selected at Narayan Nagar, Nainital for setting up a waste processing plant.

Audit observed the following deficiencies:

- The daily generated waste was 15 tons per day. However, the DPR prepared for processing plant of the capacity of five tons per day. This showed that the DPR was not based on realistic figures.
- Out of total sanctioned amount of ₹ 3.50 crore, an amount of ₹ 3.30 crore (94 *per cent* of total grant) had been incurred by the ULB, but no work has been initiated at the proposed site for setting up the processing plant due to hindrance made by general public. The expenditure was incurred on- procurement of four out of six equipments[8], consumables, manpower & contingencies etc.

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[7] The key objective of the project was "Waste to Wealth", where an advance "Universal waste upcycling machine" had to be developed for the effective disposal of the solid waste and be a revenue generator for the municipality. In addition to this, the concept of Micro-bio-composting plants for the bio-degradable waste was thought to enhance the ecology of the project site; thereby also helps to maintain the biodiversity of the project site.

[8] The equipments (four out of six) procured were installed in the laboratory of the Department of Chemistry, Kumaon University, instead of at the proposed site.

- Further, for remaining two equipment which were to be procured as per sanctioned DPR, the ULB invited tenders for five equipment[9]. It was also noticed that the funds were not available in project head for the new work order.

On this being pointed, the Executive Officer agreed with the facts and stated that since the DPR was prepared by Kumaon University on an experimental basis with the capacity of five TPD, but at the time of construction it will be installed with the capacity of 25-30 TPD, considering the requirement of the NPP Nainital. Further, it was also intimated that to meet the actual demand, a proposal for the remaining amount will be prepared and sent to the Government/ District Magistrate.

The Additional Secretary stated in the exit conference (September 2023) that the matter will be examined.

(b) Nagar Panchayat Agustmuni

Government of Uttarakhand gave financial and administrative approval for setting up of processing plant and waste disposal site development in NP Agustmuni on 17 June 2019 amounting to ₹ 97.53 lakh[10].

Records revealed that the construction work of the waste processing plant was yet to be started due to unavailability of suitable land. Further, the proposal for allotment of land was sent in August 2020 i.e., after more than a year of approval of DPR (June 2019). Thus, the DPR was prepared without availability/acquiring of land which was the basic requirement.

Against sanctioned amount of ₹ 77.38 lakh, an expenditure of ₹ 15.58 lakh was incurred on procurement of vehicle, preparation of DPR and construction of shed[11].

The Additional Secretary stated in the exit conference (September 2023) that an enquiry will be set up in this case.

Thus, the department's easy approach towards establishment of projects, failed to ensure appropriate processing and waste reduction in dumping sites.

2.6 Poor achievement against timelines in creation of infrastructure projects

As per rule 22 of SWM Rules 2016, the necessary infrastructure for implementation of these rules shall be created by the local bodies and other concerned authorities, as the case may be, on their own directly or by engaging agencies within the time frame specified.

The status of Solid Waste Management (SWM) infrastructure given as per **Table-2.3** below:

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[9] These equipment were not included in the sanctioned DPR. Work orders for procurement of above equipment worth ₹ 4.03 crore including running and operating cost of processing plant for a period of three year were issued in December 2021.

[10] Against the sanctioned cost, ₹ 33.15 lakh was to be borne from Swachh Bharat Mission, ₹ 60.81 lakh from 4th State Finance Commission and ₹ 3.57 lakh from Panchayat Nidhi. An amount of ₹ 77.38 lakh (79 *per cent*) was released to the panchayat up to July 2020.

[11] Payments to the tune of ₹ 7.13 lakh for preparation of DPR and construction of shed were irregular as these items were not included in the sanctioned DPR.

Table-2.3: Status of SWM infrastructure

Sl. No.	Activity	Time limit from the date of Notification of SWM Rules 2016	Status in Test checked ULBs			
			Implem -ented	Not imple- mented	Not appli- Cable	Remarks
1	2	3	4	5	6	7
1.	Identification of suitable sites for setting up solid waste processing facilities	01 year	11	02	--	Sites not identified in NP Augustmuni & NPP Khatima
2	Identification of suitable sites for setting up common regional sanitary landfill facilities for suitable clusters of local authorities under 0.5 million population and for setting up common regional sanitary landfill facilities.	01 year	05[12]	-	08	Common SLF site identified as clusters in five ULBs. In rest of eight ULBs individual site
3	Procurement of suitable sites for setting up solid waste processing facility and sanitary landfill facilities.	02 years	11	02	--	Sites not procured in NP Augustmuni & NPP Khatima
4	Enforcing waste generators to practice segregation of bio-degradable, recyclable, combustible, sanitary waste, domestic hazardous and inert solid wastes at source.	02 years	13	--	--	Partially implemented as discussed in para 3.2
5	Ensure door to door collection of segregated waste and its transportation in covered vehicles to processing or disposal facilities.	02 years	13	--	--	Partially implemented as transportation was not being done in covered vehicles in all the ULBs as discussed in para 3.4.1
6	Ensure separate storage, collection and transportation of construction and demolition waste.	02 years	01	12	--	Separate storage, collection and transportation of C&D Waste ensured only in NN Dehradun as discussed in para 2.3
7	Setting up solid waste processing facilities by all local bodies having	03 years	04	-	09	➢ NN Dehradun and NN Haridwar have processing facilities (SLF).

[12] Cluster- NN Haldwani, NN Rudrapur (NPP Kichha, NPP Bhawali, NP Lalkuwa, NP Bhimtal non-test checked ULBs), Cluster- NP Dineshpur (NP Gularbhoj non-test checked ULB), Cluster-NPP New Tehri (NPP Chamba non-test checked ULB), Cluster- NP Swargashram Jonk (NN Rishikesh, NPP Doiwala non-test checked ULBs).

Sl. No.	Activity	Time limit from the date of Notification of SWM Rules 2016	Status in Test checked ULBs			
			Implem -ented	Not imple- mented	Not appli- Cable	Remarks
1	2	3	4	5	6	7
	1,00,000 or more population.					➢ SLF construction under process in NN Haldwani and NN Rudrapur
8	Setting up solid waste processing facilities by local bodies and census towns below 1,00,000 populations.	03 years	07[13]	02[14]	04[15]	➢ Under process in seven ULBs ➢ Land not finalised in two ULBs. ➢ Not applicable in four ULBs as population is more than 1,00,000.
9	Setting up common or stand-alone sanitary landfills by or for all local bodies having 0.5 million or more population for the disposal of only such residual wastes from the processing facilities as well as untreatable inert wastes as permitted under the Rules.	03 years	NA	NA	NA	--
10	Setting up common or regional sanitary landfills by all local bodies and census town under 0.5 million population for the disposal of permitted waste under the rules.	03 years	05	-	08	As given in point no. 02
11	Bioremediation or capping of old and abandoned dump sites.	**05 years**	**01[16]**	**04[17]**	**08**	**As discussed in para 2.7**

Source: Information obtained from test checked ULBs.

As can be seen from the above table:

- The infrastructure was not created in any of the sampled units in the given time frame of SWM 2016.
- In two out of 13 test checked ULBs, identification/procurement of suitable sites for setting up solid waste processing facilities was yet to be done.

[13] NPP Mussoorie, NPP Nainital, NPP New Tehri, NPP Barkot, NP Dineshpur, NP Swargashram Jonk, NP Naugaon.
[14] NPP Khatima, NP Augustmuni.
[15] NN Dehradun, NN Haridwar, NN Rudrapur and NN Haldwani.
[16] Capping done in NPP Mussoorie.
[17] Bioremediation or capping not done in NN Dehradun, NN Haridwar, NPP Khatima, & NPP Barkot.

- Separate storage, collection and transportation of construction and demolition waste was ensured only in Nagar Nigam Dehradun.
- Bioremediation or capping of old and abandoned dump sites were done only in one out of five ULBs.

Thus, the failure to create the necessary infrastructure resulted in dumping of waste in open areas and effecting the environment and health of the public.

While accepting the facts it was stated by the Additional Secretary in the exit conference (September 2023) that as per SWM Rules 2016 all the activities were to be done within five years i.e., till 2021-22. However, the work is in progress and will be completed by December 2024. Further, the State Government stated (December 2023) that for covering 92 municipal bodies, 65 sites have been selected for construction of waste management projects. As per the progress of solid waste management in the State, a target of December 2024 has been set to complete door-to-door collection, source segregation and processing.

2.7 Bioremediation/Capping of old and abandoned waste dump sites

Rule 15 (zk) of SWM Rules 2016 mentions that in the absence of bio-mining and bioremediation of dumpsite, the local authorities shall scientifically cap dumpsite as per landfill capping norms to prevent further damage to the environment.

Rule 22 (11) provides five years time for bioremediation of old and abandoned dump sites and for starting the process of capping them.

The Municipal Commissioner/Executive Officer was responsible for preparation, Director UDD for scrutiny and State Level Technical Committee/ High Power Committee, Municipal Board was responsible for approval of DPR of the respective ULB.

Records of the test checked ULBs revealed that there were old and abandoned waste dumpsites in four out of 13 ULBs in which bioremediation/capping of old dumpsites was yet to be done, as depicted in the **Table-2.4** below:

Table-2.4: Status of Bioremediation/Capping of old dump sites in test checked ULBs

Sl. No.	Name of the ULB	Old Legacy Waste Dumpsite Location	Quantity of Legacy Waste at Dumpsite (Lakh	Status of DPR for disposal of Legacy Waste Dumpsites by
1	Nagar Nigam Dehradun	Danda Laukhand, Sahastradhara, Dehradun	6.24	Prepared and sent to Government for approval.
2	Nagar Nigam Haridwar	1. Sarai Dump site 2. Chandi ghat dumpsite,	4.21	Prepared and sent to Government for approval.
3	Nagar Palika Parishad Khatima	Aath taar, Lohia ghat Road, Khatima	0.33	Prepared and sent to Government for approval.
4	Nagar Palika Parishad Barkot	Shastri Nagar, Tiladi Road	0.02	Under preparation at ULB level
Total			**10.80**	

Source: Information provided by the ULBs.

As can be seen from the above table:

- The quantity of 10.80 lakh metric tons of legacy waste was lying unprocessed.
- Three DPRs were pending for approval at Government level while one DPR is under preparation stage at ULB level.

While accepting the facts it was stated by the Additional Secretary in the exit conference (September 2023) that after audit DPRs of Nagar Nigam Dehradun and Haridwar have been approved and remaining DPRs will also be approved at the earliest. The State Government further replied (December 2023) that the work of bioremediation of legacy waste is in progress. Out of the total legacy waste of 18.82 lakh metric tons in the State, 3.6 lakh metric tons of legacy waste have been disposed of, with the remaining being processed at various levels.

2.8 Recommendations

- ***The State Government needs to devise systems to assist ULBs in preparation of Solid Waste Management plans/action plans for effective implementation of waste management and monitor their effective implementation;***
- ***The State Government should ensure timely creation of the infrastructure of Solid Waste Management projects to avoid adhoc approaches adopted in the collection, storage, transportation and disposal of the solid waste to save the damaging environment. Responsibility must be fixed at all levels for inordinate delays in preparation, approval and establishment of SWM projects.***

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 ULBs[1], 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 ULBs[2] did not provide any uniform and one ULB[3] 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's[4] 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 two[5] 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 December2022)

[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 form 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 Storage[8]/transfer stations[9] in only four[10] 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)

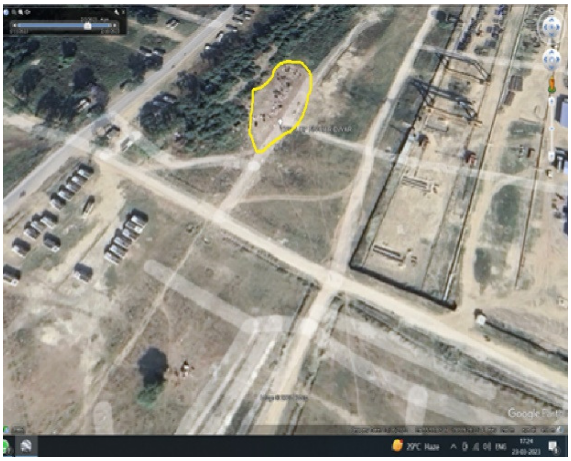


Photo-3.17: Aerial view (Geo tagging) of Secondary Storage facility in open area near new developing residential colony at Bairagi Camp, Haridwar (03 February 2023)

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 Landfill[11] (SLF) sites were available in the State[12]. 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 sites[13]. 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 trucks[14]) was lying in dumpsites measuring 75,074 sq meter (equivalent to 17 football fields[15]) 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 m^2.

- ***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)

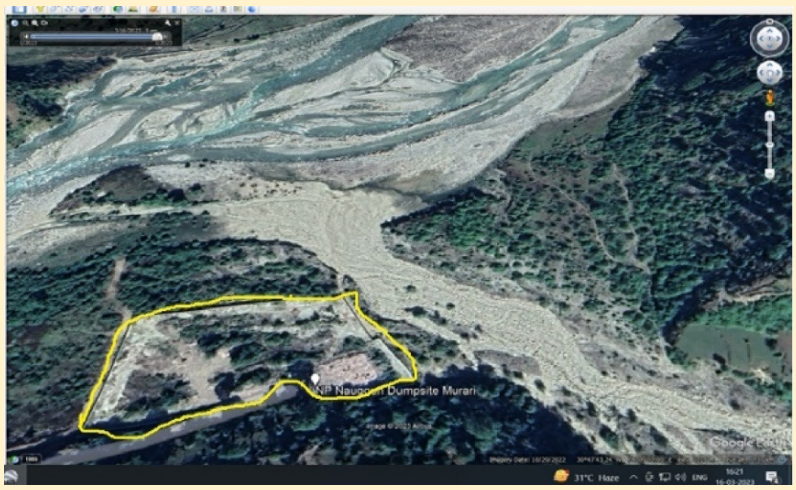


Photo-3.22: Aerial view (Geo tagged) of dumpsite at NP-Naugaon near river (16 March 2023)

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.

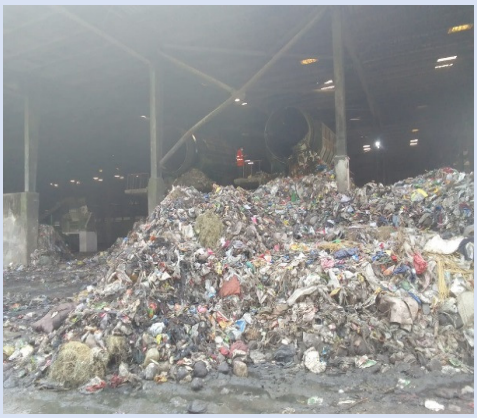


Photo-3.29: RDF at processing plant (29 October 2022)

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

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

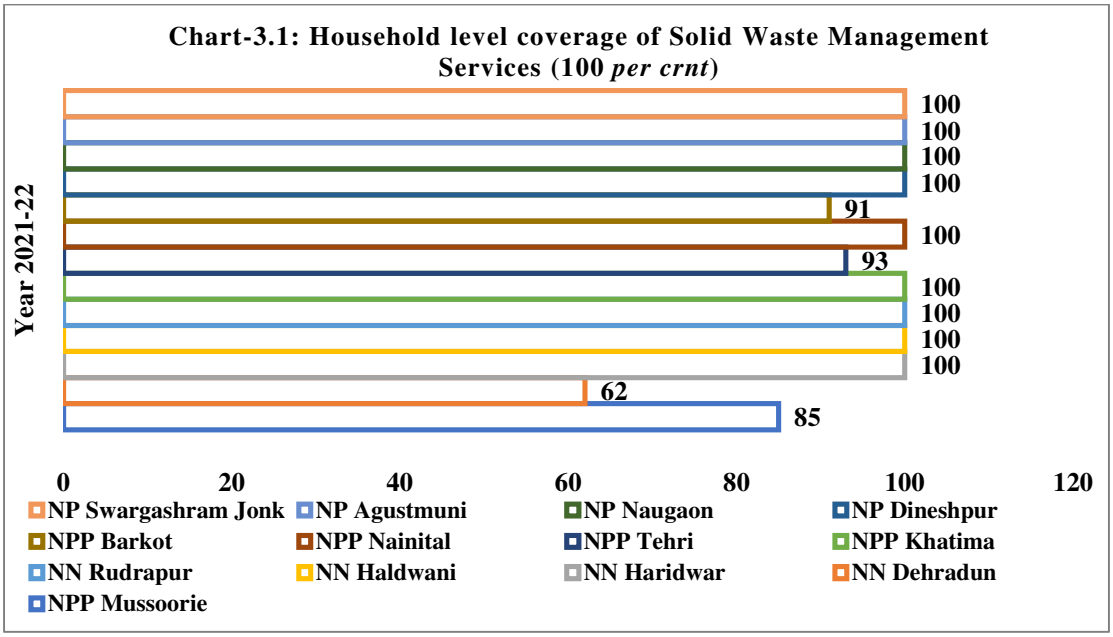
While accepting the facts it was informed by the Additional Secretary in the Exit Conference (September 2023) that an estimate for removal of RDF from the Landfill site has been prepared and after approval of the same RDF will be removed. The State Government further replied (December 2023) that 62 Solid 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-

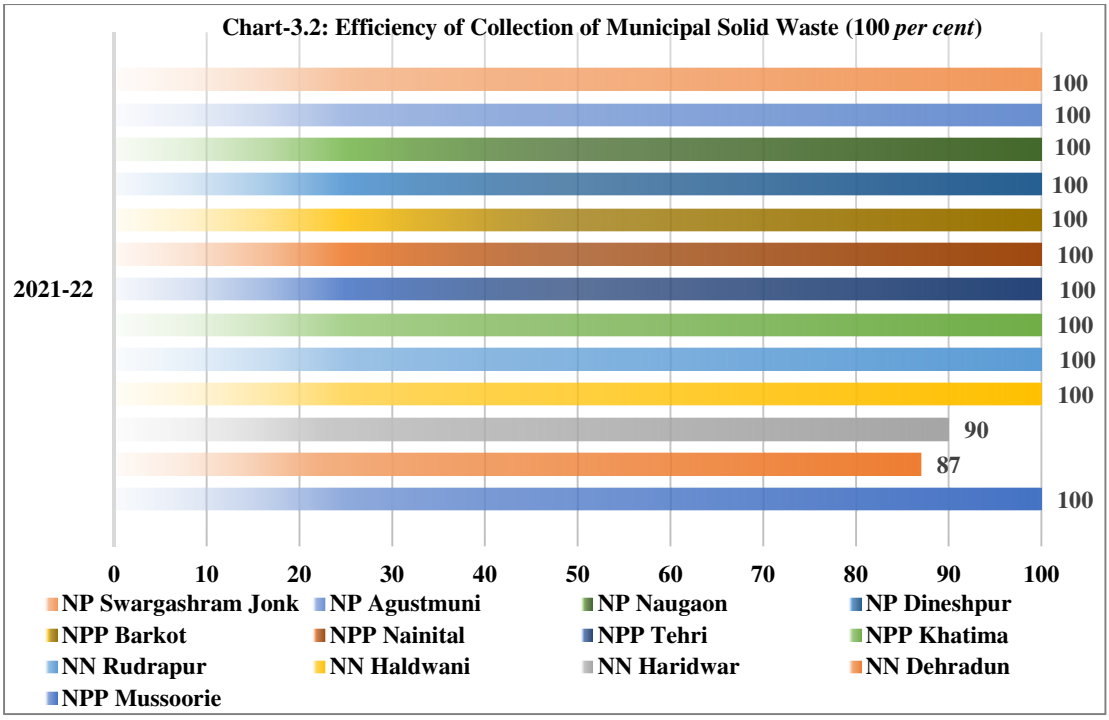
- **Household level coverage of Solid Waste Management Services:**

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.*

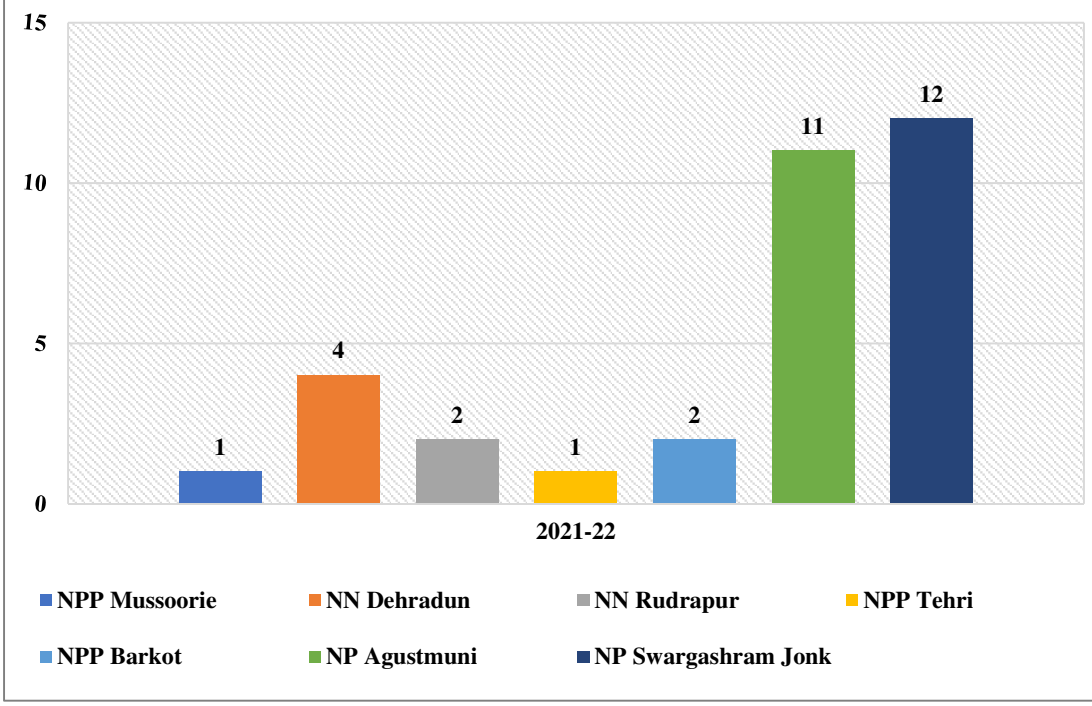
- **Extent of Segregation of Municipal Solid Waste:**

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 in NPP Barkot it was 67 *per cent* and in NN Haridwar it was 0.05 *per cent*. In rest of the 11[16] 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:

Chart-3.3: Extent of Municipal Solid Waste Recovered (80 *per cent*)



During 2021-22 out of 13 test checked ULBs, while in six[17] 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*.

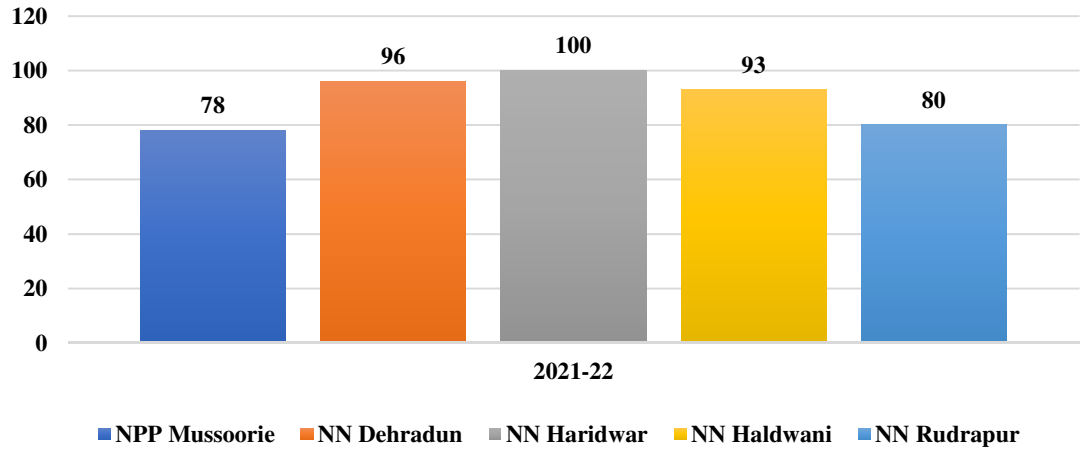
[16] NN Dehradun, NN Rudrapur, NN Haldwani, NPP Mussoorie, NPP Khatima, NPP Tehri, NPP Swargshram Jonk, NPP Nainital, NP Dineshpur, NP Augustmuni, NP Naugaon.

[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 eight[18] ULBs did not maintain data regarding customer complaints as shown in the **Chart-3.4** below:

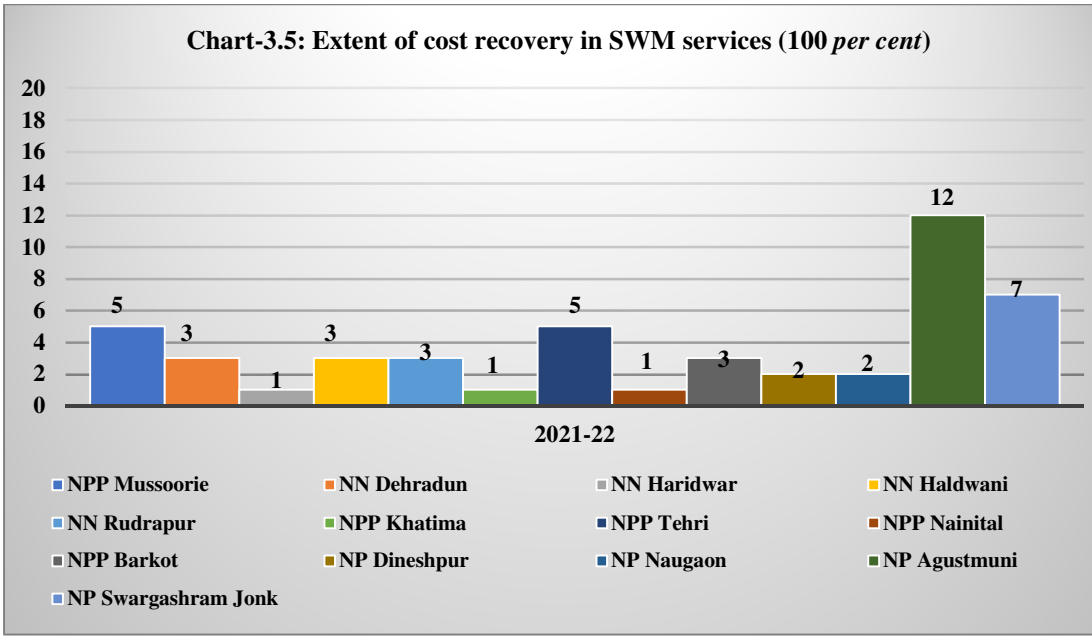
Chart-3.4: Efficiency in redressal of customer complaints (80 *per cent*)



- **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:

Chart-3.5: Extent of cost recovery in SWM services (100 *per cent*)

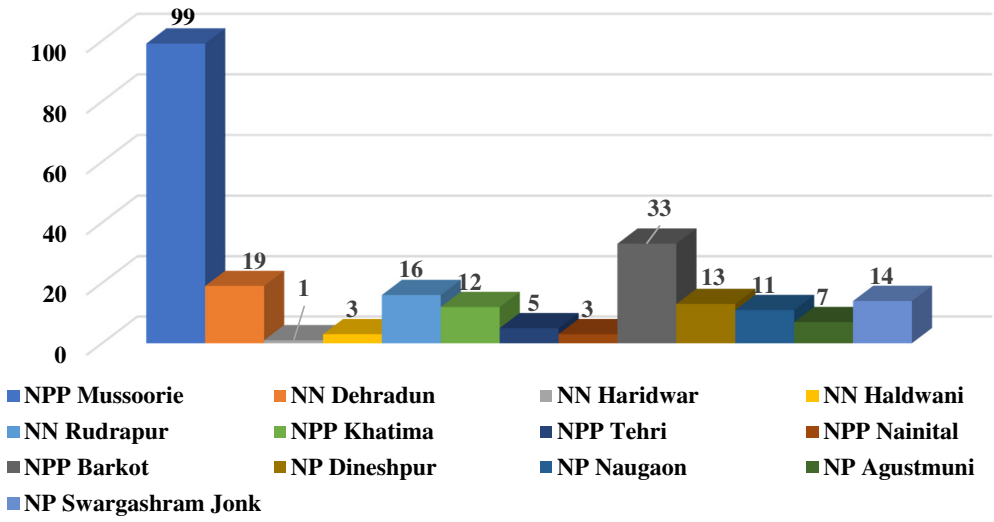


[18] NPP Khatima, NPP Tehri, NPP Swargshram Jonk, NP Dineshpur, NP Augustmuni, NP Naugaon, NPP Barkot and NPP Nainital.

- **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 Mussoorie[19] as shown in the **Chart-3.6** below.

Chart-3.6: Efficiency in collection of SWM charges (90 *per cent*)



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)).

Chapter-4
Monitoring and evaluation of Solid Waste Management System

CHAPTER-4

Monitoring and evaluation of Solid Waste Management System

Uttarakhand Pollution Control Board (UKPCB) was to enforce SWM Rules in the State. However, UKPCB did not review implementation of SWM Rules in all Urban Local Bodies (ULBs) as per mandated frequency during the period 2017-22. There was inter state movement of waste in two test check ULBs without intimation to both the State Pollution Control Boards of origin and destination states. ULBs were not submitting the annual reports timely and regularly. Complaints registration records were maintained only in five out of 13 test checked ULBs.

4.1 Inactive approach of Pollution Control Board regarding review of implementation of SWM Rules 2016

As per Rule 16 (1) (a) of SWM Rules, State Pollution Control Board was to enforce said SWM Rules in its jurisdiction. Accordingly, it was to review implementation of said SWM Rules in each ULB at least twice a year.

Table-4.1 below gives status of review of ULBs by four regional offices of Uttarakhand Pollution Control Board during 2018-22.

Table-4.1: Details of Reviews conducted

Name of the Regional Pollution Control Board	Number of ULBs under the RO, PCB	Number of ULBs reviewed	Number of ULBs not reviewed	Number of Reviews to be conducted during 2018-22	Actual Number of Reviews conducted (in *per cent*)
Dehradun	46	05	41	460	07*(02)*
Roorkee	14	02	12	140	05 *(04)*
Haldwani	25	01	24	250	03 *(01)*
Kashipur	17	04	13	170	05 *(03)*
Total	**102**	**12**	**90**	**1020**	**20 *(02)***

Source: Information provided by the department.

The above table indicates:

- Eighty-Eight *per cent* of the ULBs were not reviewed even once in last five years.
- The percentage of review conducted in last five years was minuscule i.e. ranged between one to four *per cent*.

National Green Tribunal (NGT) issued (January 2020) directions for effective compliance of SWM Rules, 2016. It also laid down interim compensation scale[1] for violation of said SWM Rules. Now in compliance to NGT directives, Regional Office of the Uttarakhand Pollution Control Board at Haldwani reviewed implementation of SWM Rules in five ULBs and imposed (April 2020) a penalty of ₹ 1.20 crore (₹ 24 lakh

[1] Any such continued failure will result in liability of every local body to compensation at the rate of ₹ 10 lakh per month per Local Body for population of above 10 lakhs, ₹ five lakh per month per Local Body for population between five lakhs and 10 lakhs and ₹ one lakh per month per other Local Body from 01 April 2020.

each ULB). However, its head office was yet to approve proposed penalty (till December 2022).

The inactive approach of the Uttarakhand Pollution Control Board was also corroborated in joint physical inspections. During these physical inspections, Audit observed instances of dumping of mixed waste in forest land, dumping of waste near highways, rivers, water bodies and agricultural land.(Photographs below may be referred to).

(A)The mixed waste was dumped in the forest land in Khatima, U.S. Nagar

Photo-4.1: Aerial view (Geo tagged) of dump in forest land (14 January 2023), NPP Khatima

Photo-4.2: Photograph taken at the time of Joint Physical verification of Dumping site (14 January 2023), NPP Khatima

(B) The mixed waste was dumped in the agriculture land in Nagar Panchayat Dineshpur, U.S. Nagar

Photo-4.3: Aerial view (Geo tagged) of the Dumping site (31 January 2023), NP Dineshpur

Photo-4.4: Photograph taken at the time of Joint Physical verification of Dumping site (31 January 2023), NP Dineshpur

The Member Secretary, Uttarakhand Pollution Control Board (UKPCB) stated (December 2023) that due to manpower shortage lesser reviews were conducted. The draft service rules for appointment to various cadres/vacant posts in UKPCB has been sent to State Government for approval. Action regarding pending penalty proposal is under consideration and action will be initiated after replies of the ULBs are received.

The inactive approach of the UKPCB towards review of implementation of SWM Rules can also be seen from the following events-

4.1.1 Regional Offices, Pollution Control Board ignorant of the inter state movement of waste

As per Rule 16 (6) of solid waste management rules, 2016, the duties of State Pollution Control Board were to regulate inter state movement of waste. Rule 18 (3) of the hazardous and other wastes (Management and Transboundary Movement) Rules, 2016 provides that in case of transportation of hazardous and other waste for final disposal to a facility existing in a State other than the State where the waste is generated, the sender shall obtain 'No objection certificate' from the State Pollution Control Board of both the States. Further, to regulate inter state movement of waste the Municipal Commissioner, Executive Officer, Member Secretary and Regional Officers Pollution Control Board were responsible.

Photo-4.5: Waste transported through Trucks in NPP Mussoorie (10 October 2022)

The regional offices of the State Pollution Control Board informed audit that no ULB/ other agency has intimated Pollution Control Board, regarding inter state movement of waste under their jurisdiction.

However, during audit of the test checked ULBs, it was noticed that inter state movement of waste was undergoing in two[2] out of 13 test checked ULBs without intimation to the State Pollution Control Board of both the States.

While accepting the facts Member Secretary, UKPCB stated (December 2023) that urban local bodies had not informed Uttarakhand Pollution Control Board regarding transfer of waste, however, the matter will be investigated. Board has issued letters to Director, Urban Development and all ULBs for compliance.

4.1.2 Uttarakhand Pollution Control Board's directions not complied by the Private Concessionaire

Uttarakhand Pollution Control Board gave (March 2018) consolidated consent to Dehradun Waste Management Pvt. Ltd. to establish and operate solid waste management facility. Subsequently, based on various inspections and complaints[3], the board noticed violations of SWM rules /environmental laws and imposed certain

[2] Nagar Palika Parishad Mussoorie and Nagar Nigam Haridwar.

[3] PCB inspected the site thrice (01 August 2019, 23 January 2020 & 19 February 2020) in the year 2019-20, apart from this, the PCB also inspected the site on complaint basis (03 April 2018, 12 July 2018 & 17 February 2022).

penalty. However, the same could not be collected till December 2022 due to ineffective pursuance of the matter, as detailed below:

- The Pollution Control Board (PCB) calculated environmental damages at ₹ 0.16 lakh per day from 01 August 2018 due to non-compliance with standards. However, the PCB did not follow up on the issued letter. Further, the firm had also not paid any environmental damage. After audit pointed out in September 2022, a letter was sent to the Municipal Commissioner, Dehradun, in October 2022, indicating that PCB consent should be obtained before finalizing financial/ administrative case of the firm. The firm submitted a bank guarantee of ₹ five lakh in lieu of compliance with environmental standards. However, the same had expired in March 2021 and the PCB did not initiate any action to renew the bank guarantee.
- A case was lodged against the firm in the designated court, Additional Chief Judicial Magistrate (ACJM) Dehradun, on 02 September 2022 for non-compliance with environmental standards. However, the case was lodged after the process of termination of the concessionaire agreement was initiated (June 2022) between the firm and the Nagar Nigam Dehradun.

While accepting the facts it was informed by the Member Secretary, UKPCB (December 2023) that earlier imposed penalty was not followed up due to shortage of staff, however, notice of ₹ 1.57 crore penalty has been issued to the firm by the Pollution Control Board. The recovery will be done at the earliest.

4.1.3 Submission of incomplete Annual Reports to CPCB

Rule 24 (3) of SWM Rules states that each State Pollution Control Board (SPCB) shall prepare and submit the consolidated annual report to the Central Pollution Control Board (CPCB) and Ministry of Housing and Urban Affairs on the implementation of the said Rules and action taken against non-complying local body by the 31st day of July of each year in prescribed form. The responsibility for preparation/review/submission of Annual Reports lies with the Municipal Commissioner/ Medical Health Officer (MHO), Executive Officer of the respective ULB and Member Secretary/Regional Officer Pollution Control Board.

It was noticed that the SPCB was compiling the reports received from regional offices/ULBs and furnishing the annual reports to CPCB in the prescribed time limit. However, cross verification of the annual reports with the individual reports furnished by the regional offices/Urban Local Bodies (ULBs) revealed following deficiencies:

- All the ULBs did not submit Annual reports to the SPCB.
- SPCB submitted consolidated annual report to the CPCB in time. Accordingly, data in respect of ULBs which submitted their annual report after due date could not be incorporated in consolidated annual report of the SPCB.

In respect of 13 test checked ULBs, Audit observed that:

- The annual report was submitted by five ULBs after the due date.

- No records regarding submission/non-submission of annual reports to SPCB was available in 10 ULBs (2017-18), six ULBs (2018-19), three ULBs (2019-20) and one ULB each (2020-21 & 2021-22).
- No action was taken by the SPCB against ULBs for not submitting their annual reports.

On this being pointed out, the regional offices of SPCB replied that the annual reports were not submitted timely by the ULBs, and regional office submitted Reports to SPCB after receiving it from ULBs. Further, letters will be issued to ULBs for timely submission of annual reports.

While accepting the facts Member Secretary, UKPCB stated (December 2023) that annual reports will be furnished to Central Pollution Control Board after receiving reports from all the ULBs. Instructions will be issued to all the ULBs for timely submission of Annual Report.

4.2 Complaint Redressal System

A complaint redressal system[4] creates a platform for citizens to voice their complaints and grievances regarding provision of Municipal Solid Waste Management services and also helps in promoting efficiency and transparency at the ULB level. The ULB, through an analysis of the complaints or grievances it receives, is able to identify lacunae and bridge gaps in service delivery. The time taken for resolution of grievances and the action taken are also monitored and recorded through this system. Multiple channels or a combination of different channels may be adopted for receiving complaints (phone calls to a centralised customer service or complaint number, SMS messages to notified mobile numbers, automated generated complaints sent to commissioners for their records, walk-in complaint registration, online complaint registration). The Sanitary Inspector & Supervisor were responsible for record maintenance & compliance and Municipal Commissioner /Executive Officer. Regional Officers Pollution Control Board were responsible for assessment of Complaint Redressal System for SWM.

Scrutiny of the records related to compliant redressal system revealed as under:

- Complaints registration records were maintained only in five out of 13 test checked ULBs.
- In these five ULBs, 78 to 91 *per cent* registered complaints were attended. In remaining nine to 22 *per cent* cases of complaints, the complaint's disposal comments were not mentioned in the Complaint registers.
- All six channels[5] were not being used to receive complaints from stakeholders

[4] Municipal Solid Waste Management Manual, 2016 - Part II, Para 6.4-.A complaint redressal system is an effective tool which facilitates effective complaint management and expedites the redressal process in a Transparent manner.

[5] In Nagar Nigam Dehradun five channels (CM portal, e-mail, by post, DM Office and Telephone/SMS), in Nagar Nigam Haridwar two channel (Telephone and DM Office), in Nagar Nigam Rudrapur three channels (Walk-in, CM portal and e-mail), in Nagar Palika Parishad Mussoorie two channels (Telephone, Walk-in), and in Nagar Nigam Haldwani two channels (telephone and CM portal) were adopted.

While accepting the facts the Additional Secretary stated that instructions will be issued to all the ULBs for maintaining the records. The State Government further replied (December 2023) that CM Helpline, CPCB's Single Use Plastic (SUP) Grievance Portal, Swachhata Portal under Swachh Bharat Mission were available for complaints related to Solid Waste Management. However, the fact remains that test checked ULBs were not using /adopted multiple channels or a combination of different channels for receiving complaints as per Manual.

4.3 Initiatives for promoting Public Awareness through Information, Education and Communication (IEC)

Rule 15 (zg) SWM Rules 2016 envisages creation of public awareness through information, education and communication campaign and education of waste generators on SWM practices and behaviours[6]. The responsibility of public awareness through IEC lies with Municipal Commissioner/Medical Health Officer, Executive Officer of the respective ULB.

All 13 tests checked ULBs conducted IEC activities, encouraging waste generators to 'segregate waste into wet and dry' and 'not to litter' by issue of bills, banners, stickers, wall paintings, etc.

The status of various modes of communication used in the test checked ULBs were as per the **Table-4.2** below.

Table-4.2: Modes of communication used in the test checked ULBs

Sl. No.	Modes of communication used	Number of ULBs	
		Yes	No
1.	Audio	13	0
2.	Video	04	09
3.	Mass communication	10	03
4.	Wall Paintings	11	02
5.	Schools	11	02
6.	Hoardings	11	02
7.	Pamphlets	11	02
8.	Other mode of communication (Nukkad Natak, Meetings, Banner etc)	12	01

Source: Information provided by the test checked ULBs.

The Additional Secretary stated in the Exit Conference (September 2023) that instructions will be issued to all the ULBs for regular and effective IEC activities in their ULBs. The State Government further replied (December 2023) that the IEC programmes prescribed by the Ministry of Housing and Urban Affairs, Government of India are being implemented at the ULB level. A mega cleanliness drive was organized

[6] Not to litter; minimise generation of waste; reuse the waste to the extent possible; practice segregation of waste into bio–degradable, non-biodegradable (recyclable and combustible), sanitary waste and domestic hazardous wastes at source; practice home composting, vermi-composting, bio-gas generation or community level composting; wrap securely used sanitary waste as and when generated in the pouches provided by the brand owners or a suitable wrapping as prescribed by the local body and place the same in the bin meant for non-biodegradable waste; storage of segregated waste at source in different bins; handover segregated waste to waste pickers, waste collectors, recyclers or waste collection agencies; and pay monthly user fee or charges to waste collectors or local bodies or any other person authorised by the local body for sustainability of solid waste management.

with the active participation of the High Court, Nainital between 12th to 18th June 2023.

Though tests checked ULBs were taking initiatives for promoting public awareness, however, the same was not so effective on the ground as mixed waste were being handed over to the waste pickers, monthly user fee or charges were not paid by the households on regular basis etc.

4.4 Deficiency in the post of Supervisory level resulted in weakness in monitoring and evaluation processes

Rule 15 of Solid Waste Management Rules 2016 envisages the duties and responsibilities of local authorities in relation to SWM activities. The Municipal Solid Waste Management Manual, 2016 describes that the Chief Executive of the ULBs (Municipal commissioner, Secretary, or Executive Officer) was responsible for implementing the MSWM plan. The head of the SWM department is responsible for monitoring and evaluation.

Scrutiny of the records revealed that there was zero to 100 *per cent* vacancies in supervisory cadres of SWM activities in test checked 13 ULBs, as detailed in **Table-4.3** below:

Table-4.3: Sanctioned strength & Men in Position of Supervisory level in test checked ULBs (As on March 2022)

Designation	Sanctioned Strength	Men-in-position	Vacant (in *per cent*)
Sahayak Nagar Ayukt (SNA)	06	06	0
Executive Officer	11	10	01 ***(09)***
Mukhya Nagar Swasthya Adhikari	02	02	0
Zonal Sanitary Officer	06	00	06 ***(100)***
Chief Sanitary Inspector/ Sanitary Inspector	46	17	29 ***(63)***
Environment Supervisor (Safai Nayak)	135	97	38 ***(28)***

Source: Information provided by the ULBs.

While, there was 100 *per cent* vacancy at the level of Zonal Sanitary Officer, 63 *per cent* in Chief Sanitary Inspector/Sanitary Inspector and 28 *per cent* in Environment Supervisor. Due to vacancy in supervisory level, effective implementation of Solid Waste Management in ULBs was lacking i.e. Waste Management Plans were not prepared, segregation at source was done partially and recovery of material etc. was partially done.

The State Government replied (December 2023) that the recruitment process is underway for 515 posts against a total of 816 vacancies in 102 bodies.

4.5 Recommendations

- ***The State Government should ensure frequent Information, Education & Communication activities and create awareness in public about the harmful effects of ineffective SWM management on health and environment;***

- ***The State Pollution Control Board needs to ensure that all concerned, involved in Solid Waste Management functioning, obtain necessary authorisation for their functioning and should enforce adherence to prescribed standards by reviewing implementation as per norms;***
- ***The State Government may scientifically assess workload of each ULB and accordingly sanction/deploy human resources.***

Dehradun
The 4 October 2024

(PRAVINDRA YADAV)
The Principal Accountant General (Audit),
Uttarakhand

Countersigned

New Delhi
The 7 October 2024

(GIRISH CHANDRA MURMU)
The Comptroller and Auditor General of India

Appendices

Appendix-1.1
(Reference: Paragraph-1.2, page 02)

Processing Technologies

- **Material Recovery Facility**

A material recovery facility (MRF) is a place where non-biodegradable or recyclable solid waste collected from the doorstep is segregated, sorted and various components of recyclable waste recovered from it for resale. The MRF accepts mixtures of waste fractions (non-biodegradable or recyclable) and its configuration depends on the several factors like the type, quantity and quality of incoming waste materials. Here the material is basically segregated into different streams of waste fractions (paper, plastic, packaging paper, bottles etc.) which is further sold to intermediaries who supply bulk material to the recycling industries. MRFs also require large storage spaces to temporary store sorted recyclables which can be made available to recyclers in bulk for improved resale value. Depending on the scale of operations and the level of mechanization in the facility, MRFs may be classified as manual or mechanized. Small scale units employ manual MRFs wherein manual sorting process is being carried and it's typically owned, operated and managed by the informal sector. Large scale units have mechanized MRFs with sophisticated systems and equipment that enable efficient separation of large quantity of material into different fractions.

Material Recovery Facility

Grinder Machine

Bailer Machine,

- **Composting**

After waste minimisation and recycling systems, the ISWM hierarchy indicates adoption of resource recovery strategies and composting as the third preferred waste management practise, ensuring that waste is processed appropriately to facilitate further

use of the material. Composting is a controlled aerobic process of biologically "digesting" the MSW, so it may be recycled for other purposes—plant nutrient, stabilization of soil in remediation process, or soil amendment for recovery of poor soils. Compost production can be carried out at the decentralised level (home composting, bin composting, box composting, vermicomposting, in vessel composting) or at a centralised level (windrow composting, in vessel composting, aerated static pile), depending on the feasibility of implementation. Both processes require significant pre-processing, and only segregated organic matter can be composted. Compost produced should meet with quality criteria specified by the Fertilizer Control Order (FCO), 2009 and 2013. A market for the compost should be ascertained before sizing the compost plants.

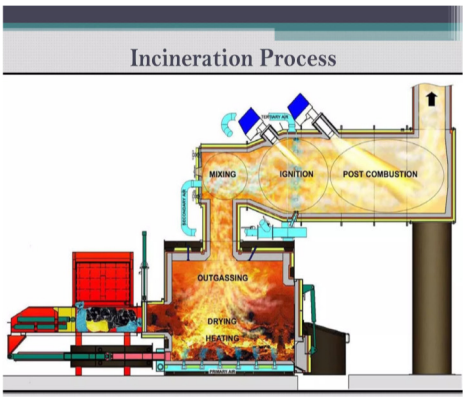
- **Waste to Energy**

Where material recovery and composting from MSW is not possible or desirable due to local conditions or because of the nature of waste, recovery of energy from MSW is

suggested as a feasible alternative. When high calorific value fractions of MSW are either incinerated (thermal process) or biodegradable fraction of MSW is processed anaerobically (biomethanation), the resultant energy, either as heat (incineration) or biogas (methane) can be reused either directly or converted to electricity using appropriate generators. Sale of this energy should result in the financial viability of waste to energy systems. Where the tariff of power is not high enough to ensure financial sustainability of the plant, a tipping fee may be considered by the ULB. Appropriate care should be taken to ensure continued and stable supply of the waste for achieving requisite economies of scale. Proper environmental checks should also be in place to meet with stringent norms for incineration.

- **Incineration**

Incineration is a waste treatment process that involves combustion of waste at very high temperatures in the presence of oxygen, resulting in the production of ash, flue gas, and heat. It is feasible for unprocessed or minimally processed refuse besides the segregated fraction of the high calorific waste. The potential for energy generation depends on the composition, density, moisture content, and presence of inert in the waste. About 65-80 *per cent* of the energy content of the organic matter can be recovered as heat energy, which can be utilized for thermal applications. Incineration is an option to be considered only after implementing suitable material recycling and recovery systems, or where other better options for



processing are not feasible and land availability is a problem. Typically, only cities which are able to supply at least 1,000 tonnes per day (TPD) of waste should venture to install waste-to-energy plants. However, incinerator plants have the potential to cause significant environmental impacts through emissions and fly ash if plants are not operated efficiently and if appropriate emission control measures are not adopted. Therefore, due care should be taken to comply with operating and emission standards as prescribed under revised SWM Rules, 2016 along with adoption of emission abatement technologies.

- **Biomethanation**

Biomethanation is the anaerobic (in the absence of air or, more specifically, free oxygen) digestion of biodegradable organic waste in an enclosed space under controlled conditions of temperature, moisture, pH, etc. It is considered one of the most technically viable option for the Indian MSW due to MSW's high organic and moisture content. Biomethanation plant requires a consistent source of degradable organic matter free from inert material as well as a sustainable demand for the generated biogas at appropriate economic conditions. biomethanation plant can be operated at decentralised level (up to 5 TPD) or centralised level depending on the feasibility of the implementation and waste inflow. The overall performance of the biomethanation plant is greatly influenced by the input feed specification, and the plant requires segregated biodegradable MSW (e.g., hotel and restaurant waste, market waste) for optimal plant performance. The homogeneity of the feed material is an important parameter from the efficiency viewpoint.

- **Refuse Derived Fuel**

Refuse-derived fuel (RDF) refers to the high calorific non-recyclable combustible fraction of processed MSW, which is used either as a fuel for steam and electricity

generation or as alternate fuel in industrial furnaces and boilers. The composition of RDF is a mixture that has higher concentrations of combustible materials than those present in the parent mixed MSW. RDF should preferably be co-processed in cement plants. Co-processing of RDF in steel industry and for power generation is also indicated, but yet to be proven in India. Internationally, the co-processing of RDF for power generation is technically proven and widely practised as a part of their waste management strategy; however, not much information is available for co-processing of RDF in steel sector.

Appendix-1.2

(Reference: Paragraph-1.5.2, page 07)

Details of allotment and expenditure in test checked ULBs

(₹ in crore)

Year	OB	Fund received from					Total available fund	Exp.	Closing Balance
		Central	State	Own	Others[1]	Total			
2017-18	52.54	56.19	247.81	78.12	0.25	382.37	434.91	298.15	136.76
2018-19	136.76	53.54	258.80	79.51	10.03	401.88	538.64	329.25	209.39
2019-20	209.39	89.32	247.28	95.16	9.32	441.08	650.47	334.59	315.88
2020-21	315.88	106.73	259.55	80.12	21.18	467.58	783.46	471.20	312.26
2021-22	312.26	48.92	267.61	85.29	30.50	432.32	744.58	528.04	216.54
Total		**354.70**	**1,281.05**	**418.20**	**71.28**	**2,125.23**		**1,961.23**	

Source: Information provided by the test checked ULBs.

[1] Chardham Yatra, Covid-19, Kavad Mela, Daiviye Aapda, Kumbh Mela, Swachh Bharat Mission, Special Assistance to States for Capital Investment etc.

Appendix-2.1
(Reference: Paragraph-2.1.2, page 13

Contingency Plan not prepared

Location	Size of the Land (in sq. meter)	Landowner	Mixed Waste dumped during 2017-18 to 2021-22 (MT)	Audit view
Ward no-03, Chandangrah, Dineshpur	300.00 sq. meter	Nagar Panchayat, Dineshpur	2,190 Ton-Approx	*The lenient view of the Panchayat not only resulted in dumping of the Municipal Solid Waste in open localities of the Panchayat jurisdiction but also causing threat to the environment. Panchayat which was responsible for maintaining environment standards in the area was itself damaging the environment by dumping the MSW in different open area of the Panchayat.*
Ramkot no-06, Barirai, Dineshpur	2,023.43 sq. meter or 0.5 acre	Raj Singh s/o shri Amar Singh	1. 352 Ton-Approx. (Hired for period December 2019 to March 2020) 2. 1,825 Ton-Approx. for the year 2020-21 (Hired for period March 2020 to February 2023)	
Gram- Ramkot No-06, Tehsil-Gadarpur	1,393.54 sq. meter or 15,000 sq. foot	Ritik s/o shri Ravindra	1,825 Ton- Approx. for the year 2021-22 (Hired for period February 2021 to February 2022)	
Gram- Anandkheda, Tehsil-Gadarpur	2,023.43 sq. meter or 0.5 acre	Ajit Singh s/o Chandan Singh	300 Ton- Approx Operated only for 02-months (Hired for period May 2022 to May 2023)	
Bura Nagar, Tehsil-Gadarpur, (Mahtosh Moad)	3,000 sq. meter or 0.30 hectare	Vijay Kumar Munjal	900 Ton- Approx. (Hired for period July 2022 to July 2023)	

Appendix-2.2
(Reference: Paragraph 2.5.5, page 18)

Status of project work in test checked ULBs

Name of the ULB	DPR prepared under scheme	Name of the Project to be established	Land owned or not	Status of the work
NPP Mussoorie	National Mission on Himalayan Studies	Biomethanation plant and Pyrolysis plant	Yes	Yet to be established, process is underway.
NPP Nainital	National Mission on Himalayan Studies	For collection, segregation and upcycling of solid waste (Processing plant)	Yes	Yet to be established, process is underway.
NN Haldwani	Jawaharlal Nehru National Urban Renewal Mission (JnNURM) (Cluster Based)	Establishment of processing plant, scientific landfill site.	Yes	The processing plant & scientific landfill site was not established yet. Tender yet to be finalised.
NPP Khatima	Swachh Bharat Mission	Compost plant & desegregation hall to be established	Not yet	Land yet to be occupied
NN Dehradun	Jawaharlal Nehru National Urban Renewal Mission	Processing plant & sanitary land fill site	Yes	Processing of waste done; RDF dumped at the site
NP Dineshpur	Swachh Bharat Mission	Centralised processing facility (establishment of desegregation hall)	Yes	No action initiated after demise of contractor's engaged for the work.
NN Rudrapur	Included in Haldwani cluster			
NN Haridwar	Jawaharlal Nehru National Urban Renewal Mission	Processing plant & sanitary land fill site	Yes	Processing plant running, RDF dumped at the SLF site.
NPP Swargshram Jonk	Swachh Bharat Mission (Cluster based)	Included in Rishikesh cluster		
NPP Barkot	Swachh Bharat Mission	MRF centre, compost pits, sanitary landfill	Yes	MRF centre, compost pits set up. Sanitary landfill yet to be set up.
NP Agustmuni	Swachh Bharat Mission	Processing plant, sanitary landfill site.	Not yet	Land yet to be occupied
NPP Tehri	Swachh Bharat Mission	Processing Plant, Sanitary Landfill site.	Yes	Project yet to start due to residents' agitation.
NP Naugaon	Swachh Bharat Mission	Processing plant, sanitary landfill site.	Yes	Agreement made for disposal facility including sanitary landfill

Source: Information provided by the ULBs.

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